An examination of pupils’ metacognitive ability in physical education

This item was submitted to Loughborough University’s Institutional Repository by the author.

Additional Information:


Metadata Record: https://dspace.lboro.ac.uk/2134/32917

Publisher: © Ian Timothy Luke

Rights: This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence. Full details of this licence are available at: https://creativecommons.org/licenses/by-nc-nd/4.0/

Please cite the published version.
An Examination of Pupils' Metacognitive Ability in Physical Education

by

Ian Timothy Luke

A Doctoral Thesis

Submitted in partial fulfilment of the requirements
for the award of
Doctor of Philosophy of Loughborough University

January, 1998

© by Ian Timothy Luke 1998
Abstract

The objectives of the present study were to examine the type and quality of metacognitive ability that pupils bring with them to Physical Education lessons, and the potential influences upon, and the effects of, pupils' metacognitive ability. In addition, there was an examination of whether pupils' metacognitive ability could be developed in Physical Education.

The research programme involved four stages and a total of six schools. Stage one to three involved validating classroom-based literature in Physical Education, the development of metacognitive ability assessment procedures and a pilot study. Stage four of the study (the main study) examined Year 7 and Year 9 pupils' metacognitive ability both before and after one of three possible intervention settings:

- a control setting,
- a self-questioning metacognitive strategy setting (Meta) or
- a self-questioning metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies setting (Meta+).

The main data-gathering tool in stage four was a specifically designed questionnaire, supported by semi-structured interviews and ethnographic data relevant to the schools, teachers, classes and lessons involved in the study.

From the pre-intervention data collected in the main study it would appear that pupils aged between eleven and fourteen struggle to develop efficient metacognitive ability and that they lack even the most fundamental necessities of effective learning such as understanding the purpose of a task. The pupils' metacognitive ability seemed to be influenced by a range of contextual and personal variables and there was an interacting relationship between their metacognitive ability and concepts such as volitional control, locus of control, motivational orientation and self-efficacy. The intervention treatment settings seemed more beneficial to the development of pupils' metacognitive ability compared to a control setting, although the influence of contextual and personal variables still had a significant bearing on this development.

Key Words Physical Education, metacognition, metacognitive ability, cognitive styles, cognitive strategies, intervention
Acknowledgements

I thank Dr. Colin Hardy for all his help, support and encouragement throughout the period of research. Even though Colin is a West Ham supporter he has been an excellent supervisor and a good friend. I also thank my family who have always been there for me both emotionally and financially. Most of all I thank Caroline for helping me realise that there is more to life than just research.
List of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Introduction</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1 Qualitative Analysis</td>
<td>5</td>
</tr>
<tr>
<td>1.1.2 Quantitative Analysis</td>
<td>7</td>
</tr>
<tr>
<td>1.2 Definitions of Key Terms</td>
<td>8</td>
</tr>
<tr>
<td>2.1 Review of Literature</td>
<td>11</td>
</tr>
<tr>
<td>2.1.1 Introduction</td>
<td>11</td>
</tr>
<tr>
<td>2.2 Metacognitive Ability Review of Literature</td>
<td>11</td>
</tr>
<tr>
<td>2.2.1 Definition</td>
<td>12</td>
</tr>
<tr>
<td>2.2.2 Metacognitive Knowledge</td>
<td>14</td>
</tr>
<tr>
<td>2.2.2.1 Task</td>
<td>14</td>
</tr>
<tr>
<td>2.2.2.2 Person</td>
<td>16</td>
</tr>
<tr>
<td>2.2.2.3 Strategy</td>
<td>17</td>
</tr>
<tr>
<td>2.2.2.4 Interaction</td>
<td>19</td>
</tr>
<tr>
<td>2.2.3 Metacognitive Strategies</td>
<td>19</td>
</tr>
<tr>
<td>2.2.4 Metacognitive Experiences</td>
<td>23</td>
</tr>
<tr>
<td>2.2.4.1 Introduction</td>
<td>23</td>
</tr>
<tr>
<td>2.2.4.2 Perspective</td>
<td>23</td>
</tr>
<tr>
<td>2.2.4.3 Nature</td>
<td>24</td>
</tr>
<tr>
<td>2.2.5 The Benefits of Metacognitive Ability</td>
<td>25</td>
</tr>
<tr>
<td>2.2.5.1 Appreciation of Context</td>
<td>25</td>
</tr>
<tr>
<td>2.2.5.2 Transfer</td>
<td>26</td>
</tr>
<tr>
<td>2.2.5.3 Motivation</td>
<td>27</td>
</tr>
<tr>
<td>2.2.5.4 Would Metacognitive Ability be Beneficial for Pupils of</td>
<td>28</td>
</tr>
<tr>
<td>Physical Education?</td>
<td></td>
</tr>
<tr>
<td>2.2.6 General Summary of Metacognitive Ability</td>
<td>30</td>
</tr>
</tbody>
</table>
2.3 Cognitive Style Review of Literature

2.3.1 Introduction
2.3.2 Definitions of Cognitive Style and Learning Style
2.3.3 Cognitive Style
2.3.3.1 The Focus on Cognitive Style
2.3.3.2 Types of Cognitive Style Dimensions
2.3.3.3 Effects of Cognitive Style Dimensions
2.3.3.4 Should Instruction Match or Mismatch Cognitive Style Combinations?
2.3.3.5 The Stability of Cognitive Style Combinations
2.3.3.6 Interacting Variables with Cognitive Style Combinations
2.3.3.6.01 Sociological:
2.3.3.6.02 Environmental:
2.3.3.6.03 Physiological:
2.3.3.6.04 Emotional:
2.3.3.6.05 Content:
2.3.3.6.06 Type of Tasks and Subject:
2.3.3.6.07 Pupil Ability:
2.3.3.6.08 Intelligence:
2.3.3.6.09 Age:
2.3.3.6.10 Hemisphericity:
2.3.3.6.11 Gender:
2.3.3.7 General Summary of Cognitive Style Dimensions

2.4 Cognitive Strategy Review of Literature

2.4.1 Introduction
2.4.2 Definition
2.4.3 The Style, Strategy and Tactic Connections
2.4.4 The Initiation and Control of Strategies
2.4.5 Interacting Variables with Strategy Development and Utilisation
2.4.5.1 Metacognitive Ability
2.4.5.1.1 Metacognitive Knowledge of Task Variables:
2.4.5.1.2 Metacognitive Knowledge of Person Variables:
2.4.5.1.3 Metacognitive Knowledge of Strategy Variables:
2.4.5.1.4 Metacognitive Strategies:
2.4.5.2 Pupils' Knowledge Base
2.4.5.3 Pupils' Personal Attributes
### 2.4.5.4 Contextual Variables

2.4.6 Why Should There be a Focus on Cognitive Strategies?

2.4.7 General Summary of Cognitive Strategies

3.1 Research Methods

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.1</td>
<td>Introduction</td>
<td>66</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Stage One: The Preliminary Study (Pre)</td>
<td>68</td>
</tr>
<tr>
<td>3.1.3</td>
<td>The Methods of Data Collection</td>
<td>70</td>
</tr>
<tr>
<td>3.1.3.1</td>
<td>Rationale for the Questionnaire</td>
<td>71</td>
</tr>
<tr>
<td>3.1.3.2</td>
<td>Rationale for the Semi-Structured Interview</td>
<td>72</td>
</tr>
<tr>
<td>3.1.3.3</td>
<td>Rationale for Utilising Basic Ethnographic Techniques</td>
<td>72</td>
</tr>
<tr>
<td>3.1.4</td>
<td>Stage Two: Questionnaire Pilot (QPil &amp; Pil)</td>
<td>74</td>
</tr>
<tr>
<td>3.1.4.1</td>
<td>Pupils' Metacognitive Knowledge and Metacognitive Strategies</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Metacognitive Knowledge of Task Variables:</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Metacognitive Knowledge of Person Variables:</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Metacognitive Knowledge of Strategy Variables:</td>
<td>80</td>
</tr>
<tr>
<td>3.1.4.2</td>
<td>Interacting Variables</td>
<td>81</td>
</tr>
<tr>
<td>3.1.4.3</td>
<td>Pupils' Understanding of the Activity Content</td>
<td>83</td>
</tr>
<tr>
<td>3.1.5</td>
<td>Stage Three: The Pilot Study (Pil)</td>
<td>84</td>
</tr>
<tr>
<td>3.1.5.1</td>
<td>Rationale for an Intervention Study</td>
<td>86</td>
</tr>
<tr>
<td>3.1.5.2</td>
<td>The Intended Main Study Intervention Approach</td>
<td>86</td>
</tr>
<tr>
<td>3.1.5.3</td>
<td>The Intended Main Study Intervention Classes</td>
<td>87</td>
</tr>
<tr>
<td>3.1.5.3.1</td>
<td>The Self-Questioning Metacognitive Strategy Class (Meta):</td>
<td>88</td>
</tr>
<tr>
<td>3.1.5.3.2</td>
<td>The Self-Questioning Metacognitive Strategy and the Metacognitive Knowledge of Person and Strategy Variables Class (Meta &amp; Meta Knowledge):</td>
<td>89</td>
</tr>
<tr>
<td>3.1.5.3.3</td>
<td>The Self-Questioning Metacognitive Strategy, the Metacognitive Knowledge of Person and Strategy Variables and the Cognitive Strategies Class (Meta+):</td>
<td>90</td>
</tr>
<tr>
<td>3.1.5.4</td>
<td>The Intended Research Procedures for the Main Study Intervention</td>
<td>91</td>
</tr>
<tr>
<td>3.1.5.4.1</td>
<td>Research Procedures Regarding Schools:</td>
<td>91</td>
</tr>
<tr>
<td>3.1.5.4.2</td>
<td>Research Procedures Regarding Teachers:</td>
<td>92</td>
</tr>
<tr>
<td>3.1.5.4.3</td>
<td>Research Procedures Regarding Classes:</td>
<td>94</td>
</tr>
</tbody>
</table>
3.1.5.4.4 Research Procedures Regarding Pupils: 94
3.1.5.4.5 Research Procedures Regarding Activity Areas: 95
3.1.5.5 The Intended Main Study Intervention Lesson 95
   3.1.5.5.1 The Standardised Lesson Structure: 96
      3.1.5.5.1.1 'Introduction and Explanation' 97
      3.1.5.5.1.2 'Teacher Modelling' 97
      3.1.5.5.1.3 'Discussions and Co-operative Learning' 99
      3.1.5.5.1.4 'Motivational Issues' 100
3.1.6 Stage Four: The Main Study 101
   3.1.6.1 The Adaptation and the Refinement of the Main Study Intervention 101
   3.1.6.2 The Main Study Intervention Classes 103
   3.1.6.3 The Research Procedures in the Study Intervention 103
      3.1.6.3.1 Research Procedures Regarding Schools: 103
      3.1.6.3.2 Research Procedures Regarding Teachers: 105
      3.1.6.3.3 Research Procedures Regarding Classes: 105
   3.1.6.4 The Main Study Intervention Lesson 107
      3.1.6.4.1 The Standardised Lesson Structure: 107
         3.1.6.4.1.1 'Introduction and Explanation' 107
         3.1.6.4.1.2 'Teacher Modelling' 108
         3.1.6.4.1.3 'Discussion and Co-operative Learning' 109
         3.1.6.4.1.4 'Motivational Issues' 109
   3.1.6.5 Additional Limitations and Information Regarding the Main Study Intervention 110
      3.1.6.5.1 The Main Study Intervention Classes: 110
      3.1.6.5.2 The Main Study Intervention Lessons: 111
   3.1.6.6 Additional Information Regarding the Wider Data Collection in the Main Study 111
      3.1.6.6.1 Development of the Semi-Structured Interview: 111
      3.1.6.6.2 The Development of the Basic Ethnographic Data: 113
4.1 Stage Four Data Analysis 118
   4.1.1 Introduction 118
   4.1.2 Content Analysis 119
      4.1.2.1 The Formation of Categories 119
      4.1.2.2 Content Analysis, General Areas, Themes and Categories 120
      4.1.2.3 Scaling of Categories 127
      4.1.2.4 Reliability of Categories 129
<table>
<thead>
<tr>
<th>List of Figures</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>Figure 2.01 The Metacognitive Ability Conceptual Framework</td>
<td>13</td>
</tr>
<tr>
<td>Figure 2.02 Diagrammatic impression of how wholists may view material containing six separable parts.</td>
<td>34</td>
</tr>
<tr>
<td>Figure 2.03 Diagrammatic impression of how analytics may view material containing six separable parts.</td>
<td>35</td>
</tr>
<tr>
<td>Figure 2.04 An Illustration of the Continuum from Cognitive Style Combinations to Task-Specific Tactics</td>
<td>54</td>
</tr>
<tr>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>Figure 3.01 The Self-Questioning Metacognitive Strategy</td>
<td>89</td>
</tr>
<tr>
<td>Chapter 4</td>
<td></td>
</tr>
<tr>
<td>Figure 4.01 The Reporting Structure for the Content Analysis and its Relationship to the Main Study Objectives (A1) to (A5) and (B1) to (B4).</td>
<td>133</td>
</tr>
</tbody>
</table>
List of Tables

Chapter 3

| Table 3.01: | The four developmental stages of the main study and the schools that were involved. | 67 |
| Table 3.02: | A summary of the preliminary study (Pre) design | 69 |
| Table 3.03: | A summary of the questionnaire pilot (QPil & Pil) design | 74 |
| Table 3.04: | A summary of the pilot study (Pil) design | 85 |
| Table 3.05: | A summary of the main study (MSt & MStQ) design | 101 |

Chapter 4

Pre-Intervention Data:

| Table 4.01: | The number of pupils in each quasi-experimental class who completed pre-intervention questionnaires and post-intervention questionnaires. | 134 |
| Table 4.01A: | Pupils suggesting that the purpose of the tasks was the development of specific physical skills. | 136 |
| Table 4.02A: | Pupils suggesting that the purpose of the task was the development of specific mental skills. | 138 |
| Table 4.03A: | Pupils suggesting that there were some specific intrinsic physical influences upon the task. | 140 |
| Table 4.04A: | Pupils suggesting that there were some specific extrinsic physical influences upon the task. | 142 |
| Table 4.05A: | Pupils suggesting that there were some specific intrinsic mental influences upon the task. | 144 |
| Table 4.06A: | Pupils suggesting that there were some specific extrinsic mental influences upon the task. | 146 |
| Table 4.07A: | Pupils suggesting that there was an adequate abundancy of information. | 147 |
| Table 4.08A: | Pupils suggesting a specific activity principle involved in the task was prioritised. | 149 |
| Table 4.09A: | Pupils suggesting that specific physical properties were required for the completion of the task. | 151 |
| Table 4.10A: | Pupils suggesting that specific mental properties were required for the completion of the task. | 153 |
Table 4.11A: Pupils suggesting that specific physical processes were required for the completion of the task.

Table 4.12A: Pupils suggesting that specific mental processes were required for the completion of the task.

Table 4.13A: Pupils suggesting that they had experienced either positive or negative feelings during the task.

Table 4.14A: Pupils suggesting that they had experienced positive feelings during the task.

Table 4.15A: Pupils suggesting specific physical properties as intra-individual variables.

Table 4.16A: Pupils suggesting specific mental properties as intra-individual variables.

Table 4.17A: Pupils suggesting some degree of awareness of their preferences in the wholist/analytic style dimension.

Table 4.18A: Pupils suggesting a wholist analytic preference in the wholist/analytic style dimension and suggesting some degree of awareness of that preference.

Table 4.19A: Pupils suggesting some degree of awareness of their preferences in the verbaliser/imager style dimension.

Table 4.20A: Pupils suggesting a verbaliser imager preference in the verbaliser/imager style dimension and suggesting some degree of awareness of that preference.

Table 4.21A: Pupils suggesting an awareness of inter-individual variables.

Table 4.22A: Pupils suggesting specific physical factors as inter-individual variables.

Table 4.23A: Pupils suggesting specific mental factors as inter-individual variables.

Table 4.24A: Pupils suggesting that there had been adequate information for them personally to understand the task.

Table 4.25A: Pupils suggesting that they desired some specific additional information.

Table 4.26A: Pupils suggesting that they had considered specific physical factors during the task.

Table 4.27A: Pupils suggesting that they had utilised general mental techniques during the task.

Table 4.28A: Pupils suggesting that they had utilised specific mental techniques during the task.

Table 4.29A: Pupils suggesting that they had made a specific cognitive conscious decision to consider their strategic action.
Table 4.30A: Pupils suggesting that they had considered their strategic action due to practical and physical occurrences. 188
Table 4.31A: Pupils suggesting that they had automatically or unconsciously considered their strategic action. 190
Table 4.32A: Pupils suggesting a good awareness that their strategic action could transfer to a wide variety of tasks. 191
Table 4.33A: Pupils suggesting that they had changed or had not changed their strategic action as a response to what they needed or wanted to do. 193
Table 4.34A: Pupils suggesting that they had experienced either positive or negative feelings during their strategic action and the task. 195
Table 4.35A: Pupils suggesting that they had experienced positive feelings during their strategic action and the task. 196
Table 4.36A: Pupils suggesting that they had some degree of volitional control. 198
Table 4.37A: Pupils suggesting that a purpose of Physical Education is the development of specific mental skills. 200
Table 4.38A: Pupils suggesting that they had a strong task-oriented motivation. 202
Table 4.39A: Pupils suggesting that they had an intrinsic locus of control. 203
Table 4.40A: Pupils suggesting that they strongly perceived themselves to have good mental abilities for Physical Education. 205
Table 4.41A: Pupils suggesting that they perceived themselves to have had the necessary abilities to complete the tasks. 207
Table 4.42A: Pupils suggesting that they perceived their abilities to be useful in most aspects of Physical Education. 209
Table 4.43A: Pupils suggesting that they viewed themselves positively. 211
Table 4.44A: Pupils suggesting that there had been elements of a strong task-oriented motivational climate during the lesson. 213
Table 4.45A: Apple Year 7 pupils' references regarding the purpose of the task. 216
Table 4.46A: Apple Year 7 pupils' references regarding the influences upon the task. 217
Table 4.47A: Apple Year 7 pupils' references regarding the abundancy of information. 219
Table 4.48A: Apple Year 7 pupils' references regarding the prioritisation of information. 220
Table 4.49A: Apple Year 7 pupils' references regarding the demands of the task. 222
Table 4.50A: Apple Year 7 pupils' references regarding their feelings during the task.

Table 4.51A: Apple Year 7 pupils' references regarding intra-individual variables.

Table 4.52A: Apple Year 7 pupils' references regarding the wholist/analytic style dimension.

Table 4.53A: Apple Year 7 pupils' references regarding the verbaliser/imager style dimension.

Table 4.54A: Apple Year 7 pupils' references regarding their awareness of inter-individual variables.

Table 4.55A: Apple Year 7 pupils' references regarding the types of inter-individual variables.

Table 4.56A: Apple Year 7 pupils' references regarding the universals of cognition.

Table 4.57A: Apple Year 7 pupils' references regarding what strategies or strategic thoughts were utilised.

Table 4.58A: Apple Year 7 pupils' references regarding why they considered utilising certain strategies or strategic thoughts.

Table 4.59A: Apple Year 7 pupils' references regarding when certain strategies or strategic thoughts would be useful.

Table 4.60A: Apple Year 7 pupils' references regarding their monitoring of their strategic action and the task.

Table 4.61A: Apple Year 7 pupils' references regarding their feelings during their strategic action and the task.

Table 4.62A: Apple Year 7 pupils' references regarding their volitional control.

Table 4.63A: Apple Year 7 pupils' references regarding their perceptions of the purpose of Physical Education.

Table 4.64A: Apple Year 7 pupils' references regarding their motivational orientation.

Table 4.65A: Apple Year 7 pupils' references regarding their perceptions of the locus of control.

Table 4.66A: Apple Year 7 pupils' references regarding their self-efficacy.

Table 4.67A: Apple Year 7 pupils' references regarding the strength of their self-efficacy.

Table 4.68A: Apple Year 7 pupils' references regarding the generality of their self-efficacy.

Table 4.69A: Apple Year 7 pupils' references regarding their general self-worth.
Table 4.70A: Apple Year 7 pupils’ references regarding their perceptions of the motivational climate during the lesson.

Post-Intervention Data:

Table 4.01B: Pupils suggesting that the purpose of the task was the development of specific physical skills.

Table 4.02B: Pupils suggesting that the purpose of the task was the development of specific mental skills.

Table 4.03B: Pupils suggesting that there were some specific intrinsic physical influences upon the task.

Table 4.04B: Pupils suggesting that there were some specific extrinsic physical influences upon the task.

Table 4.05B: Pupils suggesting that there were some specific intrinsic mental influences upon the task.

Table 4.06B: Pupils suggesting that there were some specific extrinsic mental influences upon the task.

Table 4.07B: Pupils suggesting that there was an adequate abundancy of information.

Table 4.08B: Pupils suggesting a specific activity principle involved in the task was prioritised.

Table 4.09B: Pupils suggesting that specific physical properties were required for the completion of the task.

Table 4.10B: Pupils suggesting that specific mental properties were required for the completion of the task.

Table 4.11B: Pupils suggesting that specific physical processes were required for the completion of the task.

Table 4.12B: Pupils suggesting that specific mental processes were required for the completion of the task.

Table 4.13B: Pupils suggesting that they had experienced either positive or negative feelings during the task.

Table 4.14B: Pupils suggesting that they had experienced positive feelings during the task.

Table 4.15B: Pupils suggesting specific physical properties as intra-individual variables.

Table 4.16B: Pupils suggesting specific mental properties as intra-individual variables.

Table 4.17B: Pupils suggesting some degree of awareness of their preferences in the wholist/analytic style dimension.
Table 4.18B: Pupils suggesting a wholist analytic preference in the wholist/analytic style dimension and suggesting some degree of awareness of that preference.

Table 4.19B: Pupils suggesting some degree of awareness of their preferences in the verbaliser/imager style dimension.

Table 4.20B: Pupils suggesting a verbaliser imager preference in the verbaliser/imager style dimension and suggesting some degree of awareness of that preference.

Table 4.21B: Pupils suggesting an awareness of inter-individual variables.

Table 4.22B: Pupils suggesting specific physical factors as inter-individual variables.

Table 4.23B: Pupils suggesting specific mental factors as inter-individual variables.

Table 4.24B: Pupils suggesting that there had been adequate information for them personally to understand the task.

Table 4.25B: Pupils suggesting that they desired some specific additional information.

Table 4.26B: Pupils suggesting that they had considered specific physical factors during the task.

Table 4.27B: Pupils suggesting that they had utilised general mental techniques during the task.

Table 4.28B: Pupils suggesting that they had utilised specific mental techniques during the task.

Table 4.29B: Pupils suggesting that they had made a specific cognitive conscious decision to consider their strategic action.

Table 4.30B: Pupils suggesting that they had considered their strategic action due to practical and physical occurrences.

Table 4.31B: Pupils suggesting that they had automatically or unconsciously considered their strategic action.

Table 4.32B: Pupils suggesting a good awareness that their strategic action could transfer to a wide variety of tasks.

Table 4.33B: Pupils suggesting that they had changed or had not changed their strategic action as a response to what they needed or wanted to do.

Table 4.34B: Pupils suggesting that they had experienced either positive or negative feelings during their strategic action and the task.

Table 4.35B: Pupils suggesting that they had experienced positive feelings during their strategic action and the task.
Table 4.36B: Pupils suggesting that they had some degree of volitional control.

Table 4.37B: Pupils suggesting that a purpose of Physical Education is the development of specific mental skills.

Table 4.38B: Pupils suggesting that they had a strong task-oriented motivation.

Table 4.39B: Pupils suggesting that they had an intrinsic locus of control.

Table 4.40B: Pupils suggesting that they strongly perceived themselves to have good mental abilities for Physical Education.

Table 4.41B: Pupils suggesting that they perceived themselves to have had the necessary abilities to complete the tasks.

Table 4.42B: Pupils suggesting that they perceived their abilities to be useful in most aspects of Physical Education.

Table 4.43B: Pupils suggesting that they viewed themselves positively.

Table 4.44B: Pupils suggesting that there had been elements of a strong task-oriented motivational climate during the lesson.

Table 4.45B: Apple Year 7 pupils' references regarding the purpose of the task.

Table 4.46B: Apple Year 7 pupils' references regarding the influences upon the task.

Table 4.47B: Apple Year 7 pupils' references regarding the abundancy of information.

Table 4.48B: Apple Year 7 pupils' references regarding the prioritisation of information.

Table 4.49B: Apple Year 7 pupils' references regarding the demands of the task.

Table 4.50B: Apple Year 7 pupils' references regarding their feelings during the task.

Table 4.51B: Apple Year 7 pupils' references regarding intra-individual variables.

Table 4.52B: Apple Year 7 pupils' references regarding the wholist/analytic style dimension.

Table 4.53B: Apple Year 7 pupils' references regarding the verbaliser/imager style dimension.

Table 4.54B: Apple Year 7 pupils' references regarding their awareness of inter-individual variables.

Table 4.55B: Apple Year 7 pupils' references regarding the types of inter-individual variables.
Table 4.56B: Apple Year 7 pupils' references regarding the universals of cognition.

Table 4.57B: Apple Year 7 pupils' references regarding what strategies or strategic thoughts were utilised.

Table 4.58: Apple Year 7 pupils' references regarding why they considered utilising certain strategies or strategic thoughts.

Table 4.59B: Apple Year 7 pupils' references regarding when certain strategies or strategic thoughts would be useful.

Table 4.60B: Apple Year 7 pupils' references regarding their monitoring of their strategic action and the task.

Table 4.61B: Apple Year 7 pupils' references regarding their feelings during their strategic action and the task.

Table 4.62B: Apple Year 7 pupils' references regarding their volitional control.

Table 4.63B: Apple Year 7 pupils' references regarding their perceptions of the purpose of Physical Education.

Table 4.64B: Apple Year 7 pupils' references regarding their motivational orientation.

Table 4.65B: Apple Year 7 pupils' references regarding their perceptions of the locus of control.

Table 4.66B: Apple Year 7 pupils' references regarding their self-efficacy.

Table 4.67B: Apple Year 7 pupils' references regarding the strength of their self-efficacy.

Table 4.68B: Apple Year 7 pupils' references regarding the generality of their self-efficacy.

Table 4.69B: Apple Year 7 pupils' references regarding their general self-worth.

Table 4.70B: Apple Year 7 pupils' references regarding their perceptions of the motivational climate during the lesson.

Statistical Data:

Table 4.02 Kruskal-Wallis Statistical Analysis Regarding School 5 (MSt) 'Apple' Year 7 Pupils' Content Knowledge Scores

Table 4.03 Kruskal-Wallis Statistical Analysis Regarding School 6 (MSt) 'Yard' Year 7 Pupils' Content Knowledge Scores

Table 4.04 Kruskal-Wallis Statistical Analysis Regarding School 3 (MStQ) Year 7 Pupils' Content Knowledge Scores
Table 4.05  Kruskal-Wallis Statistical Analysis Regarding School 5 (MSt) 'Apple' Year 9 Pupils' Content Knowledge Scores 393

Table 4.06  Kruskal-Wallis Statistical Analysis Regarding School 3 (MStQ) Year 9 Pupils' Content Knowledge Scores 394

Appendices

Table Ap.01: School 5 (MSt) 'Apple' Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis 682
Table Ap.02: School 6 (MSt) 'Yard' Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis 683
Table Ap.03: School 3 (MStQ) Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis 684
Table Ap.04: School 5 (MSt) 'Apple' Year 9 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis 685
Table Ap.05: School 3 (MStQ) Year 9 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis 686
## List of Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix 1:</td>
<td>Stage One: The Preliminary Study</td>
<td>527</td>
</tr>
<tr>
<td>Appendix 2:</td>
<td>Teacher Guidelines for the Completion of the Questionnaires</td>
<td>543</td>
</tr>
<tr>
<td>Appendix 3:</td>
<td>An Example Questionnaire</td>
<td>545</td>
</tr>
<tr>
<td>Appendix 4:</td>
<td>Interacting Variables with Pupils' Metacognitive Ability</td>
<td>575</td>
</tr>
<tr>
<td>Appendix 5:</td>
<td>The Metacognitive Strategy</td>
<td>582</td>
</tr>
<tr>
<td>Appendix 6:</td>
<td>The Rationale Behind the Specific Cognitive Strategies and the Selected Specific Cognitive Tactics for Each Lesson</td>
<td>583</td>
</tr>
<tr>
<td>Appendix 7:</td>
<td>Deprivation Indicators utilised in the Department of the Environment's Index of Local Conditions</td>
<td>591</td>
</tr>
<tr>
<td>Appendix 8:</td>
<td>The Teacher Modelling Processes</td>
<td>593</td>
</tr>
<tr>
<td>Appendix 9:</td>
<td>An Example Lesson Plan Used During the Main Study Intervention</td>
<td>595</td>
</tr>
<tr>
<td>Appendix 10:</td>
<td>List of Requirements for Main Study (MSt &amp; MStQ) Schools</td>
<td>600</td>
</tr>
<tr>
<td>Appendix 11:</td>
<td>A Transcription of an Interview from the Main Study Intervention</td>
<td>602</td>
</tr>
<tr>
<td>Appendix 12:</td>
<td>A Questionnaire Summary from the Main Study Database</td>
<td>612</td>
</tr>
<tr>
<td>Appendix 13:</td>
<td>The Basic Ethnographic Data Collected during the Main Study</td>
<td>614</td>
</tr>
<tr>
<td>Appendix 14:</td>
<td>The Content Analysis Categories of Pupils' Responses to the Metacognitive Ability Questionnaire (Pre- and Post- Intervention Questionnaires)</td>
<td>649</td>
</tr>
<tr>
<td>Appendix 15:</td>
<td>The Ideal Categories and Category Scales Utilised in the Overall Focus of the Content Analysis</td>
<td>673</td>
</tr>
<tr>
<td>Appendix 16:</td>
<td>Content Knowledge Data Sets Utilised for Non-Parametric Kruskal-Wallis Statistical Analysis</td>
<td>682</td>
</tr>
<tr>
<td>Appendix 17:</td>
<td>Preliminary Study: Foundation Lesson Questions</td>
<td>687</td>
</tr>
</tbody>
</table>
Chapter One

Introduction
1.1 Introduction

The term 'differentiation' became synonymous with individuality during the author's teacher training year. The DES document (1992) Physical Education in the National Curriculum emphasised the need to plan for differentiation through tasks or outcome, so, for example, if a pupil struggled with rolling and stopping a small ball then a large ball could be used to reduce the difficulty of the task. However, in practice, differentiation was much more difficult to achieve; what criteria do you follow for changing tasks or outcome? Then there were teaching styles and teaching approaches that had to be considered in order to achieve specified learning outcomes (Mosston & Ashworth, 1990). Yet, teaching styles also seem problematic as there is not a direct link between teaching and learning outcomes and, with respect to Physical Education, Lee & Solmon (1992) have argued that such an assumption has failed to make a substantive contribution to the understanding of the complex processes involved in pupils' learning. It is important to remember that teaching only influences pupils' thinking, and it is the pupils' thinking that mediates learning and achievement (Peterson, 1988; Wittrock, 1986). Therefore, while it is accepted that teachers must consider differentiation and utilise a variety of teaching styles and approaches within lessons and units of work, it is suggested that teachers' decisions and actions should be influenced by the pupils' learning processes. Without considering how each pupil learns it is difficult to justify actions that aim to differentiate between pupils and to justify the selection of one teaching approach over another.

Although the learner has been acknowledged as an influence upon the selection of a teaching strategy within Physical Education (Siedentop, 1991; Williams, 1993), research concerning the learner and the learning processes is in its infancy (Mawer, 1995). It should be acknowledged that pupils come to lessons with notions about the subject matter, perceptions of their own competence, prior knowledge, previous experiences (Lee & Solmon, 1992) and often unconscious learning preferences concerning environmental, sociological, emotional, physiological and cognitive factors (Dunn & Dunn, 1978; Riding and Cheema, 1991). Therefore, the pupil and the learning processes, as well as the teacher and the teaching processes, are going to affect the quantity, quality and type of learning that occurs (Weinstein & Mayer, 1986).

A key concern when considering a cognitive focus in Physical Education research is that the physical and practical influences on learning may be ignored. Yet, as Lee & Solmon (1992: p67) stated, "...students play an active role in their own motor skill learning through their cognitive processes", and examining cognitive conceptions
potentially offers a clearer understanding of the teaching and learning of motor skills (Lee & Solmon, 1992; Schwager & Labate, 1993). By taking a cognitive focus to learning, it is argued that learning could be viewed as a strategic process. However, most pupils define learning as something being provided for them by the teacher and an activity in which they themselves were on the receiving end (Quicke & Winter, 1994). Norman (1980: p97) highlighted a reason for this problem, stating, "It is strange that we expect students to learn yet seldom teach them about learning." Hence, McCombs (1988: p154) argued the need for, "interventions that help students change inappropriate cognitively mediated processes and belief systems in order to more directly influence their environment and positively adapt themselves to changing instructional settings."

Brown (1994) noted that one of the most interesting things about human learning is that individuals have knowledge and feelings about it and sometimes even control of it. Researchers have referred to this as 'metacognition', or the knowledge an individual has concerning their own cognitive processes and products, or anything related to them (Flavell, 1976). However, pupils often lack the necessary metacognitive knowledge for efficient learning, and they lack the ability to monitor, evaluate and regulate their learning processes. It is reported that by having efficient metacognitive ability pupils are able to learn material faster, understand it better and retain it longer (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989). Furthermore, the development of metacognitive ability appears to increase pupils' control and responsibility over their own learning processes (Nisbet & Shucksmith, 1986) and, therefore, potentially enhances desired forms of volitional control, mastery goal-oriented motivation, locus of control, self-efficacy and self-esteem. From research, there is evidence to suggest that a self-questioning metacognitive strategy has been successful in encouraging the development of such metacognitive ability during classroom subjects (King, 1991; Seifert & Wheeler, 1994), but this has not been examined in the Physical Education context.

Importantly, having and utilising knowledge of your own cognitive processes could be affected by unconscious preferences. As Brown (1994: p6) stated, "...even though people are excellent all-purpose learning machines, equipped to learn just about anything..., humans come predisposed to learn certain things more readily than others." Such 'predispositions' have often been studied under the heading of 'cognitive style' or 'learning style'. The implication of cognitive style and learning style research is that each individual has stable preferences in how they learn and will, therefore, consistently tend towards these preferences in most learning situations. Hence, cognitive and learning styles may dictate pupils' natural choice of strategy for a given
situation, whether or not it is appropriate or efficient. McKeachie (1988: p5) stated, "seldom is any explicit attention given to helping students become aware that they have a choice of types of learning strategies that may be employed." In addition, as cognitive strategies appear amenable to change through intervention, "an educational problem is how to help students, within the limits imposed by their styles, to adopt flexible strategies" (Ramsden, 1988: p176). Therefore, while the use of a self-questioning metacognitive strategy may help in the development of metacognitive ability, it may be also necessary to develop the repertoire of specific cognitive strategies of pupils, so they may be able to develop or select appropriate tactics in specific contexts rather than having the tactics being pre-selected by cognitive style tendencies.

Thus, it appeared that pupils' metacognitive ability had to be assessed in a consideration of their learning processes. There also seemed a need to consider enhancing pupils' metacognitive ability including, possibly, their repertoire of cognitive strategies to develop their learning efficiency.

As such, the author's overall research objective had two phases:

(1) To investigate the type and quality of metacognitive ability that pupils bring with them to Physical Education lessons, and the potential influences upon, and the effects of, metacognitive ability.

(2) To investigate whether pupils' metacognitive ability could be developed in Physical Education, and the potential effects of any development in metacognitive ability upon learning.

In any attempt to study metacognitive ability, a researcher is undertaking some form of cognitive assessment and, as Cavanaugh & Perlmutter (1982) suggested, there is no single technique that can provide a means of entry to the child's mind; "one cannot observe thought directly" (Clark, 1995: p118). Therefore, a number of techniques must be used together to provide 'converging measures of the variable of interest' (Cavanaugh & Perlmutter, 1982). Furthermore, it appears beneficial if these 'converging measures' include both qualitative and quantitative data (Siegler, 1989a). Thus, corroboration between techniques was considered necessary in order to strengthen the internal validity of the data. Cohen & Manion (1989) referred to the process whereby two or more methods of data collection are used, often both qualitative and quantitative, as triangulation, and they suggested that such an
approach explained more fully the complexity of human behaviour and overcame the problem of 'method-boundness'.

With respect to the present study, qualitative analysis was to be undertaken to investigate pupils' metacognitive ability both before an intervention that aimed to develop pupils' metacognitive ability (Objectives A1 to A5) and also after such an intervention (Objectives B1 to B5). Although quantitative analysis was to be utilised to investigate the interaction between the development of metacognitive ability and pupils' content knowledge (Objective C), it was deemed necessary to concentrate upon the qualitative data as efficient learning and greater understanding may be only highlighted in more qualitative data and will not always be reflected in higher grades (Watkins, 1982).

1.1.1 Qualitative Analysis

Qualitative data would not only be collected utilising questionnaires to allow a content analysis of pupils' metacognitive ability, but also by interviews to validate the questionnaires, and by utilising basic ethnographic techniques during the study of the schools, departments, teachers and classes. Therefore, the objectives of the research were;

(Obj.A) to study the metacognitive ability of pupils, within and between intact classes, within and between Year 7 and Year 9, and within and between two schools, within a unit of work.

and,

(Obj.A1) If differences were found to exist between pupils of the same class, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.A2) If differences were found to exist between classes of the same Year and school, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.A3) If differences were found to exist between Year 7 and Year 9 classes in the same school, to attempt to identify the factors that appeared to contribute to the observed differences.
(Obj.A4) If differences were found to exist between Year 7 classes from different schools, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.A5) If differences were found to exist between Year 9 classes from different schools, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.B) to study pupils' development of metacognitive ability, within and between intact classes, within and between Year 7 and Year 9, and within and between two schools, after treatments to develop metacognitive ability during a unit of work.

and,

(Obj.B1) If differences were found to exist between pupils of the same class, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.B2) If differences were found to exist between classes of the same Year and school, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.B3) If differences were found to exist between Year 7 and Year 9 classes in the same school, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.B4) If differences were found to exist between Year 7 classes from different schools, to attempt to identify the factors that appeared to contribute to the observed differences.

(Obj.B5) If differences were found to exist between Year 9 classes from different schools, to attempt to identify the factors that appeared to contribute to the observed differences.
1.1.2 Quantitative Analysis

It is suggested that efficient metacognitive ability may enhance pupils' content knowledge (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989). As such, the quantitative objective of the research was;

(Obj.C) to examine the interaction between the metacognitive ability and the content knowledge of pupils within intact classes, within Year 7 and Year 9, and within three schools, after treatments to develop metacognitive ability during a unit of work.
1.2 Definitions of Key Terms

Learning Style

An individual's consistent and characteristic cognitive, sociological, environmental, physiological and emotional preferences during learning (Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995).

Cognitive Style

The most significant preference of learning style, and is defined as an individual's consistent preferences in processing and representing information (Riding & Cheema, 1991; Tennant, 1988).

Metacognitive Knowledge

The knowledge that individuals have concerning their cognitive processes and products, or anything related to them (Flavell, 1976). It is suggested that there are three major categories of metacognitive knowledge; task, person and strategy categories (Flavell, 1979).

Metacognitive Strategies

Metacognitive strategies refer to an individual's awareness, monitoring and evaluation of a learning situation and, as such, they are closely connected with an individual's metacognitive knowledge.

Metacognitive Experiences

Metacognitive experiences are any conscious, cognitive or affective experiences during a learning task (Flavell, 1979). Therefore, metacognitive experiences occur when metacognitive knowledge and/or metacognitive strategies become conscious.

Metacognitive Ability

The utilisation, be it conscious or unconscious, of metacognitive knowledge and metacognitive strategies for a given task (Figure 2.01).
Cognitive Strategies

Goal-directed cognitive activities, be they obligatory or non-obligatory, conscious or unconscious, efficient or inefficient (Crowley & Siegler, 1993). Cognitive strategies may be viewed as a continuum from generality to specificity, from cognitive style and the most generalised of cognitive strategies to the most task-specific cognitive tactics (Derry & Murphy, 1986; Nisbet & Shucksmith, 1986).

Cognitive Tactic

A specific cognitive strategy that has been appropriately adapted for a specific task and context.
Chapter Two

Review of Literature
2.1 Review of Literature

2.1.1 Introduction

Learning should be viewed as an active, strategic process (Luke & Hardy, 1996), implying that "learning is not something that happens to students; it is something that happens by students" (Zimmerman & Schunk, 1989: p22). As a result, effective educational decisions and practices can only emanate from an understanding of the ways that pupils learn (Guild, 1994). With this in mind, Nisbet & Shucksmith (1986) argued that metacognition may be the pivot or key to the learning processes, and it has been noted that guidance in the development of metacognitive ability appeared beneficial to pupils in educational settings to facilitate attention, motivation, learning, memory, and comprehension (Wittrock, 1986). As such, a review of literature of metacognitive ability is offered. However, encompassed within the main concept of metacognitive ability appears to be the concepts of cognitive style and cognitive strategies. Thus, it was also deemed necessary to offer a review of literature regarding these two concepts.

2.2 Metacognitive Ability Review of Literature

Literature appeared to lack clarity in the definition of the concept metacognition. Terms such as metacognition, metacognitive knowledge, metacognitive strategies and metacognitive experiences were frequently interchanged. Metacognition is rather a generic and vague term overseeing all concepts deemed to be metacognitive. However, metacognitive knowledge, metacognitive strategies and metacognitive experiences are specific and distinct concepts and, while it is acknowledged that they all interact, literature has often failed to clarify the connections and interactions between them. Therefore, the author developed the main concept of metacognitive ability and developed a conceptual framework around this main concept which clarified the connections and interactions involved between pupils' metacognitive knowledge, metacognitive strategies and metacognitive experiences. Moreover, the metacognitive ability conceptual framework appeared to clarify the connections and interactions between concepts involved in pupils' learning.
2.2.1 Definition

Metacognition refers to the knowledge and control one has of one's cognitive functioning, that is, what one knows about one's cognitive performance and how one regulates one's cognitive actions during performance (Flavell, 1979; Garafalo, 1987). The two key referents in this definition, the knowledge about the cognitive system and its contents and the effective control and regulation of that system (Campione, 1987), are structured within two sections of metacognition, metacognitive knowledge and metacognitive strategies (Flavell, 1979). Pupils who have developed the necessary levels of metacognitive knowledge and have developed efficient metacognitive strategies, and utilise this information for specific learning tasks are claimed to have efficient metacognitive ability in those tasks. From Figure 2.01 it can be recognised that the utilisation of metacognitive knowledge and metacognitive strategies underpins metacognitive ability. Pupils' metacognitive knowledge and metacognitive strategies interact strongly with each other and may be either conscious or unconscious. If this metacognitive knowledge and metacognitive strategy combination is made conscious, either from deliberate consideration of it or due to a triggering event in the environment, the pupils are believed to undergo metacognitive experiences which may be either cognitive or affective in nature. However, whether the metacognitive knowledge and metacognitive strategy combination is conscious or unconscious, unless pupils efficiently utilise this information they will lack, and fail to develop, efficient metacognitive ability.

To clarify the concept of metacognitive ability, each component involved in it, metacognitive knowledge, metacognitive strategies and metacognitive experiences, will be discussed separately while making reference to the metacognitive ability conceptual framework (Figure 2.01).
Figure 2.01 The Metacognitive Ability Conceptual Framework

**Metacognitive Knowledge**
- **Task:** purpose, desired outcomes, organisation, context
- **Person:** intra-individual & inter-individual variables (inc. cognitive style), universals of cognition (inc. metacomprehension)
- **Strategy:** what?, why?, when?

**Metacognitive Strategies**
- Awareness
- Monitoring
- Evaluation

**Metacognitive Ability**

Unconscious
- Deliberate or Triggered

Unutilised

Utilised
2.2.2 Metacognitive Knowledge

Metacognitive knowledge consists of the knowledge and beliefs about the factors which interact to affect the course of cognitive outcomes. Flavell (1979) suggested three major categories; 'task', 'person' and 'strategy', and Flavell and Wellman (1977) also included a further category which they referred to as 'interactions'. The importance of such knowledge was emphasised when it was "found that students' general metacognitive knowledge for classroom learning was significantly related to students' achievement" (Peterson, 1988: p8). Each of the four categories, 'task', 'person', 'strategy' and 'interactions' will be discussed separately.

2.2.2.1 Task

Knowledge of 'task' variables includes knowledge concerning the information available to you during a cognitive activity, such as the desired outcomes of a task (Weinstein, 1988), information concerning the context in which the task is taking place (Ramsden, 1988), the abundancy and the organisation of information (Brown, 1984), and information concerning the demands of the activity (Weinstein, 1988). Nisbet & Shucksmith (1986) have suggested that pupils frequently lack metacognitive knowledge of task variables and the knowledge that they do have is far from reliable. Weinstein (1994: p258) stated, "It is impossible to know if you have reached a goal if you are not clear about the nature of the goal." Often, learners do not understand the nature of the numerous tasks that they face, and they can fail to understand procedural aspects of common tasks such as how to select out the important ideas and information in a text book. From a Physical Education perspective, during the author's preliminary study (Pre) which included over fifty interviews, pupils were asked to consider the purpose of various tasks. In a response to why the class were playing 'Stick in the Mud', which was meant to be a simple, run-around warm-up activity, a Year 7 girl explained how the teacher was investigating how sexist the class were. She suggested that if a pupil would not free anyone of the opposite gender then the teacher would assume that they were sexist. These thoughts were obviously going to affect how the young girl played the game and they could have meant that she had failed to achieve the real target of the activity which was to warm-up. Therefore, if the teacher does not make any reference to the purpose of the activity and/or the pupil lacks the necessary development of 'task' metacognitive knowledge, it is less likely that efficient learning will ever occur. As Singer & Chen (1994) noted, only when pupils learn how to analyse task conditions will they show an adequate insight into learning efficiently.
Marton (1988) noted that pupils sometimes struggle in differentiating between superordinate and subordinate characteristics of a text. Pupils can often be influenced by the presentation of material or by class organisation, rather than being influenced by events related to specific variables which are being focused upon by the teacher (Edwards & Mercer, 1987: cited in Claydon, Desforges, Mills & Rawson, 1994; Eylon & Linn, 1988). Chemistry pupils often failed to differentiate between the behaviour of single molecules and the interactions of many molecules in trying to explain chemical processes due to textbooks repeatedly showing pictures of single molecules (Eylon & Linn, 1988). A class of ten year old pupils stated that the pendulum experiment that they were given had four main variables involved in it because the teacher had established four groups (Edwards & Mercer, 1987: cited in Claydon, Desforges, Mills & Rawson, 1994). Therefore, if pupils do examine the presentation and organisation of a task for an insight into the nature or number of learning points, it may be that the principles underpinning the 'Teaching Games for Understanding' approach in Physical Education may be of value in enhancing pupils' learning. For example, when faced with long, thin badminton courts pupils may consider why the teacher has presented and organised the environment in such a way and, therefore, may be encouraged to consider the long-short gameplay strategy that is available. However, the 'intensity' of the focus on the presentation and organisation may mean that pupils fail to appreciate the interactions between the modified game and the complete game, and if the examination of presentation and organisation occurs on a superficial basis, pupils could believe that the long, thin courts are created due to problems such as lack of space. Teachers and researchers cannot assume that pupils understand why presentation and organisation is selected and, therefore, teachers and researchers cannot assume that pupils appreciate the purpose of task, the influences upon a task or the demands of a task.

In summary, it is essential not to assume that pupils understand all aspects of a task. It has been noted that young (Fourth Grade) pupils' understanding of task variables develops much later than their understanding of more personal variables, such as interest, and pupils do not appear to consider task variables as being able to affect performance (Miller & Weiss, 1982: cited in Reynolds & Shirey, 1988; Shirey & Reynolds, 1987). As an overall consequence, if a pupil lacks metacognitive knowledge of task variables and does not understand the purpose of a task, even with time and effort, efficient learning may not occur (Weinstein, 1988).
2.2.2.2 Person

Metacognitive knowledge of person variables, can be subdivided into beliefs about intra-individual variables, inter-individual variables and universals of cognition. Nisbet & Shucksmith (1986) argued that the knowledge of 'person' variables should also include the knowledge of transient processes and states, that is, the 'here-and-now' experiences, both cognitive and affective, which can emerge during learning. However, such knowledge is often incorporated with metacognitive experiences. Knowledge of intra-individual differences may be seen as knowledge about one's own skills, strengths, weaknesses, personal preferences, better and worse times of the day and personal goals (Flavell & Wellman, 1977; Schmeck, 1988b; Weinstein, 1994). A simple example may be that pupils appreciate that they can learn a gymnastic move better if they watch it being performed rather than listening to someone explaining the technique. Knowledge of inter-individual variables refers to knowledge of the people involved in a learning situation, such as peers or teachers. For example, a pupil may realise that a friend is more socially sensitive than another or a pupil may understand the type of behaviour that a teacher desires. Knowledge of the universals of cognition may be seen as a recognition that there are various degrees and kinds of understanding and, therefore, that every individual can vary in their degree of understanding with respect to a specific task. If a pupil is aware that there are different degrees of understanding then that pupil may be able to distinguish between illusory understanding and accurate understanding (Flavell, 1979). If an individual can appreciate their personal level of understanding it is argued that they must have a level of metacomprehension i.e. a knowledge of what and when they understand. The interaction between these three subdivisions of person variables are also important; for example, pupils must be willing to admit the potential existence of better options and to "be aware that one's knowledge is always open to refutation or modification from the vantage point of a different perspective" (Ranson & Martin, 1996: p17). As such, a pupil must understand intra-individual variables, appreciating that one has potential limitations in one's knowledge, while also appreciating, from inter-individual variables and the universals of cognition, that there may be different ways of approaching the same problem and different degrees of understanding a problem.

However, Torrance & Rockenstein (1988) have suggested that the awareness of one's abilities may be potentially dangerous as the pupil may form self-limiting views as a result of this awareness. Pupils' perceptions of themselves seem to be responsible for their willingness to try new ideas and their tendency to evaluate ideas (Eylon & Linn, 1988) and, therefore, if pupils developed negative views of themselves it could potentially hinder their learning processes. However, Weinstein (1988) believed that
the awareness of oneself is extremely important and helps pupils to know the kinds of resources or assistance they will need to perform efficiently and effectively.

Furthermore, Weinstein (1988) argued that a learner should know and understand their preferred learning styles. It appears that at the heart of the 'person' variables is the concept of learning styles and, more specifically, cognitive styles. It appears that the intra-individual variables and inter-individual variables may be associated with the effects of cognitive style. For example, if an individual has an analytic processing cognitive style (see Riding & Cheema, 1991) then this individual may learn better when the information is broken down into parts rather than presented as a 'whole'; such an example would be an intra- or inter- individual variable. In short, "there is evidence to suggest that individuals do differ in the ways in which they think, both in terms of thinking style and in ability to reflect on and use that style flexibly in response to differing problem situations" (Riding & Powell, 1993: p222). Importantly, Robinson (1983: cited in Das, 1988) noted that reading-disabled pupils tended to focus on their own preferred style of processing information at the expense of more effective style characteristics; thus emphasising the need for cognitive style awareness. Pennell (1985), referring to the importance of metacognitive knowledge of cognitive styles, noted that when individuals become aware that they have learning preferences they have taken the first step in metacognition and in taking charge of their learning. Similarly, Pask (1988) suggested that to encourage learning, pupils should become more aware of their cognitive styles. Nisbet & Shucksmith (1986) indirectly linked cognitive styles and 'person' metacognitive knowledge, stating that metacognitive knowledge of 'person' variables includes knowledge of one's own enduring abilities and traits, both of which are seen as connected to cognitive style (Entwistle, 1981; Riding & Douglas, 1993). Metacognitive knowledge of cognitive style tendencies may free the individual from compulsive and rigid responses permitting greater versatility when approaching learning activities. Although every style can be used successfully, each can be a stumbling block if applied inappropriately or overused (McCarthy & Schmeck, 1988: cited in Guild, 1994). As such, "successful learners are more likely to be those who are fine-tuned to the complexities of their learning style..." (Nisbet & Shucksmith, 1986: p6).

2.2.2.3 Strategy

Weinstein (1988) claimed that there is a need for metacognitive knowledge of strategies so that they can be used to guide learning or can be called upon when a comprehension problem is encountered. Metacognitive knowledge of strategies includes declarative ('what strategy'), procedural ('how to use the strategy') and
conditional ('why use the strategy' and 'when to use the strategy') variables. As Garner (1988) noted, an individual must know what the strategy is, how to use it and when to use it. In short, an individual must be able to judge the appropriateness of the strategy for a given task (Borkowski, Estrada, Milstead & Hale, 1989).

The problem is that pupils are not sufficiently aware of the importance of strategic factors (Matlin, 1994). Pupils can know strategies and fail to utilise them, having the declarative knowledge of the strategy variables but lacking the procedural and conditional knowledge of the strategy variables (Cavanaugh & Perlmutter, 1982). Pupils can fail to appreciate that some strategies are more effective than others (Matlin, 1994) and they may view cognitive strategies as simply extra content (Biggs, 1985). Younger pupils are often reluctant to abandon their usual strategies even if the strategies are ineffective or if the task is altered (Crowley & Siegler, 1993) and, at the other extreme, younger pupils can randomly swap their strategies even if the same problem or task is given to them twice within a short space of time (Siegler, 1989). In the latter case, this does not mean that the pupils are advancing in their strategy as they are just as likely to switch from a more advanced to a less advanced strategy (Siegler, 1989).

However, the problem does not only concern the selection of strategies, because as Crowley & Siegler (1993) noted, without efficient metacognitive knowledge of strategies any further developed strategies may be illegitimate. Furthermore, without metacognitive knowledge of a specific cognitive strategy, it is only likely to be used in the short term with pupils often quickly reverting back to their initial habits even if there was some immediate success gained (Martin & Ramsden, 1986: cited in Biggs, 1988). Pupils can often be in the position of being encouraged to use strategies that they do not fully understand (Crowley & Siegler, 1993) or they are only able to use a strategy when explicitly told to do so. In short, knowing when to use a strategy is as important as knowing how to use it (Garner, 1988). Flavell (1970) noted how pupils may know of relevant cognitive strategies but demonstrate a 'production deficiency' in that they lack the awareness of how to utilise them, how to adapt them to a specific situation and when they are appropriate. Brown & Smiley (1978: cited in Armbruster & Brown, 1984), noted that pupils who were induced to utilise cognitive strategies, such as underlining important parts of a text, did so more randomly than those pupils who spontaneously used such strategies. Reading researchers have argued that pupils who do not use cognitive strategies independently and effectively also exhibit a lack of metacognitive appreciation of the value of cognitive strategies and how to use them (Paris & Oka, 1986); in other words, the pupils remain 'blind' to the strategies (Brown, Campione & Day, 1981; Campione, Brown & Ferrarra, 1982).
To summarise, successful learners have a range of strategies from which they are able to select appropriately and to adapt flexibly to meet the needs of a specific situation (Nisbet & Shucksmith, 1986). Without thoughtful selection of cognitive strategies the learning processes could be hindered (Gitomer, 1984: cited in Alexander & Judy, 1988).

### 2.2.2.4 Interaction

Brown, Campione & Day (1981) reported that pupils must be aware of the nature of the material to be learned, what their unique characteristics and limitations are and what learning activities are appropriate. In other words, individuals must have metacognitive knowledge of 'task', 'person' and 'strategy' variables. Problems can occur within each of these separate categories (Butler & Winne, 1995; Goos & Galbraith, 1996). For example, pupils may misperceive task conditions and thus mismatch their choice of cognitive strategies. "The essence of sophisticated metacognitive activity is the ability to juggle and balance these aspects interactively" (Nisbet & Shucksmith, 1986: p40). Therefore, successful learners are more likely to be those who are perceptive of the requirements of a learning task and who have developed a range of cognitive strategies which they can apply according to their own cognitive style (Nisbet & Shucksmith, 1986). Flavell (1987) provided the example that one may appreciate that one is suited to strategy A whereas one's sister is suited to strategy B because the task is of this type rather than that. Given one's particular cognitive make-up and the particular task, one develops intuitions about which strategies are better.

### 2.2.3 Metacognitive Strategies

As already stated, it is important for a pupil to have metacognitive knowledge of cognitive strategies including, knowing what the strategy involves, how to use it, where to use it, when to use it and why to use it. However, whereas cognitive strategies aim to make cognitive progress, metacognitive strategies aim to monitor, evaluate, and regulate it (Flavell, 1979). These metacognitive strategies may be consciously or unconsciously utilised. Although little is known about the nature of secondary pupils' metacognitive strategy use, and how these metacognitive strategies are applied during learning (Goos & Galbraith, 1996), it is suggested that they form the executive control which frames and guides more specific knowledge and strategies. Weinstein & Mayer (1986) suggested that metacognitive strategies can result in better integration of new material with prior content and personal knowledge. Similarly, Schoenfeld (1987) noted that once metacognitive strategies were hinted at,
a group of mathematics pupils, who had struggled at a task without success, completed it with few problems. It appeared that the executive control which the metacognitive strategy offered permitted them to access the requisite knowledge and procedures.

There appears to be agreement concerning the components incorporated into metacognitive strategies. Firstly, pupils must have an awareness of their own personal cognitive activities. Awareness involves the recognition of implicit as well as explicit information (Haller, Child & Walberg, 1988) and, therefore, includes the learners' metacognitive knowledge of task, person and strategy variables that influence performance (Pintrich, 1990). Thus, as emphasised by the author, metacognitive knowledge and metacognitive strategies interact strongly (Figure 2.01). Flavell (1987) suggested that awareness may be encouraged through practices such as prediction, for example, skimming a text before reading it may provide a pupil with some awareness of the work that lies ahead and, therefore, how that pupil should approach the reading passage depending upon the purpose of the exercise.

Secondly, pupils must monitor their learning processes. Monitoring checks comprehension and, therefore, may include the checking of understanding through self-questioning, paraphrasing or summarising (McCombs, 1988). Monitoring understanding can be as simple as trying to paraphrase the content being learned or as complex as trying to analyse and evaluate how it fits in with one's prior knowledge (Weinstein, 1994). "Checking on understanding is an important part of strategic learning that fosters self-regulation. Students must be aware of their problems in understanding, or gaps in knowledge, before they can do something about it" (Weinstein, 1994: p268). As such, monitoring can provide the 'triggering mechanism' which signals whether there is a failure in comprehension and, potentially, prompt a corrective strategy (Brown, 1980). Without checking actively their progress, many pupils fall victim of what has been called the 'illusion of knowing' (Glenberg, Wilkinson & Epstein, 1982). Various studies suggest pupils can vary in whether they can sense if they have allocated sufficient time and effort to a learning task (Flavell, Friedrichs & Hoyt, 1970; Masur, McIntyre & Flavell, 1973) and, similarly, Flavell (1979) noted that young pupils do relatively little monitoring of their own memory, comprehension and other cognitive enterprises. Campione (1987: p123) emphasised the interaction between metacognitive knowledge and metacognitive strategies by highlighting the effects that poor monitoring can have on metacognitive knowledge. "As a specific example, consider a child faced with the task of remembering 10 items. If he or she believes that the items can be readily remembered (and overestimates his or her span), there is no reason for engaging any specific learning activity, even if one
were available. Further, if the learner did not monitor performance on recall trials, he or she would not become disabused of the original notion. In addition, if instruction is provided, and if performance improves, it is reasonable to expect that the learner will continue to employ that strategy only if he or she monitors its use and notes that it has actually helped; if no such monitoring takes place, it is not surprising that transfer is limited. In short, unless monitoring takes place inefficient metacognitive knowledge of task, person and strategy variables will not be improved. Kirby & Teasdale (1987: cited in Kirby, 1988) suggested that most pupils are capable of cognitive monitoring but appear to choose not to do so in standard reading situations. However, certain situations are more likely to elicit cognitive monitoring than others. When learners do not need to act on instructions or descriptions they are unlikely to monitor cognitions rigorously, if memory resources are strained monitoring of cognitions is unlikely to occur and if a task is viewed as unimportant, or if the learner is not devoting conscious attention to it, monitoring is unlikely (Garner, 1990). However, monitoring is not just about how well you understand something, but, also, how much you ought to believe it or do what it says (Flavell, 1979). The interest here for Physical Education is that, even with so called 'experts', monitoring may not always occur efficiently. For example, in a Sunday Times article, an England rugby player was asked why he kicked the ball when there was an obvious chance to run for a 'try'. The reply suggested that the team had been told to kick the ball when they reached a certain point on the field. It appeared that very little monitoring of the situation occurred, nor was there any personal examination of the validity of the gameplay tactic for various contexts. Monitoring and evaluation encourage flexibility when pupils are considering the demands of task and material, and such flexibility is a necessary requirement in Physical Education. Taking the example of games, surely flexibility is required to encourage the movement from the mere 'artisan', capable only of skilled mechanical responses, to a 'player' who matches skills to the demands of the game and threatens the unexpected (Read, 1989).

Thirdly, pupils must evaluate and regulate the learning processes. The idea of evaluation is to examine the success of the learning processes, checking the effectiveness of cognitive strategies and to ascertain whether an adequate level of comprehension has been achieved. Regulation consists of compensatory strategies to redirect and bolster faltering comprehension. For example, in the case of reading, these compensatory strategies may include re-reading and main-idea details comparison (Haller, Child & Walberg, 1988). Regulation of cognition consists of self-regulatory mechanisms such as planning, checking strategy outcomes, monitoring the effectiveness of any attempted action, and testing, revising, and evaluating strategies for learning (Armbruster & Brown, 1984). Often the problem is
not that pupils fail to understand but that, prior to a deliberate analysis, those pupils may fail to realise that they have not understood (Markman, 1979). When learners do not fully understand how to evaluate their learning, they may not detect failure (Garner, 1990). Baker (1984) demonstrated that pupils, particularly younger and poorer readers, often rely on a single criterion for textual understanding and that the criterion was the understanding of single words. Pupils would continue 'reading', ignoring text-level miscomprehension, as long as each single word made sense. The interaction of metacognitive knowledge with the evaluation component of metacognitive strategies has been suggested from several sources. For example, Markman (1979) noted that the repetition of material, even by a child, is not enough to improve comprehension and understanding as this only occurs after evaluation and after inferences are drawn. Pupils must evaluate the task and their personal learning requirements if they are to improve their metacognitive knowledge of task and person variables. Furthermore, evaluating the processes of learning can help pupils to build up a repertoire of cognitive strategies that can be called upon more automatically in the future when a similar situation arises (Weinstein, 1994).

Interestingly, Flavell (1979) has suggested that continuous evaluation of any cognitive enterprise could actually prove debilitating leaving too little a focus upon cognitive progress, but also noted that there is generally far too little monitoring than too much. It would appear that metacognitive strategies encourage learners to be more self-regulating, and "theoreticians seem unanimous - the most effective learners are self-regulating" (Butler & Winne, 1995: p245). In academic contexts, self-regulation is a style of engaging in tasks in which pupils exercise a variety of strategies, such as setting goals for upgrading knowledge, deliberating about the selection of strategies, balancing progress against costs and, as the task evolves, monitoring the accumulating effects of their activities. However, with any learning activity, obstacles may be encountered. It may become necessary for self-regulating learners to adjust or even abandon initial goals and to adapt and occasionally invent tactics for making progress (Butler & Winne, 1995). "Self-regulated students are thus aware of qualities of their own knowledge, beliefs, motivation, and cognitive processing - elements that jointly create situated updates of the tasks on which the students work" (Butler & Winne, 1995: p245).
2.2.4 Metacognitive Experiences

2.2.4.1 Introduction

Flavell (1979) stated that metacognitive experiences are any conscious, cognitive or affective experiences which are concerned with an intellectual venture. As such, pupils' metacognitive experiences may result from deliberate search of their metacognitive knowledge and metacognitive strategies, or can be triggered automatically during a specific learning task. However, metacognitive experiences cannot be constantly deliberate or learners could never learn because of thinking about learning (Nisbet & Shucksmith, 1986). To clarify the concept of metacognitive experiences, a general perspective will be provided followed by a discussion of the nature of metacognitive experiences.

2.2.4.2 Perspective

As recognised in Figure 2.01, metacognitive experiences utilise metacognitive knowledge and would be encouraged by the use of metacognitive strategies. Flavell (1979) suggested that metacognitive knowledge and metacognitive strategies may be activated as a result of a deliberate, conscious search of the mind. For example, a pupil may make a conscious effort to think of an effective cognitive strategy. Schmeck (1988) agreed, stating that learning can be improved if skills are used more intentionally and responsibly. However, as well as being intentionally used, metacognitive knowledge can be used 'automatically' (Armbruster & Brown, 1984; Flavell, 1979; Palincsar & Brown, 1984) until some 'triggering' event alerts that individual of a problem (Brown, 1987). The most common of these 'triggering' events is the retrieval of cues from the task situation (Flavell, 1979). There could be confusion about the purpose of a task, an expectation may not have been confirmed, or unfamiliar concepts are encountered too frequently for the learner to remain tolerant of his or her ignorance (Palincsar & Brown, 1984). Whatever the nature of the triggering event, learners slow down and allot extra processing to the problem area entering a controlled and strategic state that takes time and effort (Brown, 1987; Palincsar & Brown, 1984).

Nisbet & Shucksmith (1986) argued that because young pupils are often unaware of what or when they know, 'triggering' does not always occur and results in pupils failing. The implication here is that pupils require metacomprehension (the knowledge of what and when you know). Through metacomprehension pupils are able to appreciate what they need to do and how they need to react within a learning
situation. Only when a pupil acknowledges what they do or do not understand can a 'triggering' event occur when necessary. Therefore, metacomprehension may well be "the key which enables us to gain new knowledge and strategies" (Nisbet & Shucksmith, 1986: p45). However, even if a pupil is motivated, concerned and cooperative, that pupil can still have poor metacomprehension (Markman, 1979). Flavell (1979) noted, when metacognitive knowledge or metacognitive strategies rise to the consciousness, it is a metacognitive experience. Brown (1980: cited in Derry & Murphy, 1986) suggested that knowing what types of comprehension failures there are might help some pupils to have metacognitive experiences. It appears that pupils who cannot provide detailed explanations of their comprehension problems tend to do poorly on achievement tests (Garner, 1988; Peterson, 1988) and, interestingly, Flavell (1981: cited in Mayo, 1993) noted that learning disabled pupils did not exhibit 'metacognitive experiences'. Therefore, metacognitive experiences, and their strong interaction with metacomprehension, may be significant in the learning processes.

2.2.4.3 Nature

Flavell (1979) viewed metacognitive experiences as any conscious, cognitive or affective experiences which accompany or pertain to an intellectual enterprise. Therefore, they may include the area of metacomprehension as well as such feelings as despair, frustration or excitement which can emerge during learning. As McCarthy & Schmeck (1988) claimed, awareness and acceptance of one's own thoughts, memories and feelings are essential for learning versatility to develop. Obviously, metacognitive experiences may possibly add to, delete from, or revise metacognitive knowledge (Flavell, 1979). As stated, metacomprehension is closely related to the concept of metacognitive experience, and interestingly, "...metacognitive experiences are especially likely to occur in situations that stimulate a lot of careful, highly conscious thinking...in novel roles or situations, where every major step you take requires planning beforehand and evaluation afterwards; where decisions and actions are at once weighty and risky; where high affective arousal or other inhibitors of reflective thinking are absent" (Flavell, 1979: p908). The implication is that metacognitive experiences are triggered in situations creating cognitive conflict, that is, a situation which makes the learner reconsider his or her habitual way of delimiting the phenomenon in question (Marton, 1988). Indeed, Physical Education teachers are often encouraged to create such situations and 'Teaching Games for Understanding' appears to strongly utilise the idea of triggering metacognitive experiences through cognitive conflict. Referring to the previous badminton example (Section 2.2.2.1), pupils may be asked to play on a long, thin court so as to make them realise that hitting the shuttlecock at one length all of the time is not very
effective for winning points (Thorpe, Bunker & Almond, 1986). However, even if the situation does trigger an awareness, it does not automatically lead to learning. The 'metacognitive experience' needs to be transformed into knowledge and usable strategies and, as this will not inevitably happen, the strategies may need to be explicitly instructed (Nisbet & Shucksmith, 1986). In summary, although metacomprehension and other metacognitive experiences are important to learning, they do not inevitably lead to it. As Flavell (1987) noted, young pupils may have such metacognitive experiences but do not understand how to interpret them or how to react to them effectively.

2.2.5 The Benefits of Metacognitive Ability

The benefits of developing metacognitive ability are vast and varied. Improved appreciation of context, improved transfer capabilities and improved motivation are some of the main, potential effects of metacognitive ability development and each will be considered separately. A more general assessment of the benefits of metacognitive ability for Physical Education will also be included.

2.2.5.1 Appreciation of Context

Metacognitive ability appears crucial for an individual to adapt to the various learning situations that may be faced in a Physical Education lesson. Although more attention is possibly required on the effect of contexts upon metacognitive ability (Cavanaugh & Perlmutter, 1982), it appears that by developing metacognitive ability individuals reveal a capacity to adapt to, or shape, the environment of learning more effectively than those lacking in metacognitive ability (Ramsden, 1988). The self-regulation and control that metacognitive ability appears to develop within individuals may help them to understand the impact that the environment has on them covertly and behaviourally during knowledge acquisition (Zimmerman & Martinez-Pons, 1990). In turn, this understanding may suggest to them how to improve the environment to fit their needs through the use of various strategies (Pintrich, 1990; Zimmerman & Martinez-Pons, 1990). For example, in a gymnastics lesson a pupil may realise that when most of the class 'have a go' at a move, and they can see the whole movement performed rather than just explained, then they themselves are more encouraged to try it without feeling self-conscious. Therefore, that pupil may position himself or herself near a group of people who are willing to experiment with the movements requested by the teacher, to take advantage of this fact.
Context differences in terms of teaching, assessment and curriculum can prescribe or suggest to individuals different cognitive strategies and tactics (Ramsden, 1988), but some learners are more sensitive to context differences than others (Pask, 1988), and individual perceptions of context seem to result as much from personal motives and knowledge as from the actual learning situation faced. For example, Fransson (1977: cited in Schmeck, 1988) found that pupils' routine level of anxiety (fear-of-failure motive) had a larger effect on the learning approach taken than did the level of threat that was created within the experimental situation, supporting the need to focus on individual's thoughts and learning processes as well as the learning situation which has developed (Schmeck, 1988). Karmiloff-Smith (1984, 1986: cited in Shuell, 1990) suggested that individuals need to achieve control of both environmental stimuli and the internal representations that guide their behaviour, so that an individual is able to consider environmental feedback and balance these with internal representations.

It is suggested that 'sensitivity' to context increases with the development of metacognitive ability, allowing the learner to be more versatile in their approach rather than persisting in the use of the same cognitive strategies across contexts (Pask, 1988). For example, if a pupil had developed efficient metacognitive knowledge of strategy variables, that pupil would be aware of their own cognitive strategies and the variety of cognitive strategies available to them, and would, therefore, be able to respond intelligently to the context (Ramsden, 1988). Without a degree of cognitive control pupils will be controlled by, and 'at the mercy' of, the environment (Karmiloff-Smith, 1984, 1986: cited in Shuell, 1990).

2.2.5.2 Transfer

If an individual can adapt to the environment due to efficiently developed metacognitive ability, it would suggest that transfer across tasks, and possibly activities, may occur. Indeed, when pupils become aware of the processes they are using, and when they learn to control these cognitive processes, their transfer of them often increases (Brown, Bransford, Ferrarra & Campione, 1983; Pask, 1976). However, not only do metacognitive strategies appear to result in some degree of durability and transfer of information (Wagner & Sternberg, 1984), but also the metacognitive strategies themselves, and indeed cognitive strategies, can seemingly be modified and transferred across tasks, along with any information learned (Flavell, 1979; Wagner & Sternberg, 1984). It may be that it is self-control and self-regulation that encourages pupils to use previously learned skills and strategies in new situations (Borkowski, 1985; Wittrock, 1986), encouraging knowledge about skills and strategies as well as a knowledge of skills and strategies (Brown, 1984). In summary,
Derry & Murphy (1986) stated that efficiently developed metacognitive ability appears to maintain cognitive strategies outside the 'training' environment and, therefore, may help in transferring cognitive strategies and tactics across tasks.

2.2.5.3 Motivation

McCombs (1988) argued that the metacognitive skills of self-awareness, self-evaluation, and self-regulation provide a basic structure for the development of positive self-control, and these perceptions of personal control underlie continuing motivation. It may be that the sense of self-control is why developing metacognitive ability proves successful (Borkowski, Estrada, Milstead & Hale, 1989). Nisbet & Shucksmith (1986) explained that awareness of one's own mental processes and skill and practice in self-monitoring are the means by which control can be passed from the instructor to the learner, so that the learner takes a more active and responsible role in the learning processes. This transference of control from the teacher to the learner may develop an internal locus of control within an individual (Biggs, 1985) and may increase judgements of self-efficacy (Bandura, 1982) and self-esteem (McCarthy & Schmeck, 1988). Such judgements will positively affect motivation and achievement (McCombs, 1988). The implication is clear in that developing metacognitive ability can lead to, "definite improvements in the motivation of the students" (Seifert & Wheeler, 1994: p6).

"A metacognitive self-awareness is an integral component of continuing intrinsic motivation to learn" (McCombs, 1988: p164). To maintain and implement self-motivated cognitive strategies, it is necessary for pupils to know themselves, know what is important to them, and know their learning competencies and abilities (McCombs, 1988). It is, similarly, crucial that pupils appreciate that they are responsible for their learning, and that they can increase their sense of self-competency and learning achievement by taking positive self-control in learning situations (McCombs, 1988). However, self-awareness needs to be accompanied by self-monitoring and self-evaluation which motivationally appear to encourage both effort and persistence (McKeachie, 1990; Zimmerman & Risemberg, 1994). When such metacognitive strategies of self-awareness, self-monitoring and self-evaluation are internalised pupils may improve not only their immediate performance in school but also their self-efficacy beliefs and motivation to reach their 'ultimate' goal (Zimmerman & Risemberg, 1994). It seems a reliable finding that pupils who adopt a general intrinsic orientation and have a high self-efficacy are more likely to be cognitively engaged in learning through the use of cognitive and metacognitive strategies (Pintrich & Schrauben, 1992; cited in Pintrich & Garcia, 1994). However,
the question remains whether it is motivation that encourages metacognitive ability or vice versa. For example, with respect to Physical Education, Solmon (1991) supported the notion that self-reported motivation in Physical Education influences persistence during practice, the ability to correct errors, and the amount of skill acquired in volleyball. The suggestion would be that motivation is the crucial variable, but Lee, Landin & Carter (1992) noted that the use of a metacognitive strategy during tennis lessons helped pupils' physical performance and encouraged pupils to take responsibility for active learning.

Motivation, cognition and metacognition should not be treated as separate entities (Flavell, 1987; Schutz, 1994; Weinert, 1987; Weinstein, 1994) as learning performance is enhanced when all are employed by pupils (McKeachie, 1990; McKeachie, Pintrich & Lin, 1985; Pintrich & Schrauben, 1992: cited in Schutz, 1994). It is an inter-dependent relationship, as motivation must be accompanied by the cognitive strategies needed for a successful learning performance (Schutz, 1993; Schutz & Lanehart, 1994; Weinstein, 1988b; Weinstein & Mayer, 1986: cited in Schutz, 1994), a degree of motivation must be present for cognitive strategies to be utilised (Garner, 1990; McCombs, 1988; Palmer & Goetz, 1988) and, in Physical Education, Solmon & Boone (1993) noted that task-oriented motivation was positively related to the selection and use of strategies and the monitoring of practice tasks. Each example suggests a connection between motivation, cognitive strategies and metacognitive ability. As Paris, Lipson & Wixon (1983: p304) noted, "strategies combine components of both will and skill".

2.2.5.4 Would Metacognitive Ability be Beneficial for Pupils of Physical Education?

Although metacognitive ability has not been examined within Physical Education, it would appear that the development of metacognitive ability is beneficial to the learning ability of pupils within other subject areas (King, 1991; Lester, 1989; Schoenfeld, 1987). Through having efficient metacognitive ability pupils are able to learn material faster, understand it better, and retain it longer (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989). Metacognitive ability appears to increase an individual's control and responsibility over their own learning processes (Nisbet & Shucksmith, 1986) which Weinstein (1988) suggests should be a major concern of teachers. Furthermore, it appears that "high metacognitive ability positively influences problem solving performance" (Swanson, 1990: p311). Obviously, all of these effects would be beneficial to Physical Education; for
example, Tousignant, Brunelle, Laforge & Turcotte (1990) noted that one of the key aims of dance teachers is for pupils to learn to take more responsibility for their own learning. Indeed, in the author's experience of teaching, numerous teachers used comments such as, "I can't learn it for you!" Furthermore, although Nisbet & Shucksmith (1986) were not referring specifically to Physical Education, they suggested that the factor that differentiates good and bad learning in most subjects is the ability to monitor situations, tasks and problems and respond accordingly i.e. the development and utilisation of an efficient metacognitive strategy.

More specific to Physical Education, metacognitive ability, and the critical thinking it involves, "...can heighten students' awareness of their own thinking and the degree to which their thinking skills can be effective in helping them become more skilful, fit, and knowledgeable about physical activity" (Schwager & Labate, 1993: p25). The problem within most school subject areas, and Physical Education is no exception, is that there seems to be an assumption that metacognitive ability and critical thinking is being developed. For example, Schwager & Labate (1993) questioned how 'Teaching Games for Understanding' is assumed to encourage critical thinking even though pupils have not necessarily learned or, indeed, have ever been taught how to do it. Simply utilising a strategy or experiencing a situation does not mean a pupil is learning efficiently. "It is wrong to assume that new learning emerges from experience" (Nisbet & Shucksmith, 1986: p45).

The author suggests that metacognitive ability may not only enhance the development of individual skills and cognitive strategies, but may also enhance the development of gameplay strategies. Schwager & Labate (1993) provided examples to support this view. Firstly, in considering the individual skill of the tennis serve, the learner must have cognitive and metacognitive strategies to analyse the movements involved, to compare and contrast performance attempts with a required model, sequence movements appropriately, predict where the ball will land, decide if the serve was successful, and evaluate the effectiveness of the trial for future attempts. Secondly, a pupil may consider "How do I get down this basketball court when I am being marked so closely?" In this instance, the pupil will need to analyse the situation on court, selecting a possible course of action, predicting which movements will result in success, and then evaluating the outcome of the choice made. In both examples, metacognitive knowledge and metacognitive strategies are required for a successful result.

Nevertheless, with respect to perceptual motor activities, Brown (1987) noted how they are notoriously difficult to describe and explain and that many sports people can
do a great deal that they cannot describe. For example, asking an expert gymnast to consider each part of a full twisting back somersault will more likely hinder the gymnast's action than help a novice who is watching or listening. It may be that with repeated practice certain skills become automatised and are less accessible to conscious examination (Broadbent, 1977: cited in Brown, 1987; Brown, 1987). Furthermore, it has been suggested that performance may initially deteriorate when conscious metacognitive activity is encouraged in pupils who may have already developed 'automatic' metacognitive ability within a specific learning context (Riding & Powell, 1993).

However, as Nisbet & Shucksmith (1986) argued, it is the awareness of the required movements and strategies that provide the sportsperson with the necessary control and co-ordination, and even though it will be practised until it becomes intuitive, it should also be retrievable into consciousness when needed. Returning to the example of the gymnast, if a mistake naturally keeps occurring, that gymnast should be aware of the movement requirements and be able to analyse the action, either wholistically or analytically, when necessary. As a result, the fault may be discovered and corrected.

2.2.6 General Summary of Metacognitive Ability

Metacognitive ability depends upon the utilisation of metacognitive knowledge and metacognitive strategies. The development of metacognitive ability has seemed beneficial to pupils in classroom subjects and may benefit pupils of Physical Education. However, there has been very little research undertaken to examine pupils' degree of metacognitive ability in Physical Education or how to enhance pupils' development of metacognitive ability in Physical Education. To fully examine pupils' metacognitive ability, their metacognitive knowledge and metacognitive strategies should be considered. As pupils' metacognitive knowledge appears to include person and strategy variables, the concepts of cognitive style and cognitive strategies also seem relevant and important. Reviews of literature of both of these latter concepts are, therefore, offered.

2.3 Cognitive Style Review of Literature

2.3.1 Introduction

It is claimed that, regardless of academic ability, every pupil can learn although every pupil may learn differently (Dunn & Dunn, 1978). It is suggested that as well as
'situational' factors influencing the learning processes, each pupil may have relatively stable individual characteristics that will be influential during learning (Luke & Hardy, 1996; Riding & Cheema, 1991). Cognitive style and learning style appear to be part of these individual characteristics. Although both cognitive style and learning style will be defined, it is argued that the main focus in the present study should be on cognitive style. Under the heading of 'Cognitive Style' consideration will be given to the types of cognitive style dimensions, the effects of cognitive style dimensions, whether instruction should match cognitive style combinations, the stability of cognitive style combinations and the interacting variables with cognitive style combinations.

2.3.2 Definitions of Cognitive Style and Learning Style

Within the literature there is confusion with regard to the definition of cognitive style and learning style as researchers often interchange the terms. However, cognitive style is defined as an individual's consistent preferences when representing, organising and processing information (Riding & Cheema, 1991; Tennant, 1988) whereas learning style not only includes cognitive preferences in its definition, but also sociological, environmental, physiological and emotional preferences (Brunner & Hill, 1992; Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995). The argument that cognitive style is only one aspect of learning style is supported by Miller (1991: p236) who claimed that, "Treating learning styles as cognitive styles, bereft of affective, motivational and defensive implications, is naïve."

Sociological preferences generally refer to preferences in grouping, whether pupils prefer to work in small groups, in pairs, on their own, with peers, with parents, with teacher supervision, or possibly with or without their team members (Dunn, Griggs, Olson, Beasley & Gorman, 1995). Environmental preferences may include the temperature of a room, the layout of a room, whether work is done indoors or outdoors, sound and even the degree of lighting. With reference to physiological preferences, each pupil may have preferred energy or arousal levels, certain mobility requirements, as well as perceptual preferences between auditory, visual, tactile and...
kinaesthetic or whole body involvement (Brunner & Hill, 1992; Dunn, Griggs, Olson, Beasley & Gorman, 1995). Emotional preferences refer to the sources of motivation, the degree of persistence, the amount of responsibility and the level of 'desire to conform' that each pupil may have (Dunn, Griggs, Olson, Beasley & Gorman, 1995).

The definitions of cognitive style and learning style do not imply that style is fixed and cannot be influenced, but they purely suggest that each individual has preferences in learning and will consistently tend towards these preferences in most learning situations. As Schmeck (1988) argued, individuals will demonstrate components of different styles, although one style will predominate in most individuals' learning behaviour.

2.3.3 Cognitive Style

While acknowledging that cognitive style may be only one aspect of learning style (Brunner & Hill, 1992; Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995), the author deemed it beneficial to mainly focus upon cognitive style for the purpose of the study. As such, a rationale for the focus on cognitive style is offered followed by a consideration of cognitive style.

2.3.3.1 The Focus on Cognitive Style

It is suggested that all of the preferences involved in the learning style definition are inter-related (Luke & Hardy, 1996). However, it appears that the cognitive preferences may be the most influential. For example, Witkin, Moore, Goodenough & Cox (1977) argued that cognitive style strongly influences sociological preferences such as an individual's preference to work alone or to be with others. Furthermore, many of the sociological and environmental considerations are enforced by the fundamental construct of the various activities. For example, football is a team game and is often played outside. Therefore, whether or not an individual likes working with others or working outside in a variable temperature, that individual will be forced to do so at certain times. As such, the pupil may be seen as having less control over the sociological and environmental elements during a learning experience.

Therefore, there is the suggestion that the cognitive preferences involved in learning style may require the greatest attention. However, how appropriate is a cognitive style focus to Physical Education in which physical ability is clearly important? Witkin, Moore, Goodenough & Cox (1977) used a proprioceptive experiment in testing for cognitive style (Field Independence or Field Dependence) and suggested that physical
ability may be affected if indeed cognitive style can be influenced. Mawer (1995) also acknowledged, without detailed elaboration, the potential influence that cognitive style may have on the learning of physical skills.

2.3.3.2 Types of Cognitive Style Dimensions

A number of different labels have been given to cognitive preferences and it has been argued that many of these are but different conceptions of the same dimensions (Miller, 1987; Riding & Buckle, 1990; Riding & Cheema, 1991). Riding & Cheema (1991) reviewed the various labels, their descriptions, correlations, methods of assessment and effect on behaviour, and concluded that they may be grouped into two fundamental cognitive styles, the wholist-analytic and the verbal-imager dimensions. The dimensions are continua with individuals being distributed along them (Riding & Cheema, 1991; Riding & Sadler-Smith, 1992).

Wholists, as the name suggests, tend to organise information into loosely clustered wholes (Douglas & Riding, 1993), whereas analytics prefer to separate information into sections or groupings; the 'style' is whether the individual tends to process information in whole or parts. The verbaliser-imager 'style' refers to whether an individual is inclined to represent information verbally, in mental images or either during thinking (Riding & Ashmore, 1980; Riding, Glass & Douglas, 1993; Riding & Pearson, 1994). Verbalisers consider the information they read, see, or listen to, in words or verbal associations. When imagers consider information, they experience fluent, spontaneous and frequent mental pictures either of representations of the information or of associations with it. Bimodals or 'mixers' (Clements, 1982: cited in Zazkis, Dubinsky, Dautermann, 1996) tend to use either mode of representation and they are in the middle of the verbaliser-imager dimension (Riding & Ashmore, 1980; Riding & Buckle, 1990; Riding & Pearson, 1994).

2.3.3.3 Effects of Cognitive Style Dimensions

Riding, Glass & Douglas (1993: p269) stated that the wholist-analytic style; "...affects the way in which people think about, view and respond to information and situations." Wholists, seeing information as a whole, generally obtain an overall perspective (Riding & Mathias, 1991; Riding & Pearson, 1994), grasping general connections (Pask, 1976) and appreciating the complete context of a situation (Riding & Pearson, 1994). Consequently, the 'balanced' view they can obtain means they are less likely to have extreme views or attitudes (Riding, Glass & Douglas, 1993) although these views may be based on broad, personal (Pask, 1976), and often unjustifiable
associations (Entwistle & Ramsden, 1983). In addition, the wholist will find difficulty in separating a situation into parts (Riding, Glass & Douglas, 1993; Riding & Sadler-Smith, 1992) and may find difficulty in differentiating between successive stimuli as their organisational schemes access multiple and random variables rather than being linear or sequential (Schmeck, 1988). Hence, wholists may struggle in distinguishing the issues that make up a whole piece of information (Riding, Glass & Douglas, 1993), and they may tend to view material in a simplistic form (Miller, 1987). Wholists may, therefore, have a greater tolerance for uncertainty than analytics with regard to the 'correctness' of their thoughts and ideas, and they tend to be impulsive (Pask, 1988; Schmeck, 1988). Figure 2.02(a) shows diagrammatically how material containing six separable parts will be seen as a complete 'whole'; Figure 2.02(b) highlights how a wholist may sometimes tend to over-simplify a piece of material blurring the distinction between its relevant parts.

Figure 2.02 Diagrammatic impression of how wholists may view material containing six separable parts (Riding & Sadler-Smith, 1992: p328).

2.02(a) Wholist 2.02(b) Blurred Wholist View

The strength of the analytic is that they can separate information into parts (Riding, Glass & Douglas, 1993) and, through step-by-step organisational schemes (Schmeck, 1988b), they are able to build logical relationships between argument and evidence (Pask, 1976). Hence, through 'feature analysis' (Miller, 1987), they are able to see the heart of a problem, to identify similarities and to detect differences (Riding, Glass & Douglas 1993; Schmeck, 1988b). Furthermore, analytics, unlike wholists who generally keep material as it is found (Douglas & Riding, 1993; Rush & Moore, 1991; Witkin, Moore, Goodenough & Cox 1977), are able to impose a structure upon information (Satterly & Telfer, 1979; Schmeck, 1988b) or to restructure information (Rush & Moore, 1991; Witkin, Moore, Goodenough & Cox, 1977). Yet, by examining parts of a whole, it is difficult to achieve a balanced view and there may be a tendency to focus on one aspect of the situation to the exclusion of others and to distort or exaggerate it out of its proper proportion (Riding, Glass & Douglas, 1993; Riding & Sadler-Smith, 1992). Figure 2.03(a) shows diagrammatically how an
analytic will generally separate material into its component parts; Figure 2.03(b) highlights how there may be a tendency to concentrate on only one part of the whole and thereby distort it from its real perspective.

Figure 2.03 Diagrammatic impression of how analytics may view material containing six separable parts (Riding & Sadler-Smith, 1992: p328).

It is suggested that an individual's position on the wholist-analytic dimension interacts with the structure of the learning material to influence performance (Riding & Read, 1996). For example, when faced with learning from a prose passage, wholists appeared to learn best when the title of the passage was given before the passage was presented (Douglas & Riding, 1993), thereby suggesting the wholists' preference for a structure and an overall perspective to be provided.

Riding & Anstey (1982) suggested that the effects of the verbaliser-imager style dimension may be illustrated by considering the word 'bird'. In the verbal mode, 'bird' may be interpreted by the reader as a verbal association connected to the concept of BIRD whose attributes include 'has feathers' and 'can fly' which is subsumed within the category of 'animal'. An imager may not only generate a mental picture of a bird (Riding & Anstey, 1982) but may also look at the physical characteristics of the information (Riding & Tempest, 1986). For example, Riding & Tempest (1986) suggested that the word 'bird' is more 'visually distinctive' than a word such as 'caravan' as it is composed of both tall and short letters.

Riding & Douglas (1993) suggested that the effects of the verbaliser-imager style dimension are important when the presentation of learning material, and the type of content of learning material are considered. For example, verbalisers generally learn better from verbal or written presentations, while imagers learn better from pictorial presentations (Riding & Ashmore, 1980; Riding & Buckle, 1990). Furthermore, where there is both verbal and visual material available there is evidence that verbalisers learn best when the textual information is presented before the pictorial
illustrations, while imagers prefer the illustrations before being presented with the textual information (Riding & Mathias, 1991). With reference to the type of content and the effects of the verbaliser-imager style dimension, the example of a reading text can be useful. It is suggested that imagers recall highly descriptive text better than acoustically complex and unfamiliar text while the opposite appears true for verbalisers (Riding & Calvey, 1981, Riding & Dyer, 1980). Therefore, with reference to both mode of presentation and content type, individuals appear to learn best when the information can be readily transferred to their preferred mode of presentation (Riding & Douglas, 1993). For example, initial reading performance, which is clearly a very verbal task, has been found to be superior in verbalisers (Riding & Anstey, 1982).

Riding & Dyer (1980: cited in Riding & Read, 1996) distinguished between voluntary and involuntary levels of control with respect to the verbaliser-imager dimension. It was suggested that during voluntary control the individual makes a deliberate and conscious decision to generate a verbal or image response, while during involuntary control the verbal or image representation occurs spontaneously without conscious effort. It may be argued that verbalisers do not use images greatly during involuntary processing, although they can generate them successfully by conscious effort. By contrast, imagers generally use involuntary imagery as a means of representing information. However, as imagers are not in voluntary control, the images developed are likely to be less stable than those produced by verbalisers as they may be liable to interference and displacement by further involuntary intrusive images (Douglas & Riding, 1994; Riding & Read, 1996). Such involuntary control may explain why Riding & Tempest (1986) noted that imagers can struggle with a task such as drawing from memory. It is reasonable to assume that the opposite applies to verbalisers and imagers with respect to verbal associations, where verbalisers may find that their involuntary controlled verbal associations tend to be less stable than those consciously evoked by imagers (Riding & Read, 1996). Indeed, imagers sometimes performed better on recall tasks than verbalisers, when the verbal description was simple enough to visualise accurately (Riding & Calvey, 1981; Riding & Dyer, 1980; Riding & Taylor, 1976). Therefore, a pupil's ability to perform a specific task or learn efficiently may depend upon how sensitive they are to the interference effects of involuntary control from their processing system (Riding & Tempest, 1986).

Important, the wholist-analytic and verbaliser-imager style dimensions are independent of each other (Borg & Riding, 1993; Riding & Douglas, 1993; Riding & Mathias, 1991), implying an individual's position on one of the dimensions does not affect their position on the other. Hence, an individual may be a wholist-imager, a
wholist-verbaliser, an analytic-imager or an analytic-verbaliser. Furthermore, these styles will interact with one another in influencing performance (Boulter & Kirby, 1994; Riding & Mathias, 1991). The best performance on many tasks is, therefore, likely to come from combinations of the style dimension that offer the greatest strengths, namely wholist-verbalisers, and analytic-imagers, since both of these combine some facility to both analyse and see as a whole, whereas wholist-imagers and analytic-verbalisers have less complementary facilities (Riding & Mathias, 1991; Riding & Sadler-Smith, 1992).

2.3.3.4 Should Instruction Match or Mismatch Cognitive Style Combinations?

Carbo (1990) suggested that a match of instructional design to style may lead to what Csikszentmihalyi (1990: cited in Carbo, 1990) called a 'flow experience', one that is intensely pleasurable. Dunn, Griggs, Olson, Beasley & Gorman (1995) performed a meta-analytic validation of the Dunn & Dunn Model of Learning-Style preferences, and they concluded that, referring to the standard normal curve, that pupils whose styles were accommodated would be expected to achieve 75% of a standard deviation higher than pupils who had not had their styles accommodated. Dunn, Griggs, Olson, Beasley & Gorman (1995: p353) claimed that, "matching students' learning-style preferences with educational interventions compatible with those preferences is beneficial to their academic achievement." A four-year investigation by the U.S.A. Office of Education that included examination of national test data, on-site visits, observations and interviews, concluded that matching teaching to pupils' styles had a positive effect on the achievement of classified special education pupils (Alberg, Cook, Fiore, Friend & Sano, 1992: cited in Dunn, Griggs, Olson, Beasley & Gorman, 1995). Therefore, it has been argued that teachers need to use a variety of teaching and assessment methods to reach every pupil (Sternberg, 1994). Teachers are best at teaching children who match their own styles of thinking and learning, but often overestimate the extent to which their pupils share their own styles (Sternberg, 1994). As a result, it is more likely that these pupils will be undervalued and even appear stupid rather than 'mismatched' (Sternberg, 1994). Matching the teacher and the pupil's cognitive style may provide an interpersonal attraction whereby each views the other positively (DiStefano, 1970: cited in Witkin, Moore, Goodenough & Cox, 1977), and whereby information is learned quicker and retained longer (Pask, 1976).

However, it is wrong to suggest that an individual will not benefit from any teaching that does not 'match' their cognitive preferences (Luke & Hardy, 1996). It has been argued that it is important to 'mismatch' as well as 'match' an individual's cognitive preferences during lessons (Luke & Hardy, 1996; McCarthy, 1990) so as to
encourage the individual to be flexible and adapt to the situation faced rather than being dependent on information being provided in a manner that suits them. However, Miller (1991: p235) warned that encouraging stylistic versatility; "...can be psychologically damaging. Extremely specialised students should be left alone, secure within the confines of their dominant mode."

In Physical Education, Mawer (1995) acknowledged that there may be a need to both 'mismatch' and 'match' teaching and cognitive styles. Similarly, Joyce & Weil (1986: p440: cited in Mawer, 1995) noted, "to help students grow we need to generate what we currently term 'dynamic disequilibrium'. Rather than matching teaching approaches to students in such a way as to minimise discomfort, our task is to expose the students to new teaching modalities that will, for some time, be uncomfortable to them." Witkin, Moore, Goodenough & Cox (1977: p36) noted that in some circumstances, a contrast in styles in the classroom may be more 'stimulating' and may allow pupils to develop their thoughts by learning in a different manner. Furthermore, Das (1988) claimed that in order to read successfully and to gain a full understanding there needs to be a balance in cognitive style with the pupil utilising the characteristics from both ends of each style dimension.

In practice, most lessons will include pupils of various style combinations and, therefore, whether a teacher would like to match or mismatch pupils' cognitive styles, it is extremely likely that the teacher will be matching some pupils and mismatching others. Furthermore, it may be that other match-mismatch variables in the learning context, such as a gender, have more effect on learning efficiency and can obscure any 'matching' effects of cognitive style (Witkin, Moore, Goodenough & Cox, 1977). A teacher can only offer variety in approaches and try to present instructional material wholistically and analytically (Luke & Hardy, 1996; Riding & Sadler-Smith, 1992) which can be readily represented verbally or visually by pupils (Luke & Hardy, 1996; Riding & Douglas, 1993). Williams (1993: p31: cited in Mawer, 1995) appeared to have appreciated this point, noting that when teaching gymnastics in schools "...there are pupils who like to be given the answer and work towards it and who dislike unknown expectations. Others like to discover new ideas for themselves and dislike teacher oriented classrooms, repetition and drills. Some dislike individual work and no student interaction, while others dislike group projects. The fact that a single approach is thus unlikely to maximise learning opportunities for all pupils is a further reason for using a range of teaching styles rather than relying upon a single approach."
2.3.3.5 The Stability of Cognitive Style Combinations

Throughout cognitive style research there is often no real clarification between consistent preferences and transient reactions (Moran, 1991). How consistent does an action have to be before it is seen as being a style? How stable is style? Witkin, Moore, Goodenough & Cox (1977) claimed there is relative style stability. Geiger & Pinto (1991) claimed that style preferences remain relatively stable in the face of shifts in class size, pedagogical techniques, teaching approaches, and increased concentration in one's area of study, although there may be a change with time and experience. However, it is argued that repeated use and experience of a specific style combination may cause even a 'versatile' learner to become 'polarised' (Pask, 1976: p141). Freeman & Whitson (1992) suggested that style preferences may be changeable and Brodzinsky (1982) argued that cognitive style is so unstable that there is a need to pay more emphasis to task and situational characteristics. Quite simply, "...the question of changes in preferred learning styles is a thorny one and open to continued debate" (Geiger & Pinto, 1991: p761).

It would appear that certain cognitive preferences may be more stable than others. Indeed, Curry (1983) developed an 'Onion Model' in which she suggested that certain preferences or elements of cognitive style could be influenced more than others. Similarly, Schmeck, Geisler-Brenstein & Cercy (1991: p360) suggested that "...personality is inextricably linked with that person's learning style." The basic personality dimension of extroversion-introversion appears to interact with an individual's preferred cognitive representation of information (Riding & Anstey, 1982; Riding & Dyer, 1983; Riding & Tempest, 1986). As personality is considered to be very stable (Entwistle and Ramsden, 1983), cognitive representation preferences may be more stable than cognitive processing preferences.

If certain cognitive preferences can be overcome, then this may allow an individual to have greater flexibility in a greater number of learning situations. Pask (1976, 1988) noted that the most successful pupils appeared to have a 'versatile' cognitive style, demonstrating the characteristics of whatever cognitive style combination was the most appropriate to the situation. The ability to adapt or overcome individual cognitive style preferences is crucial if a pupil wants to learn in any situation. Riding & Mathias (1991) explained how the lack of style versatility can hinder learning in certain contexts, noting that individuals who are presented with information which does not match the way that they prefer to represent information would have to attempt to 'translate' it into their preferred representation. Therefore, if an individual preferred to verbally represent information but was given information through
images, that individual would have to try to transfer the images into a verbal form. As it is unlikely to be a perfect translation the resulting interference would hinder performance. As such, while pupils will predominantly tend towards a specific style combination (Riding & Cheema, 1991; Riding & Taylor, 1976), ideally pupils need to vary how they process and represent information.

It has been argued that individuals may attempt to develop cognitive strategies, flowing from cognitive style, to overcome tasks where their style is inappropriate (Boulter & Kirby, 1994; Riding & Sadler-Smith, 1992; Witkin, Moore, Goodenough & Cox, 1977). Riding & Douglas (1993) noted that imagers did not make greater use of diagrams in their answers to a task which involved text only and, therefore, suggested that the imagers were forced to use cognitive strategies that they would not 'naturally' have tended towards to work in the verbal mode of representation. It appears that a pupil's natural tendency to a style combination may be relatively stable but the cognitive strategies that a pupil uses can be influenced; thus, the pupil will predominantly use the cognitive strategies that emerge from their preferred cognitive style combination but their choice of cognitive strategy can be influenced by other factors.

2.3.3.6 Interacting Variables with Cognitive Style Combinations

As cognitive style is often incorporated into definitions of learning style (Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995), it could be assumed that the other learning style factors such as sociological, environmental, physiological and emotional variables, may interact with cognitive style combinations. However, in addition, other variables such as the content of a lesson or the tasks involved in a lesson may also interact and influence pupils' cognitive style combinations.

2.3.3.6.01 Sociological:

It has been argued that "as Cognitive Styles affect the way in which an individual thinks about and represents situations in the external world, it is reasonable to expect that they might also be related to aspects of social behaviour in addition to performance on cognitive tasks" (Riding & Read, 1996: p 84). Indeed, there appear to be differences between wholists and analytics with regard to the concept of 'social orientation' (Witkin, Moore, Goodenough & Cox, 1977). Wholists appear to have greater attentiveness to social cues than analytics (Witkin, Moore, Goodenough & Cox, 1977), they tend to look directly at the faces of individuals to gain information about the thoughts and feelings of that individual (Ruble & Nakamura, 1972) or to
attend more to verbal messages if they include social content (Eagle, Goldberger & Breitman, 1969; Fitzgibbons & Goldberger, 1971). Although there is no significant difference in general learning ability or memory between wholists and analytics, the implication is that wholists tend to perform better at learning and remembering social material (Witkin, Moore, Goodenough & Cox, 1977), even if the material is peripheral to the main task being considered (Fitzgibbons, Goldberger & Eagle, 1965). Wholists consider external social referents when defining their attitudes and feelings, particularly under conditions of uncertainty (Witkin, Moore, Goodenough & Cox, 1977). Therefore, wholists, when faced with ambiguity, are more likely than analytics to believe teachers or lecturers if they have no reason to mistrust them (Linton, 1952: cited in Witkin, Moore, Goodenough & Cox, 1977).

Wholists like being with people (Witkin, Moore, Goodenough & Cox, 1977; Zakrjajsek, Johnson & Walker, 1984), and often provide ‘welcoming’ body language, whereas analytics demonstrate a more ‘distancing’ non-verbal communication (Greene, 1973: cited in Witkin, Moore, Goodenough & Cox, 1977). The result of these ‘social’ preferences is that wholists are generally well known and better liked than analytics (Oltman, Goodenough, Witkin, Freedman & Friedman, 1975).

Comparing wholists and analytics, it has been argued that there are variations in the extent of their ‘sense of separate identity’ (Witkin, Moore, Goodenough & Cox, 1977: p13). Wholists have less distinct internal frames of reference and less segregation between the perception self and non-self than analytics (Witkin, Goodenough & Oltman, 1979; Witkin, Moore, Goodenough & Cox, 1977). Riding (1991b: cited in Riding & Read, 1996) has suggested that the wholist-analytic style dimension may be reflected socially so that wholists and analytics appear, respectively, dependent or self-reliant, flexible or consistent, realistic or idealistic and vague or organised. Furthermore, analytics are very aware of the needs, feelings and attributes which they experience, providing themselves with internal structure and making it less likely that they will automatically adhere to external social referents (Witkin, Moore, Goodenough & Cox, 1977). With respect to the body concept, analytics see the body as having distinct limits, with each part being discrete yet inter-related to form a structured whole; wholists have a more ‘global’ conception of the body (Witkin, Dyk, Faterson, Goodenough & Karp, 1962).

Numerous researchers have suggested that verbalisers are extroverts and imagers introverts (Riding, Burton, Rees & Sharratt, 1995: cited in Riding & Read, 1996; Riding & Dyer, 1980). As a result, it is suggested that verbalisers will be more outgoing and lively, and imagers polite and restrained. Verbalisers may focus on
external, stimulating tasks, whereas imagers prefer to focus on more internal and passive tasks. As a consequence, verbalisers may prefer the social aspects of work whereas imagers may be more content to work alone, and verbalisers will be less willing than imagers to do routine tasks (Riding & Read, 1996).

Riding & Read (1996) investigated the interaction between sociological grouping preferences and cognitive style combinations. It appeared that all ability and style combinations preferred group or pair work, with wholists, particularly lower ability wholist-imagers, showing the greatest preference. Pair work was preferred by wholists marginally more than analytics, especially if the individuals were higher ability wholist-imagers or lower ability wholist-verbalisers. Notably, it is claimed that with reference to co-operative learning that wholists will benefit from being paired with analytics and that analytics will not adversely be affected by such pairings (Dansereau, 1988). Individual work was least disliked by analytics and this was particularly the case with higher ability analytic-verbalisers. As Riding (1991b: cited in Riding & Read, 1996) suggested, as analytics tend to be more separate and independent than wholists, they may be more willing to perform individual work. It is suggested that higher ability verbalisers probably like group work if they are fluent and have confidence in the subject, and that the imagers prefer pair work where they can contribute but are less likely to be hindered by lower verbal fluency (Riding & Read, 1996). Furthermore, Dansereau (1988) suggested that pupils who demonstrate moderate verbal skills tend to demonstrate more enhanced skills when paired with high verbal-ability learners. Therefore, it may be that imagers prefer working in pairs as it may enhance their performance. It may be that verbalisers prefer large group work, especially if they have high ability, as they tend to be more extroverted than imagers (Riding & Dyer, 1980). For low ability pupils, verbalisers prefer pair work and imagers like group work, where perhaps they can be quiet and hide their lack of understanding. The influence of verbaliser extroversion may still be present as, for example, in pair work they can have greater attention paid to them without the threat of embarrassment. Dansereau (1988) also implied that if a verbaliser is paired with an imager, the imager may learn by observing the strategies of the partner, while the verbaliser may learn new methods by being placed in the role of 'teacher'. That is, Dansereau (1988: p118) stated, "dyads who are heterogeneous with regard to cognitive style...outperform homogeneous pairs."

In general, analytics tend to ask and answer more questions than wholists (Riding & Read, 1996). This appears to confirm the characteristics of the analytic, in which they able to identify the individual parts and issues of a topic and to have a desire to clarify them balancing argument and evidence (Pask, 1976; Schmeck, 1988). There may be
exceptions depending upon the interaction between subject and gender. For example, Riding & Read (1996) suggested that as Science may be perceived as a 'male' subject, the influence of cognitive style in females may have less effect with respect to asking and answering questions in this subject. Indeed, there was no difference between the number of questions asked and answered by wholist and analytic females during a Science lesson (Riding & Read, 1996). It appears that there is more asking and answering of questions in the group situations rather than in class situations, and this may be due to group situations lending themselves more to discussion. Wholists were more active in the group situations than analyts during an English lesson, but analyts were more active during a Science lesson. However, in whole class situations, it appeared the opposite, with wholists being more active during Science lessons and analyts more active during English lessons (Riding & Read, 1996). It may be that the types of questions asked in a group and a class situation vary between the subject areas and, therefore, suit pupils of different style combinations (Riding & Read, 1996).

Answering and asking questions are likely to be influenced by a pupil's confidence. Riding & Read (1996) examined the interaction between the wholist-analytic style dimension, subject (English, French and Science) and gender, and it appeared that, in general, wholists consider themselves more confident than analyts. The only exception concerned male pupils during English lessons. It has been noted that as wholists can often view information in a simplistic form (Miller, 1987) they may be impulsive with regard to accepting that their thoughts are correct, and, therefore, their confidence may increase (Pask, 1988; Schmeck, 1988). However, as English may be viewed as a 'female' subject (Riding & Read, 1996) this influence may affect the strength of the wholist-analytic style dimension and, as a result, explain why wholist males were no more confident than analytic males during English lessons.

Considering the verbal-imager style dimension, generally imagers are more confident than verbalisers, particularly for English (Riding & Read, 1996). It is suggested that as imagers may require voluntary control for 'verbal' work, they perceive they have control over tasks in English, whereas verbalisers may be less confident as their representation may be under involuntary control and therefore open to interference and instability (Douglas & Riding, 1994; Riding & Read, 1996).

Guild (1994) suggested that cultures have distinctive style patterns, but, quite rightly, warns that generalisations about a group of people can often lead to naive inferences about individual members of that group. However, Hilliard (1989: p17: cited in Guild, 1994) assured us, "Educators need not avoid addressing the question of style for fear
that they may be guilty of stereotyping students. Empirical observations are not the same as stereotyping, but the observations must be empirical and must be interpreted properly for each student."

Schmeck (1988) suggested that parenting could influence cognitive style. Parents who are sensitive to infant impulses and try to help them implement what they are trying to express may allow them to develop a sense of 'self' and, therefore, become more analytic. With infants whose parents tend to 'twist' their expressions to somehow satisfy their own needs or fears may hinder the development of 'self' in the infants and, as a result, lead them to become more wholistic. Sternberg (1994) also argued that there was a family influence on style claiming that later-borns are more likely to prefer creation and invention than first-borns. It may be that cognitive style is more the result of the role models that children emulate at different points in their lives rather than purely the result of parental influence (Sternberg, 1994). As such, the significance of teachers, and the role of teachers, is paramount (Biggs, 1988).

In summary, sociological variables ranging from pupils' social orientation (Witkin, Moore, Goodenough & Cox, 1977) to their perceptions of class organisation appear to interact with pupils' cognitive style combinations. While most of these sociological variables seem to be influenced by cognitive style combinations there are some variables that may influence the effects of pupils' cognitive style combinations.

2.3.3.6.02 Environmental:

The relationship between environment and style has been examined, with Kolb & Fry (1975: p36) believing that wholists prefer an environment that; "...involves them fully, openly and without bias in new experiences." Yet, can the environment influence style? Boyatzis & Kolb (1991) believed that the learning processes involve an integrated transaction between the individual and the environment, and Tinajero, Páramo, Cadaveira & Rodriguez-Holguin (1993: p793) considered style; "...with respect to the environment." Furthermore, the environment can affect learning interest (Kolb & Fry, 1975), which may in turn influence style. Interestingly, Hayden & Brown (1985) noted that pupils changed their preferred style over time, and suggested this may be due to the effects of the college environment. There is limited research regarding the interaction between the environment and pupils' cognitive style combinations although the presence of an interaction seems evident.
2.3.3.6.03 Physiological:

It has been suggested that pupils may have preferred energy or arousal levels and certain mobility requirements, as well as perceptual preferences between auditory, visual, tactile and kinaesthetic or whole body involvement (Brunner & Hill, 1992; Dunn, Griggs, Olson, Beasley & Gorman, 1995). Notably, Brunner & Hill (1992) suggested that through consideration of perceptual factors within physiological preferences, performance in Physical Education may be enhanced. Brunner & Hill (1992) reported that according to learning style research any new material is best learned through perceptual strengths and reinforced through secondary perceptual preferences. Research examining the relationship between physiological variables and pupils' cognitive style combinations is scarce although, once again, there does appear to be some interaction evident.

2.3.3.6.04 Emotional:

It is argued that emotional components are inter-related with cognitive style (Entwistle & Ramsden, 1983). Examining aspects of motivation can provide an insight into some of the emotional components and emotional learning style preferences that may interact with cognitive style (Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995). Wholists require and are affected more by externally defined goals and reinforcements, especially of a social nature, whereas analytics tend to have self-defined goals and reinforcements (Witkin, Moore, Goodenough & Cox, 1977). Analytics tend to learn more in situations requiring intrinsic motivation, although any difference is removed when external rewards are administered (Steinfeld, 1973: cited in Witkin, Moore, Goodenough & Cox, 1977). The unmotivated show no preference for either wholist or analytic work (Entwistle & Ramsden, 1983) with research suggesting that there must be 'intention' and a willingness to learn (Kirby, Moore & Schofield, 1988; Satterly & Telfer, 1979). Unfortunately, while research has examined the effects of certain emotional variables, such as motivation, upon learning, the interaction between emotional variables and cognitive style remains relatively ignored.

2.3.3.6.05 Content:

Westman (1993) suggested that the development of styles can be studied by investigating specific content areas, and this may clarify why both stability and change in styles have been reported (Geiger & Pinto, 1991). Riding & Pearson (1994) argued that performance in a subject would be influenced by the extent to which
success in the subject required an overall view, or an ability to separate in to parts, or both. "There was a significant interaction between Wholist-Analytic style and subject in their effect on performance" (Riding & Pearson, 1994: p421). For example, Riding & Pearson (1994) argued that French lessons were more suited to wholists and suggested that the analytic pupils may have focused so strongly on individual aspects that it led to an inefficient fragmentation of the information.

2.3.3.6.06 Type of Tasks and Subject:

Riding & Read (1996) asked both Science and French pupils whether they preferred product-based tasks or process-based tasks. Product-based tasks referred to those where the pupil was required to produce a piece of work where the teacher was more interested in the final outcome than in how it was completed, such as completing a set of examples or obtaining some information. Process-based tasks would require the pupils to discuss and develop ideas or to use certain strategies where the teacher was more interested in how the task was completed, such as trying out or making up different ways of doing a task. Generally, analytics were more oriented towards product-based tasks and wholists were more oriented towards process-based tasks. Imagers were biased towards process-based, while verbalisers preferred process-based tasks when they were wholists and product-based tasks when they were analytics. Riding & Read (1996) argued that the analytics tended to be more focused, more convergent in their thinking and, therefore, more goal-directed.

Analytics are believed to perform better than Wholists on cognitive tasks (Satterly & Telfer, 1979; Witkin, Moore, Goodenough & Cox, 1977), they are more interested in the abstract and theoretical (Biggs, Fitzgerald & Atkinson, 1971) and they are superior in discriminating between differences in both colour and weight (Fine, 1972, 1973). Hence, it has been suggested that specific cognitive styles may match certain topics and subjects (Ramsden, 1988). Zakrajsek, Johnson & Walker (1984) implied that a high percentage of Dance and Physical Education Majors had a wholist cognitive style, but debated how much the training determined the style and how much the natural style tendency determined the field of study. Notably, Dunn (1990) argued that style does not affect subject preference although the way it is taught may; "A teacher's cognitive style is likely to affect their preferred teaching style, forming a 'format preference'" (Riding & Read, 1996: p104). If an individual perceives (consciously or unconsciously) that Dance is taught in a wholistic manner and this is how they would like information to be processed, that individual may be attracted to the lesson (Dunn, 1990). Riding & Read (1996) noted that school subjects may have 'natural' format dominances and may prove beneficial to specific cognitive style.
combinations. However, "the extent to which these subject format dominances are 'natural' to the subject or the product of how teachers were themselves taught and prefer to offer them is unclear, but insofar as possible, as wide a range of mode as the subject allows should be offered to facilitate learning by pupils of a range of styles" (Riding & Read, 1996: p102).

2.3.3.6.07 Pupil Ability:

With reference to style preferences and subject matter, ability appears to be an interacting variable. For example, Dunn, Griggs, Olson, Beasley & Gorman (1995) claimed that academically average pupils were more responsive to style accommodations in lessons than were high, low or mixed groups of pupils. Riding & Read (1996) investigated the interaction between subject matter (English and Science), cognitive style combinations and ability, and concluded that the 'natural' tendency of verbalisers to use writing and imagers to use pictures increased with ability. It would appear that having ability in a subject does not automatically mean that pupils will be using the appropriate style combination strategies for the task or subject, but may mean that they can use their natural mode more efficiently even in non-suited situations. For example, within English, higher ability pupils preferred the mode of writing which was naturally appropriate to the subject, except for the wholist-imagers, who said that they would rather complete tasks with pictures (Riding & Read, 1996). "Able students were thus characterized by the use of learning strategies commensurate with their cognitive style...Where subjects allowed, they were therefore able to maximize learning" (Riding & Read, 1996: p101). However, when necessary, the higher ability pupils may be able to use strategies emerging from a different, and possibly more appropriate, style combination. For example, within Science, where pictures were the most appropriate representation, high ability verbalisers as well as imagers selected to complete the tasks with pictures. It appeared that lower ability pupils were more constrained by the usual format for the subject than those of higher ability (Riding & Read, 1996). When pupils had lower ability there appeared to be a problem of interference between the pupils' natural style combination strategies, over which they may have lacked voluntary control, and those strategies most appropriate for the subject matter (Riding & Read, 1996).

2.3.3.6.08 Intelligence:

Although subject matter and ability appear to interact with cognitive style, this is not the case with intelligence. It is claimed that "...style is independent of intelligence" (Riding & Pearson, 1994: p419). The basic distinction between them is that
performance on all tasks will improve as intelligence increases, whereas the effect of style on performance for a pupil may be either positive or negative depending on the nature of the task (Riding & Pearson, 1994). As a result, "both style and intelligence will affect performance on a given task" (Riding & Pearson, 1994: p423).

2.3.3.6.09 Age:

Kirby & Lawson (1983) suggest that 'natural' cognitive style will increase with age or grade level unless pupils are encouraged to alter this pattern. Furthermore, Hunt (1974: cited in Witkin, Moore, Goodenough & Cox, 1977) suggested that the wholist processing style preference generally appears developmentally earlier than the analytic processing style preference.

2.3.3.6.10 Hemisphericity:

Tinajero, Páramo, Cadaveira & Rodriguez-Holguin (1993) claimed that there is a relationship between the wholist-analytic style dimension and hemisphericity, with the analytic having consistently greater hemispheric specialisation. Riding, Glass & Douglas (1993) maintained that there is a link between the verbaliser-imager style dimension and hemisphericity, with verbalisers having predominantly left hemisphere activity and imagers having predominantly right hemisphere activity. Torrance & Rockenstein (1988) referred to left and right brain dominance in their discussion of 'stylistic' tendencies.

2.3.3.6.11 Gender:

Witkin, Moore, Goodenough & Cox (1977) suggested that women tend to be more wholistic whereas men are more analytic although the difference between the sexes is quite small compared to the range within each sex. Riding & Read (1996: p85) argued that there "do not appear to be any overall gender differences with respect to cognitive style although there are likely to be gender-based learning strategy preferences, across and within subjects." The suggestion is that, although gender does not directly influence cognitive style stability, the choice of cognitive strategies that emerge from the various style combinations could be influenced by how society perceives gender roles and how pupils perceive specific subject matter (Riding & Dyer, 1983). Within Physical Education the gender difference in style does not seem to exist (Pettigrew & Zakrjseki, 1984; Zakrjseki, Johnson & Walker, 1984). Riding & Read (1996) have reviewed a great deal of gender research and have argued that when interpreting gender research there is the problem of distinguishing between, on
the one hand, biological and, on the other, cultural causes of the differences. It is difficult to assess from the research what are the 'natural' or 'learnt' features of boys' and girls' cognitive preferences and characteristics, and the relative importance of each in determining cognitive strategy preference (Riding & Read, 1996).

2.3.3.7 General Summary of Cognitive Style Dimensions

In summary, it appears that every individual will have a preference for a cognitive style combination (Dunn, Griggs, Olson, Beasley & Gorman, 1995). Every style combination can be used successfully, but can also hinder performance if applied inappropriately or overused. As Schmeck (1988: p8) claimed, "in a sense...the most sophisticated, most developed style is no style at all but a versatile reduction in rigid cross-situational, style-like consistency."

A significant argument is whether teachers should attempt to match instruction with each individual's cognitive style combination. For example, Dunn, Griggs, Olson, Beasley & Gorman (1995) argued that identical instructional environments, methods, and resources will be effective for some learners and ineffective for others. The stronger the individual's preferences, or the less academically successful the individual is, the more important it is to provide compatible instructional strategies. Given responsive and 'matched' environments, resources, and approaches, pupils attain statistically higher achievement and attitude test scores than pupils with dissonant or 'mismatched' treatments (Dunn, Griggs, Olson, Beasley & Gorman, 1995). However, Schmeck (1988: p180) argued that "we should strive to make the student's style more versatile." It is up to the teacher to vary the environment so sometimes there is a 'match' and other times a 'mismatch', thereby encouraging the development of an area that may not be a preference (McCarthy, 1990). It is acknowledged that while attempting to overcome stylistic tendencies there may be a slight disruption to the smooth flow of success, but it is still a necessary requirement (McCarthy & Schmeck, 1988).

It is accepted that an examination of the learning behaviours associated with cognitive styles can assist physical educators and curriculum specialists to better address each pupil's unique learning needs (Ennis & Chepyator-Thomson, 1990). However, in practice, for a department to adapt each lesson and teaching approach to the diversity of pupils' cognitive styles may be "a rather difficult and impractical suggestion" (Pintrich & Garcia, 1994: p122). However, Dunn, Griggs, Olson, Beasley & Gorman (1995) argued that teachers can easily accommodate each style combination in their teaching, although they also noted that the most successful studies conducted to
match cognitive style preferences were with small sample sizes rather than with large or medium sample sizes. The implication is that with larger class numbers it might be difficult to always 'match' instruction with each pupil's cognitive style combination. To encourage pupils' versatility, it may be important to emphasise the differences between styles and strategies. "Styles are probably architectural features. By contrast, strategies are ways that may be learned and developed to cope with situations and tasks, and particularly methods of utilising styles to make the best of situations for which they are not ideally suited" (Riding & Read, 1996: p82). Most pupils can learn to capitalise on their cognitive style combination strengths when they are concentrating on new or difficult academic material (Dunn, Griggs, Olson, Beasley & Gorman, 1995). It appears that rather than always attempting to match cognitive style combinations, it may be beneficial to focus on the cognitive strategies that emerge from the various cognitive style combinations and which may potentially lead to greater flexibility and appropriate action in the learning situation. Although it is acknowledged that cognitive style is not the only influence upon a pupil's development and utilisation of cognitive strategies, it is argued that it does play a central role (Palmer & Goetz, 1988). Strategy instruction combined with the development of metacognitive ability may act as the catalyst to free the individual from 'compulsive' stylistic tendencies, to a more flexible and intentional level (McCarthy & Schmeck, 1988). A review of cognitive strategy literature is offered.

2.4 Cognitive Strategy Review of Literature

2.4.1 Introduction

It has been argued by numerous researchers that cognitive strategies may flow from cognitive style combinations (e.g. Pask, 1988), although, whereas pupils' cognitive style combinations are relatively stable, cognitive strategies may be more open to influence (Riding & Read, 1996). Therefore, by focusing upon cognitive strategies teachers may be able to encourage pupils to break 'compulsive' stylistic tendencies and adapt to the task in hand more appropriately, especially if metacognitive ability is developed concomitantly (McCarthy & Schmeck, 1988). Following a definition of cognitive strategies, there will be a consideration of the sources of cognitive strategies, the control and initiation of cognitive strategies and the variables that may interact with strategy development and utilisation. The emphasis that is placed on cognitive strategies throughout the study will then be explained.
2.4.2 Definition

There are problems in defining 'strategy' (Crowley & Siegler, 1993; Palmer & Goetz, 1988) as researchers appear to differ in how general and incorporating the term should be (see Bjorkland, 1990). For example, Crowley & Siegler (1993) noted that some definitions argued that cognitive strategies must be conscious, planned processes, whilst others argued that cognitive strategies were any activities that streamlined cognitive performance. Snowman (1986) attempted to clear the problem of strategy definitions by forming a distinction between strategic and tactical ways of learning. A strategy is a sequence of procedures for accomplishing learning (Derry & Murphy, 1986; Schmeck, 1988; Snowman, 1986) and the specific procedures within this sequence are called tactics (Snowman, 1986). Schmeck (1988) suggested that there was a dimension of strategic generality-specificity. The term strategy refers to a pupil's general approach or plan during a learning task whereas the term tactics refers to the specific activities of the pupils. Tactics operationalise strategies and, therefore, are the observable activities that imply certain strategies are being utilised. As such, cognitive strategies signify the collection of mental tactics selected, employed and controlled by an individual in a particular learning situation to facilitate their acquisition of knowledge or skill, and to achieve their desired objectives (Derry & Murphy, 1986; Paris, Lipson & Wixon, 1983). More succinctly, when cognitive strategies are utilised in a particular learning situation they are referred to as tactics. For example, an outlining strategy or an underlining strategy (Mayer, 1988) aimed at developing a wholistic assessment or an analytic assessment respectively, would be referred to as tactics rather than strategies if they were utilised for a particular learning situation such as examining a lecture handout.

It has been further suggested that cognitive strategies can be defined as being deliberate, learner-initiated and learner-controlled (Palmer & Goetz, 1988; Paris, Lipson & Wixon, 1983; Winograd & Hare, 1988). As such, it is implied that cognitive strategies will not be utilised unless a pupil is motivated and deliberately attempts to initiate and control them (Palmer & Goetz). However, the author suggests that learning does not always occur consciously and while it is accepted that there is a dimension of strategic generality-specificity with reference to cognitive strategies and tactics, from an examination of the origins of various 'types' of strategies it can be argued that cognitive strategies are any goal-directed cognitive activities, be they obligatory or nonobligatory, conscious or unconscious, efficient or inefficient (Crowley & Siegler, 1993).
2.4.3 The Style, Strategy and Tactic Connections

Numerous researchers have claimed that cognitive strategies flow from cognitive style (Riding & Cheema, 1991; Rush & Moore, 1991; Witkin, Moore, Goodenough & Cox, 1977). When a cognitive strategy is favoured with a certain bias that ignores subtle variation in the situation, it suggests that there may be a presence of a cognitive style (Schmeck, 1988). As such, Pask (1988: p85) claimed that "a style is a disposition to adopt one class of learning strategy" and noted that the "consistency of the person's strategic preference across tests (and subject matters) is curiously high" (Pask, 1988: p97). Cognitive style can determine strategy selection more than the contextual demands (Pask, 1988) and an individual's domain knowledge (Swan, 1993). Therefore, as an example, it would appear that wholistic individuals will have a natural tendency to utilise wholistic strategies (Kirby, 1988), focusing strongly on overall features of the task. McCarthy (1990) developed a system known as 4MAT to introduce the idea of cognitive style combinations and their respective cognitive strategies to schools. The analytic pupils often used planning strategies, with problems being solved by looking at individual sections or parts of the learning tasks with the sequence of these parts being critical. However, the more wholistic pupils often based strategies on intuition, beliefs and opinions, and by looking at the whole picture (McCarthy, 1990). Kirby (1989) referred to the cognitive strategies that immediately emerge from cognitive style as general cognitive strategies. Such cognitive strategies function like traits and will generalise across domains of performance.

Perkins & Salomon (1989) suggested that general cognitive strategies act like a 'gripping device' retrieving and wielding more specific cognitive strategies. The implication is that under a general cognitive strategy heading there are various examples of specific cognitive strategies (see Schmeck, 1988b). For example, the mnemonic is a specific cognitive strategy and may be an example of a general 'analytic-verbaliser' strategy as it involves creating and labelling sections of a whole in a verbal form. Similarly, Miller (1987) argued how wholistic pupils may frequently use an analogy, which would be a specific cognitive strategy, to relate one area of knowledge to another and to develop a more overall picture. However, it is assumed that cognitive style and general cognitive strategies may not only encourage certain 'specific cognitive strategies', they will also probably influence how they are used (Kirby, 1989; Pask, 1988). Furthermore, the strength of a pupil's tendency to a cognitive style may filter down to influence how specific cognitive strategies are utilised. For example, Pask (1988) noted that while wholists generally used analogies, some relied on the task material to provide the analogies while others created their
own. Those developing their own analogies may be less dependent upon the contextual variables and, therefore; may have weaker wholistic tendencies. As such, although the 'type' of general and specific cognitive strategy may be determined by cognitive style, there may be variations in the selection and utilisation of these cognitive strategies (Pask, 1988).

While examples of specific cognitive strategies can be placed under the headings of general cognitive strategies, cognitive tactics are examples of specific cognitive strategies within a specific context and for specific content. For example, B.E.E.F. (Balance, Elbow up, Extension, Follow through) is a specific example of a mnemonic being used to identify and focus attention on the technique points of a basketball free throw and, as such, is a tactic. Spitz (1993) highlighted how specific cognitive strategies are modified for specific content, and he gave the example of a pupil learning to remember numbers by utilising a mnemonic technique of relating race times to numbers. As such, there will inevitably be more variability between pupils' tactics compared to their general cognitive strategies. However, Schmeck (1988) argued that when clusters of tactics were examined there appeared to be some consistency between them. The implication was that these tactics could be clustered together under a specific cognitive strategy heading and, therefore, a general cognitive strategy heading.

The author argues that such 'tactics' are sometimes used by pupils without any awareness that it is, indeed, a tactic. There is little understanding that it was developed from a specific cognitive strategy, and that this specific cognitive strategy could have been used for other content and in other subject areas. Returning to the pupil who utilised the mnemonic technique of relating race times to numbers, Spitz (1993) noted that the same pupil failed to utilise any mnemonic technique for remembering letters. The author argues that the pupil failed to appreciate that the initial tactic had emerged from a type of specific cognitive strategy which could have been modified for the new task. When a pupil utilises a tactic without any awareness or appreciation of the connection between that tactic and a specific cognitive strategy, then the author suggests that the pupil is actually utilising a 'blind tactic'.

The need for awareness does not mean that cognitive strategies and tactics cannot be unconsciously utilised, but the author suggests that, if necessary, the pupil should be able to consciously modify or evaluate them. Unfortunately, although cognitive strategies can be lengthy, they may also be so rapid in execution that it is almost impossible to recapture, recall or even be aware that one has used a cognitive strategy or tactic (Nisbet & Shucksmith, 1986). However, this 'awareness' leads Rush &
Moore (1991: p310) to note that, "...strategies that arise from cognitive styles may be more malleable than the styles themselves", and Witkin, Moore, Goodenough & Cox (1977: p27) to claim that there is, "...apparent malleability of learning strategies flowing from cognitive styles". An individual cannot change their natural preference for a cognitive style combination (Riding & Pearson, 1994), but may be able to influence their choice of strategies if they understand what cognitive strategy type they will tend towards, and the other cognitive strategies that are available (Riding & Pearson, 1994; Witkin, Moore, Goodenough & Cox, 1977). As such, "strategies...are amenable to change through intervention, and an educational problem is how to help students, within the limits imposed by their styles, to adopt flexible strategies" (Ramsden, 1988: p176).

In summary, it may be useful to see strategies as a continuum from cognitive style combinations and the most generalised of cognitive strategies, to the most task-specific tactics (Derry & Murphy, 1986; Nisbet & Shucksmith, 1986); Figure 2.04 offers an illustration of such a continuum.

Figure 2.04: An Illustration of the Continuum from Cognitive Style Combinations to Task-Specific Tactics

| Cognitive Style Combination | (e.g.)
|-----------------------------|--------
| General Cognitive Strategies | analytic-verbaliser |
| Specific Cognitive Strategies | analytic-verbaliser strategies |
| Cognitive Tactics | mnemonic |

'B.E.E.F' (to help identify technique points for a basketball free throw)
Nisbet & Shucksmith (1986) claimed that the notion of a structure or hierarchy of cognitive strategies is important only in so far as it might indicate the potential difficulties, temporary or permanent, to the types of cognitive strategies that may be developed and encouraged. With respect to individual pupils, not all cognitive strategies will be equal in either their generalisability or their instructability (Nisbet & Shucksmith, 1986; Schmeck, 1988). That is, the 'natural' cognitive strategies that emerge from an individual's cognitive style combination may be applied to different tasks in a rather spontaneous, unconscious, and consistent manner (Pintrich, 1990), suggesting that these cognitive strategies may be easier to generalise and to guide through instruction. However, Roberts & Erdos (1993: p265) suggested that the idea of teaching only cognitive strategies that match the cognitive style of a pupil is 'of dubious worth' as this obviously fails to take into account the different efficiencies of cognitive strategies for different tasks. Pask (1976) argued that pupils will not relinquish their 'natural' cognitive strategies, even if they cannot successfully execute them, unless very strong advice is provided. Furthermore, pupils may well be able to use certain cognitive strategies efficiently although they may not be able to adopt them 'naturally'.

2.4.4 The Initiation and Control of Strategies

It is important to examine how cognitive strategies are initiated and controlled if a clear categorisation of cognitive strategies is to be developed. The initiation and control of a cognitive strategy may arise primarily from the pupils' self-instructions and would, therefore, be learner-controlled. However, the initiation and control may come from the teacher or an instructional system which would be lesson-controlled. Furthermore, the cognitive strategy may be processed either consciously or unconsciously (Derry & Murphy, 1986; Rigney, 1978, 1980). As such, if a pupil is attempting to learn from a coaching manual, then if that pupil utilises a specific cognitive strategy, such as an analogy, to develop some appropriate tactics, then they are not only aware of their strategic action but they also initiated it. If the manual suggests the use of that specific cognitive strategy by offering the appropriate tactics then it is lesson-controlled, even though the pupil is aware of the specific cognitive strategy or tactics being used. Such externally imposed specific cognitive strategies, or more specifically, tactics, have been found to contribute to achieving in various Physical Education tasks with children (Gallagher & Thomas, 1984: cited in Singer & Chen, 1994) and collegiate athletes (Fenker & Lambiotte, 1987: cited in Singer & Chen, 1994). An assumption in this approach is that it minimises the time needed for learning (Singer & Chen, 1994). However, a situation can evolve, where a specific cognitive strategy, and the tactics that emerge from that specific cognitive strategy,
are learner-controlled but so spontaneous and automatic that there is no conscious awareness of their initiation (Derry & Murphy, 1986; Garner, 1988), which may free attentional resources for other factors (Derry & Murphy, 1986). However, while efficient learning can occur in a state of automaticity, pupils should be able to "switch on to awareness when adaptability is required" (Singer & Chen, 1994: p147). The lesson-controlled counterpart of automatic processing would involve the instructional design methodology incorporating controls into a lesson so that the pupils are required to employ particular specific cognitive strategies and tactics to accomplish subject-matter oriented tasks, although they are not aware of such employment (Derry & Murphy, 1986). Interestingly, this latter situation would be what the author refers to as 'blind tactics', as the pupils are at the level of working with specific content, the tactics are initiated by the teacher or the lesson, and the pupil lacks both awareness and control.

This situation of 'forcing' tactics is the most conventional situation in most schools (Derry & Murphy, 1986; Schmeck, 1988b). Considering 'Games for Understanding' (Thorpe, Bunker & Almond, 1986), it is apparently based around developing a lesson so that pupils are 'forced' to become aware of problems and are 'forced' to use certain gameplay tactics. For example, the long, thin court 'forces' the gameplay tactics of hitting long and then hitting short. As such, the situation is forcing pupils' discovery of the gameplay tactic rather than guiding their discovery of it (Almond, 1996). Reducing pupils' awareness and control of a specific cognitive strategy or tactic may be beneficial as pupils 'trying' to learn may see the instructions as demanding something different to what the teacher intended and, therefore, it is conceivable to structure situations so that some pupils would perform better if they were not trying to learn (Derry & Murphy, 1986; Schmeck, 1988). However, this situation of 'forced' or 'hidden' specific cognitive strategies and tactics does little to help pupils cope with requirements for further independent learning of material that is not highly 'designed' (Rigney, 1978). Burrows & Abbey (1986) noted that although their pupils were able to use the 'hit long-hit short' tactics on the long, thin court they did not use it on a larger court. The reason offered was that the pupils were probably rushed too quickly onto the larger court. However, could it be that as the task had lost the 'design' which initially forced the use of the specified gameplay tactics, the apparent learning of those tactics also disappeared? It may be that the tactics were being 'drilled' in the long, thin court situation, and as Rathmell (1978) argued with respect to mathematics, drill and practice procedures may increase children's speed and accuracy of response but these procedures are not sufficient to develop efficient cognitive strategies. The DES document (1991: p9) National Curriculum Physical Education Working Group Interim Report stated that, "Children who are required to make few decisions for
themselves and who merely respond to instructions are likely to acquire accurate physical skills, but are unlikely to develop judgement, adaptability or independence." Similarly, Steinberg (1985) implied that tactics can become 'drilled' and inflexible, noting that pupils became so proficient at a counting tactic that they could not adopt any other specific cognitive strategies or tactics to answer addition questions.

2.4.5 Interacting Variables with Strategy Development and Utilisation

Literature has suggested numerous variables that may interact with cognitive strategy development or deployment. For example, gender may create a slight difference in the choice of cognitive strategies and how they are utilised (Pokay & Blumenfeld, 1990), as may age (Chen, 1990; Palincsar & Brown, 1984; Paris & Oka, 1986), experience (Best, 1990), attention (Wittrock, 1988), ability (Eylon & Linn, 1988; Perkins & Salomon, 1989; Siegler, 1989) and interest in the task (Hidi, 1990; Reynolds & Shirey, 1988; Watkins, 1982). However, literature regarding cognitive strategies has appeared to suggest support for the metacognitive ability conceptual framework developed in the present study. Therefore, to take the literature review in full circle, the association between cognitive strategies and metacognitive ability is prioritised. However, literature regarding cognitive strategies and their interaction with pupils' knowledge base, pupils' personal attributes and contextual variables is also considered as these concepts have been discussed more thoroughly than most others in the literature, and also because they offer an insight into the possible effects of pupils having, or not having, developed efficient metacognitive ability.

2.4.5.1 Metacognitive Ability

The most significant interacting variable with cognitive strategy development and utilisation appears to be pupils' metacognitive ability. Pupils must try to develop and utilise their metacognitive knowledge and their metacognitive strategies if both cognitive strategy use and learning is to be efficient. Therefore, in this consideration of metacognitive ability, pupils' metacognitive knowledge of task variables, metacognitive knowledge of person variables, metacognitive knowledge of strategy variables and pupils' metacognitive strategies will be considered separately.

2.4.5.1.1 Metacognitive Knowledge of Task Variables:

If pupils are not clear about the purpose of a task they will not know what cognitive strategy to employ (Butler & Winne, 1995). Siegler (1989) noted how pupils switched cognitive strategies when they were presented with the same problem twice,
suggesting that if pupils do not appreciate what the task involves, strategy selection and use will be hindered. Pupils must understand the task and see it as important before any cognitive strategies will be utilised (Paris, Lipson & Wixon, 1983). As such, pupils metacognitive knowledge of the task will influence cognitive strategy use (Weinstein, 1988).

**2.4.5.1.2 Metacognitive Knowledge of Person Variables:**

As it is argued that pupils will have a 'natural' tendency for specific 'types' of cognitive strategy due to their cognitive style combination (Pask, 1988), it is clear that pupils must be aware of this influence when developing, selecting and utilising strategies. For example, if wholistic pupils are unaware that they may tend to be impulsive and may need to control this, their strategies may be less effective (Kirby, 1989). Pupils must have metacognitive knowledge of 'person' variables (Flavell & Wellman, 1977; Schmeck, 1988; Weinstein, 1988).

**2.4.5.1.3 Metacognitive Knowledge of Strategy Variables:**

It is argued that pupils not only need to know what the strategy is, but also why it should be learned, how to use it, when to use it and how to evaluate its use (Paris, 1988; Winograd & Hare, 1988). Otherwise, cognitive strategies will be based on a superficial level and become welded to the original context (i.e. 'blind tactics'), and transfer of these cognitive strategies to new, related situations will be minimised (Garner, 1990; Paris & Oka, 1986). Wittrock (1988) suggested that 'model learners' are aware of their own cognitive strategies, choose among them, and are able to employ them appropriately to task and context. Thus, these 'model learners' have metacognitive knowledge of their cognitive strategies (Weinstein, 1988).

**2.4.5.1.4 Metacognitive Strategies:**

While cognitive strategies make cognitive progress, metacognitive strategies monitor that progress (Garner, 1990). The effectiveness of cognitive strategies needs to be monitored and evaluated. For example, pupils can maintain inefficient cognitive strategies even when the need for a change is paramount (Casey, 1993; Shuell, 1990). If pupils believe that they have an effective cognitive strategy and that they have used it correctly, there is a reluctance to accept a different answer from an external source, even if they are wrong and the answer offered back is correct. Hence, Nisbet & Shucksmith (1986) claimed that both metacognitive strategies and cognitive strategies are required for efficient learning.
2.4.5.2 Pupils' Knowledge Base

Garner (1990) claimed that knowledge base and cognitive strategies closely interact. Indeed, it is argued that as pupils' knowledge in a domain increases, there will be a change in the selection and utilisation of strategies (Alexander & Judy, 1988). Rabinowitz, Cohen & Freeman (1992) noted that the typicality and familiarity of the relevant domain information when pupils are initially learning a cognitive strategy will not only enhance the use of that strategy but will also maintain its usage in other situations. Alexander & Judy (1988) suggested that domain knowledge and cognitive strategies have an interdependent relationship as domain knowledge may play a foundational role from which cognitive strategies can be developed, whilst cognitive strategies can contribute to the utilisation and acquisition of domain specific knowledge. It is claimed that pupils can distort incoming information to match, or 'fit in' with their domain knowledge which will clearly influence the development and selection of strategies (Alexander & Judy, 1988; Eylon & Linn, 1988). Similarly, pupils may be ready to use a cognitive strategy but are prevented by the absence of other non-strategy information in their knowledge base (Garner, 1988).

2.4.5.3 Pupils' Personal Attributes

Dean (1977: cited in McCarthy & Schmeck, 1988) suggested that there is a significant relationship between self-esteem and the choice of strategies with high self-esteem pupils using more sophisticated strategies. Furthermore, it appears that pupils who adopt a more intrinsic orientation not only try harder or persist longer, but also recruit more effective cognitive strategies for learning or problem solving (Pintrich, 1990). Perceptions of personal ability, or self-efficacy, can significantly influence whether strategies are utilised. For example, if pupils think they will fail in a task, even if they did use a cognitive strategy, then they will not bother using it (Garner, 1990; Palmer & Goetz, 1988). Palmer & Goetz (1988: p51) stated, "We are suggesting that the match of learner and strategy attributes conceptually forms the basis of individuals' decisions concerning whether or not they can use a strategy."

It would seem that pupils' motivation strongly interacts with the development and use of cognitive strategies as McCombs (1988: p153) claimed that "motivation is...a necessary component of strategic behaviour and a precursor to strategy use." It seems that the development of motivation and the development of strategic behaviour may be a two-way process (McCombs, 1988; Pokay & Blumenfeld, 1990).
"Context differences impose on or suggest to students different strategies of learning" (Ramsden, 1988: p159). The contextual domains that may influence pupils' deployment of strategies of learning include, the way the information is taught (Ramsden, 1988), the method of assessment (Doyle, 1983; Ramsden, 1988; Watkins, 1982) and the content and structure of the curriculum (Casey, 1993; Ramsden, 1988). With respect to the latter, Fennema, Carpenter, Franke, Levi, Jacobs & Empson (1996) noted that pupils can develop their own cognitive strategies and these may be closely integrated with the problem types. However, when tasks become too predictable, learning and cognitive strategy deployment can become 'technified' (Marton & Säljö, 1976b) and pupils simply develop 'stock responses', or template-like responses, to specific situations without grasping the underlying principles (Perkins & Simmons, 1988). Casey (1993) argued that the more complex the structure of the problem the increased likelihood of a pupil adopting an error prone cognitive strategy.

However, contextual effects operate both directly and indirectly as there may be a difference between what the contextual factors actually are, and what the pupils perceive them to be (Ramsden, 1988; Watkins & Hattie, 1990). For example, whereas the general purpose of an activity may be to gain an understanding of the content, an individual may view the purpose as simply trying, "...to come up with the right answers to the questions" (Marton, 1988: p79) and they may do so without any real understanding of the content at all, by utilising 'dubious' strategies (see MacLure & French, 1980). For example, one strategy may be to 'imitate' others' answers, even when the teacher does not offer any positive reinforcement. MacLure & French (1980) noted that there were fifteen calls of 'pliers' and 'clippers' in response to a question which was looking for the answer 'cutters', even though the teacher did not positively respond to any of them. A second strategy may be to retrieve answers that have already been introduced in the discourse (MacLure & French, 1980). Therefore while in Physical Education it is beneficial to have relevant activities while warming-up and leading to the lesson focus, it cannot be assumed that answers to questions later on in the lesson will be accompanied by understanding, even if the correct answer emerges.

Contextual influences on strategy development and deployment may take on a more sociological, or social interaction, form. For example, the lesson climate can significantly interact with strategy development and use. The pressure of competition, or having goals linked with 'performance' rather than 'mastery' can affect the choice of strategy. Furthermore, Denscombe (1980) claimed that pupils often exploit how the
climate has been developed, copying strategies used by the teacher and focusing on classroom 'negotiation' rather than learning. For example, young, male staff may 'flirt' with females, being able to use it to secure co-operation. Girls may use it as a counter strategy for similar purposes (Denscombe, 1980). Denscombe (1980) argued that pupils may focus strategy development on gaining 'control' of the teacher-pupil 'battle' and to cope with the demands placed upon them in the lesson situation. However, the focus on these strategies may strongly influence the efficiency of developing cognitive strategies aimed at understanding and learning.

Although contextual and sociological variables interact with pupils' development of cognitive strategies, it is assumed that pupils can make 'calculated' decisions and have a degree of cognitive control and not purely be the product of socialisation (Brown, Bransford, Ferrarra & Campione, 1983; Hammersley & Turner, 1980; Weinstein, 1986).

2.4.6 Why Should There be a Focus on Cognitive Strategies?

It has long been recognised that the cognitive strategies a pupil utilises when tackling a learning task are a major influence on the quality of the learning outcome (Marton & Säljö, 1976; Paris & Oka, 1986). "People rely on cognitive strategies to promote learning, remembering and problem solving" (Paris, 1988: p299). Pupils must engage in some form of cognitive strategy to build connections between new ideas, and relate new ideas to prior knowledge (Mayer, 1988; Weinstein & Mayer, 1986). "Learning and thinking strategies and skills are the tools we use to meet our learning goals" (Weinstein, 1994: p259). Supporting these claims, cognitive strategy use has been considered crucial to both reading achievement and to the learning of a new language (Chen, 1990; Paris & Oka, 1986).

Cognitive strategies may be the key to developing a 'flexible' learner who can adapt to the environment without being at the mercy of the limits imposed on them by their cognitive style (Paris, 1988; Ramsden, 1988; Witkin, Moore, Goodenough & Cox, 1977). Cognitive strategies that are not naturally present in a particular style combination can be both encouraged and developed (Rush & Moore, 1991). The importance of encouraging a variety of cognitive strategy 'types' has been emphasised. Pask (1988) argued that both wholistic and analytic strategies are required to achieve complete understanding and Torrance & Rockenstein (1988) suggested creative thinking comes from whole-brain functioning and, therefore, requires a variety of strategy 'types'. Riding & Mathias (1991) argued that when eleven-year-olds had a style combination that offered strategies to view wholistically
and to view analytically, namely the wholist-verbaliser and the analytic-imager style combinations, performance was enhanced. Similarly, it has been noted that difficulty in reading may be due to pupils relying heavily on a single cognitive strategy rather than using a variety of strategies in a flexible manner (Kirby, 1988).

Strategies are beneficial to learning, they can be identified and they can be developed (Kirby & Lawson, 1983; Weinstein & Mayer, 1986). Strategy development has provided positive results to pupils of all ages and abilities (Mayo, 1993) regardless of material format and whether strategies are used publicly or privately (Patterson, Dansereau & Newbern, 1992). Resnick (1987) suggested that cognitive strategies may not only allow people of limited education to participate in cognitively complex activity systems, but also enhance the capacity of highly educated people well beyond what they could do independently.

In Physical Education, Scantling, McAleese, Tietjen & Strand (1992) successfully encouraged a cognitive strategy, referred to as concept mapping, which helped pupils to fully comprehend and connect ideas and principles presented in the lessons. Furthermore, Bouffard & Dunn (1993) claimed that research in the movement domain has demonstrated that when an appropriate cognitive strategy is shown to pupils and they are requested to use it, motor performance usually improves. This effect has been demonstrated with labelling (Winther & Thomas, 1981: cited in Bouffard & Dunn, 1993), rehearsal (Weiss, Ebbeck & Rose, 1992; Weiss & Klint, 1987: cited in Bouffard & Dunn, 1993), and organisation (Gallagher & Thomas, 1986: cited in Bouffard & Dunn, 1993) cognitive strategies.

However, McKeachie (1988) stated that it is all too easy to assume, because 'A' pupils differ from less able pupils in study strategies, that their success is due to these strategies. It is conceivable that the causal relationships here are reversed. It may well be that 'A' pupils use different strategies because they already have a good grasp of the material, and are able to use more sophisticated strategies than those of pupils who lack sufficient background and ability. Nevertheless, McKeachie (1988: p3) acknowledged that, "the relationship is one in which effective study strategies usually result in greater learning." Therefore, the nature of children's strategic processing is an important area of consideration for teachers as well as researchers (Christensen & Cooper, 1992). Unfortunately, most of the previous interventions aimed at encouraging cognitive strategy development have actually been conducted at the more specific level of tactics, and worse still, 'blind tactics' as they have often failed to provide sufficient attention to how or why the tactics are related to specific cognitive strategies and how or why they can be used to produce an efficient learning outcome.
Clark & Salomon (1986: cited in Rush & Moore, 1991) have also noted that a lot of research has concentrated on manipulating, or restructuring, instructional tasks, rather than addressing the potential development of cognitive strategies and strategy efficiency within the pupil. Physical Education is one subject that has strongly followed this pattern (e.g. Brunner & Hill, 1992; Thorpe, Bunker & Almond, 1986). Strategy development and strategy efficiency may need to be addressed explicitly as pupils' 'spontaneous' or 'informal' strategies have been both naïve and inefficient compared to those developed through explicit guidance in school (Adetula, 1996; Alexander & Judy, 1988; Boulter & Kirby, 1994). Furthermore, the greater the repertoire of cognitive strategies the more successful the pupil is likely to be (Watkins & Hattie, 1990), especially if these cognitive strategies can be called upon 'automatically' (Weinstein, 1994).

Knoll (1987: pvii: cited in Nickerson, 1988) referred to a 'new vision of teaching' where the teacher not only considers the content and organisation of a lesson but also the cognitive strategies required by that content to make learning meaningful, integrated, and transferable. Teachers need to delicately balance content goals, cognitive strategies required for achieving those goals, and the experiences the pupils bring to their learning. Unfortunately, Nisbet & Shucksmith (1986: p82) argued that, generally, most teachers have "little notion of the sort of strategies the children would use or need." However, with reference to Physical Education, Bouffard & Dunn (1993) argued that if pupils can be encouraged to develop and utilise cognitive strategies, they may become more independent learners, which, in turn, may enable teachers to spend more time on the development of technical and aesthetic skills. Furthermore, if cognitive strategies can encourage both physical and cognitive development, it may be that cognitive strategies offer suggestions in how to discourage the task-avoidance behaviours of pupils that have been noted in Physical Education lessons (Griffin, 1984, 1985; Portman, 1995). With reference to academic subjects, Nisbet & Shucksmith (1986) suggested that it was only a short step from pupils failing due to inefficient learning-focused cognitive strategies, to pupils searching for task- or teacher- avoidance strategies that would help them hide their lack of success.

Some researchers may argue that cognitive strategies do not exist at all, with all learning involving tactics and 'blind tactics'. The claim would be that all learning is content and context specific (Brown, Collins & Duguid, 1989). However, as Bruner (1985: cited in Miles, 1988: p5-6) pointed out, "It is absurd to insist that each and every theory of learning is utterly domain specific, that nothing general can be said about learners or learning environments. You do not quite need a different model of a
learner to talk about learning to play chess, learning how to play a flute, learning mathematics, and learning to read the sprung rhymes in the verse of Gerald Manley Hopkins."

2.4.7 General Summary of Cognitive Strategies

Cognitive strategies are a significant influence on learning efficiency (Weinstein, 1994) in both cognitive and physical tasks (Bouffard & Dunn, 1993). Although there is often confusion about cognitive strategy definitions, it is claimed that they are any goal-directed cognitive activities, be they obligatory or non-obligatory, conscious or unconscious, efficient or inefficient (Crowley & Siegler, 1993). Cognitive strategy selection and deployment appears to be strongly influenced by cognitive style, and may be seen as a continuum from style and the most generalised of strategies to the most task-specific tactics (Derry & Murphy, 1986; Nisbet & Shucksmith, 1986). Cognitive strategies may be consciously or unconsciously initiated and may be learner-controlled or lesson-controlled (Derry & Murphy, 1986). However, if a tactic, emerging from a specific cognitive strategy, is unconsciously initiated and lesson-controlled, it is argued to be a blind tactic. As such, the pupil may struggle to independently utilise the same specific cognitive strategy from which the tactic emerged for a new situation (Rigney, 1978). Finally, there are numerous variables that interact with strategy selection and deployment and will, therefore, influence whether or not efficient learning takes place. However, according to literature, the development of pupils' metacognitive ability is one of the most major influences on whether cognitive strategy use will be efficient.
Chapter Three

Research Methods
3.1 Research Methods

3.1.1 Introduction

The development of the research programme followed four main stages. Firstly, a preliminary study (Pre) was carried out utilising semi-structured interviews with Year 7 and Year 9 pupils from two schools. The aim was to consider whether previous classroom focused research dealing with metacognitive ability, cognitive style combinations and cognitive strategies could be 'transferred' to Physical Education. It appeared from the results that such classroom focused research was applicable to Physical Education. Thus, following the preliminary study (Pre), there was some consideration regarding the methods of data collection that would be most suitable for the main study (MSt & MStQ) which aimed to investigate pupils' metacognitive ability before and after an intervention. Stage two of the research programme assessed the feasibility of utilising a questionnaire to examine pupils' metacognitive ability. A metacognitive ability questionnaire was developed and then piloted (QPil) in two schools with Year 7 and Year 9 pupils. It appeared that data regarding pupils' metacognitive ability could be collected utilising a specifically designed questionnaire. Thirdly, a refined version of the metacognitive ability questionnaire along with the intervention procedures to develop pupils' metacognitive ability, were piloted (Pil) in one school with Year 7 pupils. Finally, the main study was carried out (MSt & MStQ) in three schools with Year 7 and Year 9 pupils. Pre- and post-intervention qualitative data (content analysis and ethnographic data) and quantitative data (statistical data) was collected in two of the schools (MSt), while only pre- and post- intervention quantitative data (statistical data) was collected in the third school (MStQ); the data from the third school was collected to expand the quantitative analysis (statistical analysis). Table 3.01 illustrates the four stages of development and the schools involved at each stage. For the sake of clarity, each stage will be considered separately although, because of the strong interactions between the stages, where necessary, references are made to the main study (stage four) in stages one to three.
Table 3.01: The four developmental stages of the main study and the schools that were involved.

<table>
<thead>
<tr>
<th></th>
<th>Preliminary Study (Pre)</th>
<th>Questionnaire Pilot (QPII)</th>
<th>Pilot (PII)</th>
<th>Main Study (MSt &amp; MStQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>School 1</td>
<td>School 1 (Pre)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 2</td>
<td>School 2 (Pre)</td>
<td>School 2 (QPII)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 3</td>
<td></td>
<td>School 3 (QPII)</td>
<td>School 3 (MStQ)</td>
<td></td>
</tr>
<tr>
<td>School 4</td>
<td></td>
<td></td>
<td>School 4 (Pil)</td>
<td></td>
</tr>
<tr>
<td>School 5</td>
<td>'Apple'</td>
<td></td>
<td></td>
<td>School 5 'Apple' (MSt)</td>
</tr>
<tr>
<td>School 6</td>
<td>'Yard'</td>
<td></td>
<td></td>
<td>School 6 'Yard' (MSt)</td>
</tr>
</tbody>
</table>
3.1.2 Stage One: The Preliminary Study (Pre)
(Appendix 1)

From the literature review, the development of metacognitive ability and the understanding of cognitive style combinations and cognitive strategies appeared to offer potential benefits to the teaching and learning of Physical Education. However, research in these areas had been carried out in either laboratories or classrooms and not in Physical Education settings. Furthermore, Denscombe (1980) claimed that Physical Education lessons vary considerably from the 'normal' academic context. As such, it could not be assumed that conclusions drawn from classroom research would be valid in Physical Education, especially when it was considered that individuals in Physical Education lessons have to try and express understanding through movement rather than through 'language' (Evans, 1995). Thus, a preliminary study (Pre) was deemed necessary to investigate whether pupils' metacognitive ability could be assessed, and whether the various cognitive style combinations were evident in Physical Education. Pupils' cognitive strategies were assumed to be related to pupils' cognitive style combinations. The second objective of the preliminary study (Pre) was to validate previous classroom-based research in a Physical Education setting and, therefore, support further cognitively focused research in Physical Education. The study involved conducting semi-structured interviews with sixty pupils from Year 7 and Year 9 of two schools. The number of pupils was split evenly across the schools, and consideration was given to age and gender, so that there were eventually fifteen girls and fifteen boys interviewed in Year 7 and 9 from four classes. Both schools were Middle schools (11-14 year old pupils) because it was assumed that the years of opportunity for the development of metacognitive ability rested between 10 and 14 years of age (Nisbet & Shucksmith, 1986). Table 3.02 summarises the details of the preliminary study (Pre). Each pupil was asked fourteen questions which referred specifically to the content from an observed lesson and either directly or indirectly enquired about the concepts of metacognitive ability and cognitive style combinations.
Table 3.02: A summary of the preliminary study (Pre) design

<table>
<thead>
<tr>
<th>Objective</th>
<th>To investigate whether pupils' metacognitive ability could be assessed, to assess whether the various cognitive style combinations were evident and to validate previous classroom based research in a Physical Education setting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>March - May, 1994.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Pupils</th>
<th>Gender of pupils</th>
<th>Activities</th>
<th>Data Collection Method</th>
<th>Data Collection Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 1 (Pre)</td>
<td>Year 7</td>
<td>8</td>
<td>Male</td>
<td>Hockey</td>
<td>Semi-Structured Interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Observed Lessons</td>
</tr>
<tr>
<td></td>
<td>Year 9</td>
<td>7</td>
<td>Male</td>
<td>Gymnastics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 2 (Pre)</td>
<td>Year 7</td>
<td>7</td>
<td>Male</td>
<td>Foundation : Core Games</td>
<td>Semi-Structured Interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Observed Lessons</td>
</tr>
<tr>
<td></td>
<td>Year 9</td>
<td>8</td>
<td>Male</td>
<td>Non-Stop Cricket</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>Female</td>
<td>Netball Related Games</td>
<td></td>
</tr>
</tbody>
</table>
From the results of the preliminary study (Pre) it appeared that metacognitive ability, cognitive style combinations and cognitive strategies should be considered more in a Physical Education setting. There was evidence that pupils' metacognitive knowledge, metacognitive strategies, metacognitive experiences and, therefore, metacognitive ability could be assessed. Furthermore, the preliminary study (Pre) appeared to validate some of the classroom-based research in a Physical Education setting which implied that further cognitively focused research in Physical Education may prove beneficial. Notably, there has been recent support for cognitive factors, in general, to be examined more in Physical Education (Singer, 1995; Turner & Martinek, 1995), and it has been argued that, "...it is imperative to learn more about student attributes and thought processes that mediate learning in Physical Education" (Solmon & Boone, 1993: p418). However, while acknowledging that there was a need to investigate pupils' learning processes and, more specifically, pupils' metacognitive ability, the author had to consider what the most suitable methods of data collection would be for such a study.

3.1.3 The Methods of Data Collection

Once it had been established that metacognitive ability could be assessed, that pupils showed signs of having cognitive style combinations and that classroom based research appeared to have some validity in a Physical Education setting, the author was forced to consider the appropriate methods of data collection that could be utilised to achieve the main study objectives. It was decided that a questionnaire would be the main data gathering tool, that semi-structured interviews would be utilised to validate the questionnaire and that basic ethnographic techniques would be utilised in an attempt to provide contextual data regarding the schools, departments, teachers, classes and lessons. Corroboration of data was considered necessary in order to seek to strengthen the internal validity of data. Such corroborated data may provide depth to the understanding of a given study and help to overcome the problem of 'method-boundness' (Cohen & Manion, 1989). Cohen & Manion (1989: p296) noted that the use of different types of corroboration or triangulation "...has special relevance where a complex phenomenon requires elucidation." Using their example, a comparative study of different teaching approaches necessitates the use of several types of corroboration if a 'fuller, more realistic picture' is to be constructed. In simple terms, as any intervention has a 'multitude of intervening variables' researchers should attempt to consider as many of these as possible (Stallings, 1995). Langley (1995) successfully utilised the process of corroboration or triangulation in the study of pupils' thoughts during Physical Education. "So complex and involved is the teaching-learning process in the context of the school that the single-method approach
yields only limited and sometimes misleading data. Yet, ironically, this is the method that figures most in educational research" (Cohen & Manion, 1980: p214). However, during triangulation the author not only had to decide on what forms of information were required but he also had "to consider the respective weightings that are given to the chosen methods" (Cohen & Manion, 1980: p219). As such, it is acknowledged that the questionnaire was the main data gathering tool, the purpose of the semi-structured interviews was to validate the questionnaires, and the data from the basic ethnographic techniques played a supportive role, providing details of the context in which the intervention study was undertaken and to potentially offer areas of influence upon pupils' development of metacognitive ability and cognitive strategies. A rationale for each of these methods of data collection is offered. However, the practical details regarding each method of data collection are presented at a relevant stage of the thesis where each method of data collection was first used.

3.1.3.1 Rationale for the Questionnaire

Ideally, all the children involved in the main study should have been interviewed by the author, as verbal reports can provide adequate evidence for the effectiveness of a given intervention concerning metacognitive and cognitive strategies (Peterson, 1988). However, in considering the potential effects of age variables, school variables and intervention setting variables upon pupils' development of metacognitive ability and content knowledge, there was likely to have been over three hundred pupils involved in the main study. As such, interviewing everybody did not seem practical, especially as such interview data would have to be gathered both prior to and after the intervention. Similar problems were faced by Underwood (1988) with two thousand pupils involved in a study. Therefore, the author decided upon a questionnaire. The questionnaire had been successfully used before to investigate metacognitive ability in mathematics lessons with both college students (Schoenfeld, 1985, 1987) and with school pupils (Goos & Galbraith, 1996; Lester, 1989). Goos & Galbraith (1996) used questionnaires not only to investigate metacognitive ability but also to check more direct 'content' knowledge; suggesting a similar format to that of the author's main study (MSt & MStQ). More specifically to Physical Education, Solmon & Boone (1993) utilised a questionnaire to investigate achievement goals in tennis lessons, with an aim to "...learn more about student...thought processes that mediate learning in Physical Education" (Solmon & Boone, 1993: p418). Solmon & Boone (1993) designed their own questionnaire specifically for the study, as the author did, and as Gurney (1988) stated with reference to self-esteem, 'home-grown' assessment methods should not be despised.
Goos & Galbraith (1996) noted that questionnaires do not provide as accurate a description of cognitive processes as concurrent verbalisation methods as they require the pupils to use inferential processes or retrieve information from long term memory. However, Goos & Galbraith (1996) continued to argue that such retrospective questionnaires can provide valuable clues to pupils' thoughts and knowledge structures as long as they involve explanations. Therefore, within the author's questionnaire design the pupils were encouraged to provide reasons and explanations for most answers. Clearly, this was necessary if there was to be content analysis (Holsti, 1969) undertaken of pupils' responses regarding their metacognitive ability (Objectives A1 to A5 and Objectives B1 to B5), and a full appreciation of their content knowledge was to be gained (Objective C).

3.1.3.2 **Rationale for the Semi-Structured Interview**

The semi-structured interviews were utilised to investigate the same areas as those involved in the questionnaire, although the number of questions was significantly reduced. The semi-structured interview has been positively and successfully utilised to gain an insight into pupils' thoughts about Physical Education (Gonçalves, Carreiro da Costa & Piéron, 1996), and interviews are a prominent method utilised to encourage pupils to externalise metacognitive and cognitive strategies (Garner, 1988; Peterson, 1988). However, there are inevitably going to be problems with a semi-structured and focused interview, such as pupils reporting the utilisation of metacognitive and cognitive strategies that they do not demonstrate using (Cavanaugh & Borkowski, 1980: cited in Garner, 1988; Hitchcock & Hughes, 1993). However, Ericsson & Simon (1984: cited in Siegler, 1989) reviewed the literature on the use of verbal protocols as data and concluded that people can often accurately describe their thought processing when they report immediately after the processing and when the processing episode is not too brief in duration. Although it has been claimed that younger pupils may struggle more than older pupils to provide accurate verbal reports (Brainerd, 1973: cited in Siegler, 1989), Portman (1995: p37) has noted, "as a researcher, I was surprised not so much by what was said, as by how articulate they [pupils] were about what was happening to them in Physical Education classes..." Therefore, as Ericsson & Simon (1980) suggested, verbal reports can be a valuable and reliable source of information if elicited with care.

3.1.3.3 **Rationale for Utilising Basic Ethnographic Techniques**

Researchers have appreciated teaching and learning are strongly influenced by the context in which they take place (Brown, Collins & Duguid, 1989; Shulman, 1986),
although Harris (1987: cited in Langley, 1995) noted that these contextual influences during learning are relatively unstudied. Langley (1995) claimed that there has not been a framework developed in Physical Education to accommodate these contextual effects on pupils' thoughts and perspectives and their subsequent physical performance. In addition, Langley (1995) argued that the mediational influences of both cognitive and social processes may help to explain the teaching and learning processes. Indeed, Goos & Galbraith (1996) suggested that unhelpful social interactions sometimes impeded pupils' development of metacognitive ability. As such, "the social/historical context of the physical activity setting is believed to provide an important mediating influence on the expressed perspectives and thoughts of these students" (Langley, 1995: p34).

From the preliminary study in schools 1 (Pre) and 2 (Pre), it was suggested that pupils' responses with regard to their metacognitive ability could be influenced by 'wider' issues, such as the teacher or, indeed, the school 'ethos'. To recapitulate a previous example, when one pupil was asked what she thought was the reason for playing 'Stick in the Mud' at the beginning of the lesson, the answer given was to check if the class members were sexist or not. During an informal discussion with a teacher in the school, the author was informed that there had been a 'big push' on the subject of sexism during tutorial lessons as the school wanted to be seen as promoting 'equality'. Similarly, Maehr & Midgley (1991: cited in Treasure & Roberts, 1995) argued that the efforts at the classroom level can easily be undermined by school-wide policies and procedures. For example, a teacher may be strongly attempting to develop a task-oriented motivational climate only to have the headteacher announce the establishment of a school-wide academic context associated with competition and external rewards (Treasure & Roberts, 1995). Thus, it was deemed crucial to examine the context in which the intervention had taken place. Wittrock (1988) argued that the efficiency of cognitive strategies may depend upon apparently insignificant contextual variables, which are actually critical. Yet, the number of influential and interacting variables would be so great, rather than attempting to determine the direct cause and effect relationships the author was attempting to identify 'plausible patterns of influence' (Guba & Lincoln, 1988: p82: cited in Langley, 1995) concerning the pupils' development of metacognitive ability.
3.1.4  Stage Two: Questionnaire Pilot (QPil & Pil)

Table 3.03: A summary of the questionnaire pilot (QPil & Pil) design

<table>
<thead>
<tr>
<th>Objective</th>
<th>To develop a questionnaire that would assess pupils' metacognitive ability.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>December, 1995.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School 2</th>
<th>Year 9</th>
<th>Number of Pupils</th>
<th>Classes</th>
<th>Activities</th>
<th>Data Collection Method</th>
<th>Data Collection Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(QPil)</td>
<td></td>
<td>24 (One Class)</td>
<td>Mixed Ability</td>
<td>Basketball</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mixed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 3</td>
<td>Year 7</td>
<td>22 (One Class)</td>
<td>Gender</td>
<td>Swimming</td>
<td>Questionnaire</td>
<td></td>
</tr>
<tr>
<td>(QPil)</td>
<td></td>
<td></td>
<td>Intact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 4</td>
<td>Year 7</td>
<td>48 (Four Classes)</td>
<td></td>
<td>Netball</td>
<td></td>
<td>Before &amp; After</td>
</tr>
<tr>
<td>(Pil)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>After Intervention</td>
</tr>
</tbody>
</table>

As the questionnaire was to be the main data gathering tool in the main study (MSt & MStQ) it was imperative that it was designed well and piloted. The questionnaire was piloted with Year 7 and Year 9 pupils in school 3 (QPil) and school 2 (QPil) respectively, and with Year 7 pupils in school 4 (Pil); Table 3.03 provides further details regarding the number of pupils, classes and activities involved in the questionnaire pilot (QPil). There were seven versions of the questionnaire before the final metacognitive ability questionnaire was established. Readability tests were undertaken for the questionnaires and each had a Flesch-Kincaid Index of less than Year 7 in United Kingdom schools. Although this indicated that the questionnaire was suitable for the ages involved in the study, it was anticipated that the understanding of the questions might pose a problem for some pupils. For example, in school 4 (Pil) some pupils were slow in answering the questionnaire and one pupil struggled with the language. Nevertheless, it appeared that rather than reading ages, it was the length of questionnaire that was the main problem as the pupils were unable to complete it in a single lesson and, therefore, had to continue completing it in the next tutorial period. Not only would this increase the time delay between the learning situation and the reporting of that learning situation, but there was also the possibility of conversations between the pupils to compare answers even though the questionnaires were collected...
in after each lesson. One effect of the large questionnaire which could not be really controlled was how pupils may have become disheartened or overwhelmed by it. For example, in school 4 (Pil) one boy overtly stated that he thought the questionnaire was too long and suggested that he "would never finish it." Unfortunately, to assess and appreciate the complexities involved in the metacognitive ability conceptual framework and, therefore, pupils' learning, the questionnaire could not be reduced in size. The main study was to play a foundational role in the consideration of pupils' learning and, hence, the questionnaire had to provide enough information to assess the type, the quality, the effects and the development of pupils' metacognitive ability. A less substantial questionnaire would not have been able to provide adequate amounts of data.

The author felt that the pupils in schools 2 (QPil), 3 (QPil) and 4 (Pil) were convinced that they should not be reading or writing in Physical Education lessons and were, therefore, suspicious why they were. As stated in the author's personal diary, it was "...very obvious that they did not appreciate missing physical activity." Their confusion at writing in Physical Education lessons and their concern for missing physical activity was worsened as the pupils in school 4 (Pil) were working in a sports hall without proper tables and chairs. As such, they did not feel in an 'academic' context and, as the questionnaire was substantial, their lack of comfort could have been a crucial influence upon the manner in which they completed it. As such, the author felt it necessary in the main study, when possible, to avoid interrupting Physical Education lessons for the purposes of completing the questionnaires and to try and offer the questionnaires in a classroom environment. Although the classroom environment was achievable in schools 5 (MSt), 6 (MSt) and 3 (MStQ), Physical Education lessons were disrupted in school 5 (MSt) and 3 (MStQ), and pupils' 'free' tutorial time was disrupted in school 6 (MSt). Furthermore, the author had restricted access to the pupils in school 6 (MSt) due to research sponsorship commitments and he was, therefore, dependent upon that school's teachers to encourage the completion of the questionnaires and to collect the questionnaires in. The author did print out guidelines for the teacher with regard to how the questionnaire should be introduced (Appendix 2) although, as the author was not present during the completion of the questionnaires, it cannot be ascertained whether the guidelines were followed. As lessons had to be disrupted, as each school varied slightly in the type of lesson disruption and as the author had restricted access to some classes, there were inevitably limitations in the degree of standardisation, between the schools and classes, regarding how the questionnaire was completed.
The pupils were ensured on confidentiality and anonymity with respect to their questionnaires, as they were with any interviews or comments made to the author. "Anonymity of student data is essential for increasing each participant's willingness to provide honest and spontaneous responses" (Rikard & Langley, 1995: p95) and to lower the possibility of self-presentation bias (Karabenick & Knapp, 1991). During the development of the questionnaire in school 2 (QPil) and 3 (QPil) it appeared that when the pupils were told that the teachers would not be seeing any of the answers they were more willing to fill the answers in. A Year 9 pupil in school 2 (QPil) immediately stated, "Oh right then, that means I can write that then." The author emphasised that there was not necessarily any 'right' answers to the questions and this seemed to be accepted by most of the pupils. A Year 9 pupil in school 2 (QPil) did enquire about an answer during one of the questionnaire pilot studies and another pupil exclaimed, "He already said that there are no right answers."

To better understand individual differences, Griffey (1991: cited in Langley, 1995) suggested that pupils' performance should be considered through a more personalised account of the learning processes. Indeed, from the questionnaire pilot studies in schools 2 (QPil) and 3 (QPil) it appeared necessary that the questionnaire design should emphasise that pupils were being specific to themselves and, hence, the word 'you' was underlined for the main study questionnaires. Lee, Landin & Carter (1992) similarly personalised the questions they utilised during their study of thought processes during tennis instruction; for example, they asked 'What were you trying to do during the part of the lesson you just saw on the videotape?'

In the design of the questionnaire, clearly the main study objectives, to investigate the metacognitive ability that pupils bring with them to Physical Education lessons (Objectives A1 to A5), to investigate the development of pupils' metacognitive ability (Objectives B1 to B5), and to study the interaction between pupils' metacognitive ability and their content knowledge (Objective C) had to considered. As such, the questions aimed to establish pupils' metacognitive knowledge and metacognitive strategies, and to assess possible interacting variables such as pupils' volitional control, pupils' thoughts on the purpose of Physical Education, pupils' motivational orientation, pupils' locus of control, pupils' self-efficacy and pupils' perceptions of the motivational climate. Furthermore, pupils' understanding of the lesson content had to be established. With reference to the balance of the questionnaire, six questions were directed to pupils' metacognitive knowledge and strategies with respect to task variables, eleven with respect to person variables and seven with respect to strategy variables. Three questions referred to pupils' volitional control, two to their thoughts on the purpose of Physical Education, six questions to their motivational orientation,
two to their locus of control, seven to their self-efficacy and six to their perceptions of motivational climate. Pupils' understanding of the lesson content was examined utilising fifteen questions although the marks available did vary between activity areas and questionnaires. The number of questions for each concept was determined by how many were required for the author to direct pupils' thoughts to all aspects of that concept. For example, with respect to pupils' locus of control, two questions were required to consider whether pupils viewed positive situations (success) as being in their control and whether they viewed negative situations (lack of success) as being in their control.

In this present discussion each section of the questionnaire will be explained and example questions will be offered. As the questions will be taken from a variety of the main study questionnaires the activity area involved in the questions may differ. Furthermore, to maintain clarity, each section of the questionnaire will be explained following the structure and order of the literature review, although this may mean that the question numbers during this discussion appear haphazard.

3.1.4.1 Pupils' Metacognitive Knowledge and Metacognitive Strategies

The three key categories of metacognitive knowledge refer to 'task', 'person' and 'strategy' variables. Importantly, Goos & Galbraith (1996) treated such metacognitive knowledge as three distinct categories and, indeed, demonstrated how pupils could have knowledge in one of these categories and not in the others. Therefore the author's questionnaire and analysis had to separate the three categories. The answers provided would suggest whether pupils had any awareness of 'task', 'person' and/or 'strategy' categories, and whether pupils had monitored and evaluated these categories. The combined assessment of metacognitive knowledge and metacognitive strategies would provide an insight into pupils' metacognitive ability. For the sake of clarity, each metacognitive knowledge category will be presented separately.
3.1.4.1.1 Metacognitive Knowledge of Task Variables:
(Appendix 3, Questions 1 - 6)

It is argued that pupils must know about the information available to them during a
cognitive activity, such as the desired outcomes (Weinstein, 1988), the context in
which the task is taking place (Ramsden, 1988), the abundancy and organisation of
information (Brown, 1984) and the demands of the task (Weinstein, 1988). Therefore
questions were included such as;

Q(2) What could have affected how well you did the breaststroke leg kick in the
lesson?

Q(3) (i) Were you given enough information by the teacher to do the breaststroke leg
kick well?
(ii) What did you think was the most important point of the information that the
teacher gave to you?

Q(4) What abilities or skills does someone need to be able to do the breaststroke leg
kick well?
*Give reasons for your answer*

Affective metacognitive experiences concerning task variables were investigated and
were potentially useful for suggesting whether a metacognitive 'trigger' had been
activated and whether it was acted upon or not. Therefore, the questionnaire included;

Q(6) What feelings did you have when the teacher explained that you were going to
be doing the breaststroke leg kick task?

3.1.4.1.2 Metacognitive Knowledge of Person Variables:
(Appendix 3, Questions 7 - 17)

'Person' variables, can be subdivided into beliefs about intra-individual variables,
inter-individual variables and universals of cognition (Flavell & Wellman, 1977).
Within the realm of intra- and inter- individual variables the concept of cognitive
style combinations becomes prevalent and, therefore, tendencies in cognitive style
combinations also needed to be investigated.
Therefore, for *intra-individual* variables;

Q(11) What parts of the discus throw did you do well?

*Give reasons as to why you were able to do these parts well.*

Q(12) What parts of the discus throw did you do poorly?

*Give reasons as to why you were not able to do these parts well.*

For *inter-individual* variables;

Q(8) (i) Did the task of throwing the discus suit everyone in your class?

(ii) Who did it suit the most and who did it suit the least?

*Give reasons for your answers.*

For *universals of cognition*;

Q(9) (i) Were the instructions for the discus throw clear?

(ii) What extra information would you like about any part of the discus throw?

*Give reasons for your answers.*

Regarding pupils' cognitive style combinations, and more specifically their preferences in the wholist/analytic style dimension, an example of one of the questions acknowledged that analytics can spot differences within and between tasks (Riding, Glass & Douglas, 1993), whereas wholists struggle to do this, as they often gain a simplistic (Miller, 1987) and overall perspective (Riding & Mathias, 1992). As such, wholists may be able to spot simplistic similarities within and between tasks whereas analytics are more likely to appreciate any differences within and between tasks. Therefore, the questionnaire included;

Q(16) List two of the differences between the discus throw and the shot putt action.

Q(17) List two similarities between the discus throw and the shot putt action.

It is argued that if pupils have an awareness of their cognitive style and the effects of their cognitive style they are more likely to be able to adapt and have greater versatility in a task rather than rigidly utilising their natural cognitive style even if it is inappropriate (McCarthy & Schmeck, 1988: cited in Guild, 1994; Nisbet &
Shucksmith, 1986). Therefore, an awareness was suggested in the questionnaire if the pupils could at least explain some information that, according to literature, pupils of that specific cognitive style would often struggle with. For example, as the wholist struggles with identifying differences within and between tasks, if a pupil correctly suggested two points of similarity and at least one point of difference between the two specified actions then that pupil was categorised as having awareness of their processing cognitive style. In short, three out of four possible points had to be suggested for a pupil to be categorised as having awareness of their preferences in wholist/analytic style dimension. In addition, the wholist/analytic style dimension was assessed by questioning pupils whether they had enough time before commencing with a task and they were asked for an explanation why this was the case. It has been argued that wholists appear to have a greater tolerance for uncertainty than analytics with regard to the 'correctness' of their thoughts and ideas, and they tend to be impulsive (Pask, 1988; Schmeck, 1988). As such, they are more likely to be willing to commence an activity without great reflection and thought.

Regarding pupils' awareness of their preferences in the verbaliser/imager style dimension, an example of one of the questions focuses upon the pupils' preference to represent information either verbally or through images;

Q(14) Are you happier when the teacher describes an activity or happier when the teacher demonstrates it.

Give reasons for your answer.

3.1.4.1.3 Metacognitive Knowledge of Strategy Variables:
(Appendix 3, Questions 18 - 24)

Pupils must know the appropriateness of a specific cognitive strategy for a given task (Borkowski, Estrada, Milstead & Hale, 1989) and, therefore, what specific cognitive strategy should be used in a specific situation, why it should be used in that specific situation and when it is required. Clearly, pupils' monitoring and evaluation of their specific cognitive strategies and their strategic action is critical. Such strategy knowledge is influenced strongly by epistemological beliefs of the pupils, as it may be that a pupil is reluctant to abandon poor 'informal strategies' (Alexander & Judy, 1988; Crowley & Siegler, 1993) or because they believe that there is always only one way of approaching a task.
Therefore, questions were included such as,

Q(21) (i) During your attempts at a back crawl start, what ideas did you have for improving each time?
(ii) What made you think of these ideas?

Q(22) Would the ideas you had for the back crawl start be useful for any other activity, game or practice?
*Give reasons for your answer.*

Q(23) Did you change your plan for doing well in the back crawl start task at any time?
*Give reasons why you did or did not change your plan.*

Again, affective metacognitive experiences were investigated but this time with respect to strategy variables. Therefore the question read;

Q(24) What feelings did you have during the back crawl start task?

3.1.4.2 *Interacting Variables*

Pupils' volitional control, their thoughts on the wider purpose of Physical Education, their motivational orientation, their locus of control, their self-efficacy and their perceptions of the motivational climate, arguably all interact, influence, and indeed are influenced by, the level of metacognitive ability that pupils have developed (Appendix 4). Thus, these interacting variables were examined in the metacognitive ability questionnaire (Appendix 3, Questions 25 - 50).

Where appropriate other questionnaires were examined to establish the type of question and the wording used to investigate such factors. For example, in studies of 10- through 12- year old pupils (Duda & Nicholls, 1989; Duda, Oslin & Templin, 1991) the Sport Task Orientation and Sport Ego Orientation Scales (the orthogonal scales in the TEOSQ - the Task and Ego Orientation in Sport Questionnaire) have been found to be internally consistent, and have acceptable test-retest reliability following a three-week period (Duda, 1992). The pupils are asked to note which of a given list of items suited them following the phrase, "I feel most successful in sports when..."
As such, the main study questionnaire included a question with regard to pupils' motivational orientation, "When do **you** feel successful in athletics?", and was supported by the question "When do you feel **you** have 'achieved' in athletics?" The specificity of naming the activity was utilised by Seifrez, Duda & Chi (1992) within a study concerning basketball, and this seemed necessary here to maintain the focus on the activity area throughout the whole questionnaire where possible. It is important to note that, while the questions may seem to have been taken directly from the TEOSQ, each question was left open ended rather than providing a choice of answers.

Reviewing the literature of the specific areas of interest also made it possible to establish how specific the questioning should be, and whether there were a variety of areas that had to be included to obtain a clear picture of that area. For example, Bandura (1977: cited in Feltz, 1992), stated that any research investigating self-efficacy must have microanalysis, checking level, strength and generality of perceived competence. Furthermore, any questions must be specific to the activity, through consultation with coaches concerning most important sub-skills and variables (Feltz, 1992). However, Harter (1982) also noted that pupils will have a general level of self-competence and this must also be examined by inquiring directly how much they like themselves as a person. Therefore the questionnaire included,

For **self-efficacy - level**;

Q(36) What abilities and skills do **you** have which are useful for discus throwing?  
*Give reasons for your answer.*

For **self-efficacy - strength**;

Q(36) Are these abilities and skills that **you** have good enough to complete the task of throwing the discus well?  
*Give reasons for your answer.*

For **self-efficacy - generality**;

Q(38) Are these abilities and skills always useful in athletics?  
*Give reasons for your answer.*
For general self-worth:

Q(42) Is there anything that you would like to change about yourself when doing P.E. activities?

Give reasons for your answer.

3.1.4.3 Pupils' Understanding of the Activity Content

As domain knowledge increases, strategic action is altered (Alexander & Judy, 1988). Through having efficient metacognitive ability, pupils may learn material faster, understand it better and retain it for longer (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989). As such, pupils' domain and content knowledge had to be established in the author's questionnaire (Appendix 3, Questions 51 - 65). The questions asked were based on the content from the actual lessons observed and the intervention lessons. As such, pupils were not asked about information outside of the lesson content and any answers were considered in light of what the teacher had stated in the lesson. The questions were supported by experts in the field as feasible questions, taking into consideration the content that the teachers had covered during the observations and the content frequently covered at the pupils' age range. The questions were structured so that, as much as possible, they were not asking for 'facts' that could be learned by rote, but called for the application of such 'facts' in a specific situation. For example, 'Give a reason why the only pause or delay in the breaststroke arm action should be in the stretch and glide position'. Therefore, the content questions required the pupils to explain relevant information or utilise it in a different situation, and often to give reasons for their answers. For example in the Year 7 Swimming lesson the pupils had been informed that the tumble turn was quicker than the 'grab' turn and so the question read, 'You are being timed how quickly you can do four widths, what type of turn do you think should be used? Give reasons for your answer'. Furthermore, throughout the whole questionnaire, the author had to attempt to reach both verbalisers and imagers, wholists and analytics in the question design. However, it must be noted that verbalisers may have had an immediate advantage as representation was in verbal or written form. Nevertheless, where appropriate, and especially in the content questions, there were additional diagrams, which appeared to have been utilised by some pupils. For example, a Year 7 pupil in school 6 (MSt) adapted diagrams on the questionnaire with arrows to show his answer.
3.1.5 Stage Three: The Pilot Study (Pil)

The pilot study was undertaken in school 4 (Pil) with Year 7 pupils only. As well as acting as a final pilot for the refined metacognitive ability questionnaire, it provided the opportunity to pilot the intervention procedures that would be involved in the main study (MSt & MStQ).

Thus, the author was able to assess the feasibility and procedures involved in observing another teacher's lesson, adapting the metacognitive ability questionnaire to the content of that lesson (e.g. the chest and overhead pass in Netball), having pupils complete this pre-intervention questionnaire, personally teaching an intervention lesson to all of the classes, adapting the metacognitive ability questionnaire to the content of the author's intervention lesson (e.g. the bounce pass and the choice of pass in Netball), and having pupils complete this post-intervention questionnaire.

During stage three of the research programme no semi-structured interviews were carried out due to time constraints. However, while ethnographic data was not analysed, there were attempts at utilising basic ethnographic techniques to assess what information could possibly be accessed and obtained. Further details regarding the pilot study (Pil) are explained in Table 3.04 and throughout this present discussion.

Following stage one and stage two of the research programme, the author was confident that the research objectives (objectives A1 to A5) to study pupils' metacognitive ability could be achieved through the observation of a lesson, the adaptation of the metacognitive ability questionnaire to the content of that lesson, and the completion of that questionnaire by the pupils. Additional support and information could be gained through the utilisation of semi-structured interviews and basic ethnographic techniques.
Table 3.04: A summary of the pilot study (Pil) design

<table>
<thead>
<tr>
<th>Objective</th>
<th>To pilot a further refined version of the metacognitive ability questionnaire and the intervention procedures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>January, 1996.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Quasi-Experimental Settings</th>
<th>Classes</th>
<th>Activities</th>
<th>Data Collection Method</th>
<th>Data Collection Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>School 4 (Pil)</td>
<td>Year 7</td>
<td>(Control)</td>
<td>Mixed Ability</td>
<td>Netball</td>
<td>Questionnaire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Meta)</td>
<td>Mixed Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Meta &amp; Meta Knowledge)</td>
<td>Intact</td>
<td></td>
<td>Ethnographic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Meta+)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Legend

<table>
<thead>
<tr>
<th>Control</th>
<th>A control class.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta</td>
<td>A self-questioning metacognitive strategy class.</td>
</tr>
<tr>
<td>Meta &amp; Meta Knowledge</td>
<td>A self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables class.</td>
</tr>
<tr>
<td>Meta+</td>
<td>A self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables and the development of cognitive strategies class.</td>
</tr>
</tbody>
</table>

However, in assessing the development of pupils' metacognitive ability (objectives B1 to B5) the author believed that an intervention study would prove beneficial, and there had been requests for intervention studies with regard to the cognitive strategic action of pupils (Perkins & Salomon, 1989; Weinstein, 1994; Wittrock, 1988). The rationale for the intervention study and the intended procedures for the main study intervention are presented at this stage of the research programme, that is, stage three,
although the main effects of the pilot study (Pil) upon the main study intervention are explained in stage four of the research programme.

3.1.5.1 Rationale for an Intervention Study

Perkins & Salomon (1989) suggested that there was a need for intervention studies to address common absences, by investigating whether pupils lacked certain strategies before an intervention and gained from their use after an intervention. Wittrock (1988: p296) further suggested that interventions should consider "...changing the behaviour of learners by giving them new strategies, and new ways to think about learning and knowledge acquisition." Weinstein (1994) noted that interventions concerning metacognitive and cognitive strategy usage could lead to significant improvements in academic grade point averages. As such, not only were interventions deemed necessary by other researchers, but intervention studies have proved both feasible and practical for investigating metacognitive ability and cognitive strategy development. However, it should not be assumed that such variables selected in an intervention reflect the only differentiating attribute of able and less able learners (Paris & Oka, 1986).

3.1.5.2 The Intended Main Study Intervention Approach

Wittrock (1988: p293) argued that the typical educational psychologist's approach to interventions which involved 'laying learning strategies' on pupils without appropriate levels of comprehension should be avoided. Hence, there have been numerous discussions regarding the most effective type of intervention approach. Such approaches have included,

- the general approach, whereby the development of metacognitive ability would be encouraged explicitly and separately from content areas (Ennis, 1989),
- the infusion or embedded approach whereby metacognitive ability would be developed explicitly but through subject content (Ennis, 1989), and,
- the immersion approach whereby metacognition would not be made explicit but would be developed through 'strong' immersion into the content area (Ennis, 1989; Prawat, 1991).

The author decided upon the infusion or embedded approach, an approach that has been supported by numerous researchers (Ennis, 1989; Glaser, 1984; Goos & Galbraith, 1996; Joyce, 1985: cited in Nickerson, 1988; Resnick, 1987b). The author would then be able to utilise a traditional curriculum so as to make the study practical.
and relevant to Physical Education teachers, and also be able to encourage pupils to fully appreciate the genuine usefulness of developing metacognitive ability in a meaningful context (Mayo, 1993). Furthermore, as pupils' informal cognitive strategies can be inefficient (Alexander & Judy, 1988) the author argued that there may be a need to make the specific cognitive strategies explicit. Importantly, and within Physical Education, Singer (1988) successfully utilised an infusion or embedded approach in the development of a five-step cognitive strategy which aimed to enhance both the acquisition and performance of complex motor skills. However, Nickerson (1988: p33) argued that researchers do not have to view each approach as being completely distinct and "we should not fall into the trap of believing we are forced to...just because it is often posed that way." Therefore, the principles espoused in the immersion approach of becoming deeply emerged and engaged in the content (Ennis, 1989; Prawat, 1991) were also recognised, as were the general approach principles that metacognitive ability should be fully explained to encourage transfer and generality to all contexts.

3.1.5.3 The Intended Main Study Intervention Classes

In the main study the author intended to have a control class and three quasi-experimental classes. Eventually the number of classes was reduced as it became difficult to differentiate between two of the quasi-experimental classes, and the main study (MSt & MStQ) only included a control class and two quasi-experimental classes. The term 'quasi-experimental' is utilised as the author acknowledges that in a school-based intervention there are a multitude of variables out of the control of the author that will influence the effectiveness of the intervention. As such, the author does not claim to have had the unequivocal control of the dependent variables which are deemed necessary within an 'experiment'.

The intended main study intervention classes were,

- a control class (Control)
- a self-questioning metacognitive strategy class (Meta),
- a self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables class (Meta & Meta Knowledge). This class was later removed after the pilot study in school 4 (Pil),
- a self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables and the development of specific cognitive strategies class (Meta+).
3.1.5.3.1 The Self-Questioning Metacognitive Strategy Class (Meta):

While metacognitive strategies seemingly play only a 'supervisory' role in the learning processes, it may be that metacognitive strategies are all that are required to improve learning performance. It may be that pupils 'possess' the necessary cognitive strategies and abilities already, but are unable to use them in a skilful or an appropriate manner (Nisbet & Shucksmith, 1986). Flavell (1976) referred to this as a production deficiency, and the suggestion is that pupils can know that a cognitive strategy exists but they lack the awareness of a situation and fail to monitor why and when the cognitive strategy is useful. Schoenfeld (1987) supported the concept of production deficiency, noting that once metacognitive strategies were hinted at, a class of mathematics pupils, who had laboured at a task without success, completed it with few problems. It would appear that the use of a metacognitive strategy permitted them to access their relevant prior knowledge and relevant cognitive strategies. Nisbet & Shucksmith (1986) argued that metacognitive strategies are crucial to the learning processes as they control cognitive strategies and influence a pupil's approach to learning. Therefore, with respect to the main study (MSt & MStQ), the author decided that a basic form of metacognitive strategy would have to be developed which would hopefully guide pupils' appreciation of a learning situation; encourage their awareness, monitoring and the evaluation of that learning situation. Within classroom subjects a self-questioning metacognitive strategy approach appears to have proved successful (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994), with questions such as 'What are we trying to do here?', 'Do we need to change our plan?' and 'What would we do differently next time?' being placed under the metacognitive strategy sub-headings of awareness, monitoring and evaluation respectively (King, 1991). Pupils in reading who have been categorised as 'learning disabled', for example, have raised their level of understanding when they have been encouraged to utilise self-questioning and self-summarisation metacognitive strategies (Palinscar & Brown, 1984). Within Physical Education, steps similar to those suggested concerning awareness, monitoring and evaluation appear to have enhanced motor skill acquisition (Ainsworth & Fox, 1989; Singer, 1988, 1995). Thus, an intervention which offers a metacognitive strategy would be attempting to access the metacognitive knowledge relevant to the specific learning situation and to encourage the conscious awareness, monitoring and evaluation of that knowledge (Figure 2.01). It was hoped that the development of a self-questioning metacognitive strategy (Figure 3.01 and Appendix 5) would encourage pupils to consciously justify their actions (Flavell, 1987) and, therefore, direct their thoughts towards task, person and strategy variables and increase the number of metacognitive experiences that they would appreciate and understand. These metacognitive experiences could then,
potentially, be utilised to enhance metacognitive ability. The self-questioning metacognitive strategy was adapted from previous research (King, 1991; Seifert & Wheeler, 1994) and the metacognitive strategy sub-headings of awareness, monitoring and evaluation were also emphasised to direct pupils' thoughts towards the process of utilising a metacognitive strategy rather than just utilising it. Hence, during the intervention lesson the pupils in the Meta class would be presented with a self-questioning metacognitive strategy by the author and would be encouraged to utilise it as much as possible.

Figure 3.01: The Self-Questioning Metacognitive Strategy

<table>
<thead>
<tr>
<th>General Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
</tr>
<tr>
<td>• What am I trying to do?</td>
</tr>
<tr>
<td>• What could affect how I do it?</td>
</tr>
<tr>
<td>• Why am I trying to do it?</td>
</tr>
<tr>
<td>• How am I going to do it?</td>
</tr>
<tr>
<td>Monitoring</td>
</tr>
<tr>
<td>• Am I getting closer to the goal?</td>
</tr>
<tr>
<td>Evaluating</td>
</tr>
<tr>
<td>• Did I achieve what I wanted to achieve?</td>
</tr>
<tr>
<td>• What would I do differently next time?</td>
</tr>
<tr>
<td>• Do I understand it?</td>
</tr>
</tbody>
</table>

3.1.5.3.2 The Self-Questioning Metacognitive Strategy and the Metacognitive Knowledge of Person and Strategy Variables Class (Meta & Meta Knowledge):

For the effective provision and development of a metacognitive strategy pupils must have adequate metacognitive knowledge of person and strategy variables. Pupils must appreciate that there can be different degrees of understanding (Flavell, 1979), and they must understand the influences and effects of cognitive style if they are to become more flexible in their approach to learning (Pask, 1988; Pennell, 1985). Furthermore, it is claimed that pupils must be able to select and adapt cognitive
strategies to meet the demands of a specific situation (Nisbet & Shucksmith, 1986). While a metacognitive strategy may encourage pupils to focus on comprehension, cognitive style and cognitive strategies, if pupils lack even a general awareness of the effects of person or strategy variables, then the focus will be wasted. As such, pupils may need to be guided in the development of metacognitive knowledge of person and strategy variables. Hence, as well as being presented with a self-questioning metacognitive strategy by the author and being encouraged to utilise that metacognitive strategy, the Meta & Meta Knowledge class would also be offered both an explanation and a commentary regarding cognitive style combinations and how their cognitive style combinations may influence how they strategically approach each task.

3.1.5.3.3 The Self-Questioning Metacognitive Strategy, the Metacognitive Knowledge of Person and Strategy Variables and the Cognitive Strategies Class (Meta+):

Although it is suggested that pupils may be able to develop their own specific cognitive strategies and, therefore, may not need to be guided in specific cognitive strategy development, it has been noted that pupils' own specific cognitive strategies may not be efficient (Alexander & Judy, 1988; Peterson, 1988). Therefore, as well as metacognitive strategies and metacognitive knowledge being developed, pupils may also need to be guided in their development of relevant specific cognitive strategies. The author had to have a strong rationale behind the development of specific cognitive strategies and tactics to ensure that these specific cognitive strategies and tactics would be appropriate to each cognitive style combination, the activity areas and the intervention tasks (Appendix 6). Ramsden (1988) clearly argued that the development of flexible cognitive strategies should be the direct aim of teaching and not be seen as a by-product of learning content. By guiding pupils in their development of cognitive strategies combined with the metacognitive knowledge of those strategies, the isolation of cognitive tactics from specific cognitive strategies, general cognitive strategies and cognitive style combinations may be avoided. Schmeck (1988) argued most teaching is aimed at the level of tactics, and it is the isolation of tactics from the origins of those tactics and the insufficient attention to whether or not the tactics coherently fit together that leads to inefficient learning. The author has referred to these tactics as 'blind tactics'. Therefore, the Meta+ class would be presented with a self-questioning metacognitive strategy, they would be offered an explanation and a commentary regarding cognitive style combinations, and they would be introduced to appropriate specific cognitive strategies and, therefore, appropriate cognitive tactics for the intervention tasks.
3.1.5.4 The Intended Research Procedures for the Main Study Intervention

Research Procedures Regarding Schools:

The choice of school for the pilot study (Pil) was based mainly on accessibility. However, Haller, Child & Walberg (1988) have argued that school location can have a significant effect on pupils' development of metacognitive ability. They suggested that urban school pupils benefited more from guidance in the development of metacognitive ability than rural or suburban school pupils. It may be that some urban school pupils have more potential to develop metacognitive ability if the priorities of the Physical Education department do not include such a focus. For example, school 4 (Pil) was an inner-city school and the Head of the Physical Education Department stated that the pupils came from one major inner-city area, they were extremely active and enjoyed Physical Education although they did not like to listen. It appeared that the Department ethos was to encourage pupils to enjoy their Physical Education and to use up some of their energy while maintaining discipline. As such, the development of metacognitive ability was not a priority. For the main study (MSt & MStQ) the author decided to have more structure in the choice of schools. From discussions with Tessa Kay, an expert in Recreation Management, it was established that the definitions of urban, suburban and rural schools were too vague to clearly separate and differentiate between various areas. She suggested that the County Council should be contacted and by utilising social deprivation figures the least and most deprived areas in the County could be established (Appendix 7). One school was randomly selected (Borg & Gall, 1983) from the least and most deprived areas for the main study with reserve schools also being selected. School re-selection from a reserve list was required within the higher social deprivation area when it was discovered that Physical Education classes at the school were not mixed-gender. One school was also randomly selected from an area statistically average in social deprivation ratings to expand the quantitative analysis involved in the main study. To summarise, in the main study school 5 (MSt) 'Apple' was rated as the least deprived school, school 6 (MSt) 'Yard' was rated as the most deprived school and school 3 (MStQ) was rated as an averagely deprived school.

---

2 Tessa Kay is a lecturer in the Physical Education, Sports Science and Recreation Management Department at Loughborough University.
The access and timing of the intervention lay mainly with the schools. For example, school 5 (MSt) 'Apple' was immediately willing to help but were awaiting an OFSTED³ inspection and, therefore, wanted to delay the study. However, as research in the main study schools did not coincide, the author was able to concentrate and become emerged in the interactions of one school at a time. With respect to previous Physical Education research, Theeboom, De Knop & Weiss (1995) similarly organised sessions so that the researchers could concentrate on one school at a time.

3.1.5.4.2 Research Procedures Regarding Teachers:

The teachers involved in the main study prior to the intervention could clearly influence its effectiveness, although Haller, Child & Walberg (1988) suggested that teacher differences may be minimal regarding their influence on the development of metacognitive ability. The author attempted to select both a male and a female teacher from each of the three schools to ensure consideration had been given to the potential effects of teacher gender on the learning processes of pupils within specific classes and during specific activities. The pilot study (Pil) only involved Year 7 pupils and a single, female teacher. There were always going to be possible problems in ascertaining a teacher of each gender from each school for the Main Study, and in school 6 (MSt) the same female teacher taught both Year 7 and Year 9, and in school 3 (MStQ) two female teachers were involved as this was all that was feasible after reflection of the timetable.

In addition, all of the teachers were kept 'blind' to the purpose of the study in order to lower the possibility of the teacher reacting differently to either the control or quasi-experimental classes (Pocock, 1988). To ensure the teachers remained 'blind' the author taught all of the intervention lessons, although the school teachers taught the lessons from which the content was used in the pre-intervention questionnaire. Thus, in the pilot study (Pil) the school 4 (Pil) teacher taught a Netball lesson including content concerning the chest and overhead passes so the metacognitive ability questionnaire was then adapted to refer to this content (pre-intervention questionnaire). The author then taught the intervention lesson including content concerning the bounce pass and the choice of pass in Netball, while also including the relevant intervention setting content such as the self-questioning metacognitive strategy. By the author being the teacher for the intervention lessons, he was also able to standardise and control as many of the teacher variables as possible; for example, both those which are stable such as social background and gender, and those which

³ OFSTED is an acronym for the Offices for Standards in Education.
are less stable such as the language used and the presentation of the content (Caine, 1989: cited in Theeboom, De Knop & Weiss, 1995; Theeboom, De Knop & Weiss, 1995). As the teachers did not have to change their normal practices there was the practical benefit that they were more willing to participate in the study and, seemingly, more comfortable with the author during any informal discussions. As Raymond (1991: p38) explained, "If teachers, already coping with their multi-faceted role and other numerous pressures, are faced with organisational and curriculum change in a way that sees them ill-equipped then conflict, tensions and anxieties will emerge."

However, as well as the teachers remaining 'blind' it appeared beneficial to keep the pupils 'blind' also, thereby creating a double-blind study design. Thus, the study counteracted the Hawthorne effect which refers to the psychological benefits that arise out of the mere participation in studies (Cohen & Manion, 1989). Furthermore, as the intervention lesson structure was standardised as much as possible the control class acted as a form of placebo class to further counter potential psychological effects (Pocock, 1988). However, while the author had requested that the school teachers should attempt to teach the same content and in the same manner to each of their classes prior to the intervention, and a standardised lesson structure was developed for the intervention, the author still had to make regular notes after each lesson concerning unanticipated and unavoidable differences so that they could be acknowledged in the analysis of the data. As such the author attempted to balance and acknowledge the, "...intimate intermingling of generality and context-specificity in instruction" (Perkins & Salomon, 1989: p24).

To summarise, the teachers involved in the pilot study (Pil) and the main study (MSt & MStQ) were required to continue with their normal unit of work for the activity area that they were presently teaching; for example Netball, Swimming and Health-Related Exercise. They were asked to teach exactly the same lesson to the control class and each of the quasi-experimental classes while the author observed the lesson and made notes. The author adapted the metacognitive ability questionnaire and semi-structured interview so that the lesson content from these observed lessons was utilised as the focus for each question. To clarify, question one in the metacognitive ability questionnaire generically enquired what a task involved and why the class were doing the task. Therefore, as the school 6 (MSt) 'Yard' Year 9 observed lessons were Volleyball and focused upon the 'dig', the question asked 'During the lesson you had to perform a 'dig'. Explain what the task of doing a 'dig' involved. Why were you doing the task? These pre-intervention questionnaires and semi-structured interviews would be completed, following which, the author would teach a single intervention
lesson. The content from the author's intervention lesson would then be utilised to adapt the metacognitive ability questionnaire and semi-structured interview for the post-intervention questionnaire and semi-structured interview. Teachers and pupils remained 'blind' to the purpose of the study.

3.1.5.4.3 Research Procedures Regarding Classes:

Although Haller, Child & Walberg (1988) suggested that small sample sizes gave larger effects in the development of metacognitive ability, classes were to remain intact, mixed-ability and mixed-gender. The author wanted the study to be relevant and practical to teachers of Physical Education. Teachers often, "have little regard for the findings of conventional educational research, seeing it as having limited, if any, practical value" (Hitchcock & Hughes, 1993: p4). Piéron (1984: cited in Gusthart & Kelly, 1990) suggested that intact classes maintain ecological validity in the instructional setting, thereby acknowledging that learning is "entangled with situations" (Brown, 1994: p6). Although this decreases the ability to 'control' the myriad of additional factors that can influence the processes involved in teaching and learning, it was argued that in Physical Education it enables the assessment of variables as they occur with minimum deviation from what would have occurred in the classes had the study not been conducted (Solmon & Boone, 1993). However, researchers should always reflect on how their own personal biographies could influence teaching and learning (Smagorinsky, 1995). Nevertheless, the 'ecologically valid' class setting had previously proved practical and successful for investigating metacognitive processes (Schoenfeld, 1985, 1987) and, with respect to Physical Education, Solmon & Boone (1993: p423) have argued that "continuation of this line of research appears to have merit, as much remains to be discovered concerning the interaction of cognitive processes that facilitate student achievement."

3.1.5.4.4 Research Procedures Regarding Pupils:

Researchers have suggested that pupils cannot be consciously strategic in their learning under the age of ten, and that conscious self-direction in learning is relatively rare (Biehler & Snowman, 1990; Nisbet & Shucksmith, 1986). Guidance in the development of metacognitive ability appeared to have little influence on pupils in the fourth, fifth and sixth grades (Haller, Child & Walberg, 1988). However, by the age of fourteen, pupils will have become more able to estimate their abilities accurately (Paris & Oka, 1986), they will be more able to plan consciously (Nisbet & Shucksmith, 1986) and they will have developed their own 'theories of schooling' (Paris & Newman, 1990). Haller, Child & Walberg (1988) noted that the development
of metacognitive ability had large effects for pupils of the seventh and eighth grades and Linn & Songer (1987: cited in Eylon & Linn, 1988) noted that pupils from ten to fourteen were successfully encouraged to develop strategies that led to a robust understanding of the issues involved in tasks. Therefore, although the task of learning to learn is a continuously developing task, "ten to fourteen are the years of opportunity" (Nisbet & Shucksmith, 1986: p74). Guidance in the development of metacognitive ability may be less effective with regard to pupils who are over sixteen years of age because they are more likely to have established 'habits' that will be hard to change considering the increasing pressures on pupils at that age to learn large volumes of information for examinations (Nisbet & Shucksmith, 1986). They may listen to advice but they will often continue using the same, potentially inappropriate, strategies that they have used previously.

In the pilot study, only Year 7 pupils were involved. However, to take age into consideration in the development of metacognitive ability and cognitive strategies, the main study involved Year 7 and Year 9 pupils. Year 8 pupils were eliminated purely to reduce the numbers involved in the study and because the age influences in the development of metacognitive ability and cognitive strategies could still be investigated by the cross-sectional analysis between Years 7 and 9. Year 10 pupils were not approached, even though this is the upper age limit in the 'years of opportunity', as they would be commencing with their G.C.S.E. studies and were less flexible in their timetable commitments. Therefore, in the main study (MSt & MStQ), there were three Year 7 and three Year 9 intact, mixed-ability and mixed-gender classes from each of the three schools involved; a total of 193 Year 7 pupils and 186 Year 9 pupils.

3.1.5.4.5 Research Procedures Regarding Activity Areas:

The activity area involved in the pilot study (Pil) was Netball. Obviously, the activity areas involved in the main study intervention depended upon the timetabled activities at the school. In school 5 (MSt) 'Apple', the activities were Swimming (Year 7) and Health-Related Exercise (Year 9); in school 6 (MSt) 'Yard' they were Athletics (Year 7) and Volleyball (Year 9); in school 3 (MStQ) they were Dance (Year 7) and Hockey (Year 9).

3.1.5.5 The Intended Main Study Intervention Lesson

In the pilot study (Pil) the author attempted to develop a standardised lesson structure for each of the main study intervention lessons. When Lee, Landin & Carter (1992)
attempted to standardise a lesson format within a tennis unit their lesson plans listed
the critical features of the lesson. The author, similarly, developed a detailed and
specific lesson format for the intervention lesson but in both the pilot study (Pil) and
the main study (MSt & MStQ) the author had the additional advantage of being the
only teacher involved in the single intervention lesson with every class of every
school; a total of nine Year 7 lessons and nine Year 9 lessons in the main study (MSt
& MStQ). In the study by Lee, Landin & Carter (1992) there had been more than one
teacher involved in their intervention lessons and this would have made
standardisation more difficult. To recapitulate, the author's standardised intervention
lesson would follow a lesson taken by a school teacher and the completion of the pre-
intervention questionnaires and semi-structured interviews.

3.1.5.5.1 The Standardised Lesson Structure:

The intended standardised lesson structure for the main study intervention included an
introduction and explanation of the lesson content and the relevant quasi­
experimental settings, or intervention setting variables, for each specific class. To
recapitulate, in the pilot study (Pil) there was the control class and three quasi­
experimental classes, whereas due to practical difficulties in differentiating between
the Meta & Meta Knowledge and the Meta+ intervention settings during the pilot
study (Pil), the number of quasi-experimental classes was reduced to two (the Meta
class and the Meta+ class) in the main study (MSt & MStQ). The processes involved
in 'teacher modelling' were followed and it was intended to encourage both
discussions and co-operative learning opportunities. It was intended that the self­
questioning metacognitive strategy and the mnemonic specific cognitive strategies
were to be offered on laminated cards. General motivational issues were considered in
an attempt to encourage a task-oriented environment. All intervention lesson content
was discussed with experts in the activity field; for example, the Netball tasks in the
pilot school were discussed with Sarah Olden 4, the Swimming tasks were discussed
with Colin Hardy 5, and the Health-Related Exercise tasks were discussed with Jo
Harris 6.

4 Sarah Olden is a Physical Education teacher in Nottingham and an England Netball player.
5 Colin Hardy is a senior lecturer in the Physical Education, Sports Science and Recreation Management
Department at Loughborough University.
6 Jo Harris is a lecturer in the Physical Education, Sports Science and Recreation Management Department at
Loughborough University.
Initially, the author intended to build up a rapport with the pupils and establish the purpose of the lesson. In doing so, it is important to realise that, "when teachers are enthusiastic about their subject matter students are more likely to pay attention and develop enthusiasm of their own" (Good & Brophy, 1991: p472). Therefore, it proved useful to follow some of the ideas regarding enthusiastic behaviour in the teaching of physical behaviour as noted by Rolider, Siedentop & Van Houten (1984: cited in Mawer, 1995). For example, the author frequently used positive gestures and actions during his teaching. The content of the author's comments clearly varied depending upon the quasi-experimental class, but initially each class was given an introduction and an explanation of what was going to be involved in the tasks and lesson. With regard to the classes involved in the development of a self-questioning metacognitive strategy the author would provide a description of what a metacognitive strategy was, what it involved, why it is useful and when it is used. As such, the explanations themselves would be metacognitive, making pupils aware of the purpose of the metacognitive strategy and how successful learners use it to activate, monitor, regulate and make sense out of information (Roehler & Duffy, 1984: cited in Winograd & Hare, 1988). As in all Physical Education explanations, it was essential that the information was clearly communicated, which not only involved focusing on the details of the content, but also involved a full description of the context in which the content was to be practised (Mawer, 1995).

Following a clear explanation of what was involved in the tasks and lesson, the author was in the position to commence with the second stage of the lesson, teacher modelling. A teaching approach that has successfully been used during the development of metacognitive ability and cognitive strategies is teacher modelling (Nisbet & Shucksmith, 1986). Teacher modelling had proved successful in previous studies examining teaching (Brown & Campione, 1979), not only in improving strategy use (Palincsar & Brown, 1984; Paris & Oka, 1986) but also in tackling problems concerning the affective system (McCombs, 1988; Seifert & Wheeler, 1994). King (1991) successfully utilised teacher modelling principles in combination with a self-questioning metacognitive strategy. Teacher modelling involves Vygotskian principles of mediated learning and shifting responsibility for strategy use from the teacher to the pupil (Paris & Oka, 1986) and, therefore, "involves more than mere copying" (Nisbet & Shucksmith, 1986: p49). Nisbet & Shucksmith (1986) summarised the principles of Vygotsky (1962) stating that during early development,
the speech of the adult controls and directs pupils' behaviour. However, at a later stage of development, pupils' own overt speech becomes an effective regulator of pupils' behaviour. Eventually, at an even later stage of development, the pupils' covert or inner speech assumes a regulatory role. In short, there is a transition for the pupil from control and direction by others to self-regulation (Nisbet & Shucksmith, 1986).

The teacher modelling processes (Appendix 8) were intended to be used as a structure to develop the self-questioning metacognitive strategy. The author would focus on the self-questioning metacognitive strategy (Appendix 5) and, where relevant, the specific cognitive strategies, while thinking aloud as he tried to cope with any problems in the learning situation (Mayo, 1993; Meichenbaum, 1971; Nisbet & Shucksmith, 1986; Seifert & Wheeler, 1994). The teacher should offer a form of commentary (Appendix 9) going beyond simple procedural instructions, attempting to make explicit what the pupils ordinarily cannot see; that is, the thoughts and feelings that go with decisions (Graves, 1983; Nisbet & Shucksmith, 1986). As such, the self-questioning metacognitive strategy and the specific cognitive strategies would be illustrated in action and not just declared by the teacher (Schoenfeld, 1985: cited in Brown, Collins & Duguid, 1989). Thus, pupils may perceive that there could be different ways of approaching the tasks (Garofalo, 1987) and once they are not committed to the idea that there is only one right answer, and that the teacher will declare this right answer, they are more likely to be mastery oriented and to use efficient cognitive strategies (Schutz, Pintrich & Young, 1993: cited in Pintrich & Garcia, 1994).

Following the teacher commentary, pupils would be encouraged to utilise the self-questioning metacognitive strategy during guided practice with overt self-verbalisations (Meichenbaum, 1971; Nisbet & Shucksmith, 1986). The process of verbalisation is thought to play an important role in learning, as verbalising a skill can lead to greater skill acquisition (Nisbet & Shucksmith, 1986; Schunk & Cox, 1986; Seifert & Wheeler, 1994) by focusing and guiding pupils' attention on important strategy information (Schunk, 1982). However, Erickson & Simon (1985: cited in Eylon & Linn, 1988) suggested that there may be increased difficulty in thinking aloud as the task complexity increases. Thinking aloud may be problematic for young pupils who may have limited processing capacities as well as limited verbal formulae for presenting their thoughts. In addition, it is possible that pupils may be hesitant to provide overt thoughts that may be overheard by fellow pupils (Rikard & Langley, 1995) and overt verbalisation may be quickly replaced by the covert verbalisation. The author would decrease the level of guidance offered by simply reducing the amount of verbal instructions, demands and reinforcement. Therefore, the pupils
would be left to personal overt or covert verbalisation while solving any problems (Meichenbaum, 1971; Seifert & Wheeler, 1994). As Brown (1994: p10) noted, "It is a common belief that higher thought is an internalised dialogue."

Within the teacher modelling processes the intention of the main study (MSt & MStQ) was to also include activities that had been shown to potentially enhance metacognitive ability such as discussion and co-operative learning. Discussion and co-operative learning can closely relate to the processes of teacher modelling, potentially leading to a more covert dialogue (Brown, 1994).

**3.1.5.5.1.3 Discussions and Co-operative Learning**

Metacognitive discussions were intended to ensure that the processes of learning were examined by pupils just as much as the outcomes (Nisbet & Shucksmith, 1986). Discussions may establish the existing cognitive strategies used by the pupils which can influence the effectiveness of any new cognitive strategies (Perkins & Simmons, 1988; Wittrock, 1986, 1988). Furthermore, "...by hearing how other students attack particular problems or assignments, students can add many new strategies to their repertoires" (Hand, 1990: p13; Fortunato, Hecht, Tittle & Alvarez, 1991), even if some members are not capable of full participation (Brown, 1994). Paris & Oka (1986) utilised discussion in their ISL (Informed Strategies for Learning) programme and noted that dialogues stimulated pupils to think and to share ideas, similar to reciprocal teaching or peer tutoring techniques (Palincsar & Brown, 1984). Nisbet & Shucksmith (1986) claimed, whether formal or informal, discussion would probably remain the teacher's foremost tool in developing pupils' metacognitive ability. It was intended to encourage pupils to speculate on their own cognition, to examine their cognitive strategies for tackling tasks and to reflect on their performances (Nisbet & Shucksmith, 1986).

Co-operative learning encourages the active processing of information and interacts with metacognitive strategies as pupils must reflect on their learning as they attempt to explain processes with other pupils (Dansereau, 1988; Wittrock, 1986: cited in Mayo, 1993). Furthermore, the social context created by a co-operative approach can serve to enhance the motivation and positive affect of the participants (Slavin, 1980). Metacognitive ability can be encouraged, for example, by having one partner teach an activity to the other which Pask (1988) referred to as 'teachback'. It was hoped that the self-questions in the metacognitive strategy could be utilised to guide and control the quality of the 'teachback' exchange (King, 1991). For example, the question 'What am I trying to do?' may be divided into more specific questions by the pupil acting as the
teacher to guide what information they give to their partner and what order they present it in. In addition, rather than passively listening, the partner being taught should check for omissions in the information, correct inaccurate information, detect the key ideas that are emerging and offer other ideas for teaching the activity if necessary. For example, following the question, 'What could affect how I do it?' in the self-questioning metacognitive strategy, a listening pupil may inform the teaching pupil that there are additional influences that may affect how the learning situation is approached. Such active listening appears extremely beneficial to learning especially when the partners may have different cognitive style combinations, as ideas can be evaluated, compared and shared (Dansereau, 1988). With reference to Physical Education where numerous problems are solved through movement, Qin, Johnson & Johnson (1995) noted that co-operative efforts allowed pupils of all ages to share strategies and correct each other's errors during non-linguistic problems, including motor activities. Brown & Campione (1986: p1060) summarised, "Understanding is more likely to occur when a student is required to explain, elaborate, or defend his or her position to others; the burden of explanation is often the push needed to make him or her evaluate, integrate, and elaborate knowledge in new ways."

3.1.5.1.4 'Motivational Issues'

As with any lesson, motivational issues had to be considered. Paris, Lipson & Wixon (1983: p304) noted, "strategies combine components of both will and skill" and Baird & White (1982: cited in McCombs, 1988) claimed that without motivational issues being included in a lesson then strategy development would prove inefficient. Furthermore, "Because achievement behaviours occur within a context, the structure and climate must support, enhance, and facilitate those achievement-directed behaviours that we desire over the long term" (Ames, 1992: p175). It is even argued that the motivational climate may override pupils' dispositional goal orientation (Treasure, 1993: cited in Treasure & Roberts, 1995). However, Clark (1995) argued that there are no simple procedures that can be followed to ensure that the motivational climate will always be positive and, therefore, the author mainly emphasised that pupils should focus on their learning and not just their performance during the lesson (Singer & Chen, 1994). Furthermore, the emphasis on teacher recognition and evaluation was based on mastery of the tasks rather than comparison of outcomes with the rest of the class (Ames, 1992; Epstein, 1988); for example, during the Health-Related Exercise intervention lesson, the author praised pupils for attempting to raise their heart rate into their heart target zone and did not ask pupils to compare heart target zones or to compare whether they were successful in reaching it or not.
Stage Four: The Main Study

The Adaptation and the Refinement of the Main Study Intervention

Following the pilot study (Pil) in stage three of the research programme, some adaptations and refinements had to be made to the intervention procedures involved in the main study (MSt & MStQ). However, the pre-intervention procedures of observing a lesson, adapting the metacognitive ability questionnaire and the semi-structured interview to the content of that observed lesson, and having pupils complete these pre-intervention questionnaires and selected pupils complete these pre-intervention semi-structured interviews, seemed to be well organised.

There were three schools involved in the main study with Year 7 and Year 9 classes being involved from each of the schools for the collection of pre-intervention data. However, due to a misunderstanding between the author and the teacher involved in school 6 (MSt) 'Yard', most of the Year 9 post-intervention questionnaires from school 6 (MSt) 'Yard' were not collected in or were sent home with the pupils. Thus, for the collection of post-intervention data there were school 5 (MSt) 'Apple' Year 7 and Year 9 classes, school 6 (MSt) 'Yard' Year 7 classes and school 3 (MStQ) Year 7 and Year 9 classes involved (Table 3.05). The author had to face the problem of balancing the realistic situation relevant to the specific schools and the 'ideal' situation based on literature concerning metacognitive strategy and cognitive strategy development.

Table 3.05: A summary of the main study (MSt & MStQ) design

<table>
<thead>
<tr>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>To study the metacognitive ability of pupils, within and between intact classes, within and between year 7 and year 9, and with-in and between two schools, within a unit of work.</td>
</tr>
<tr>
<td>To study the development of metacognitive ability of pupils, within and between intact classes, within and between year 7 and year 9, and within and between two schools, after treatments to develop metacognitive ability during a unit of work.</td>
</tr>
<tr>
<td>To study the interaction between the metacognitive ability and the content knowledge of pupils within intact classes, within year 7 and year 9, and within two schools, after treatments to develop metacognitive ability during a unit of work.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>February, 1996 - October, 1996</td>
</tr>
<tr>
<td>Year</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>School 5 (MSt) 'Apple'</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

School 6 (MSt) 'Yard'

| Year 7 | (Control) | Mixed Ability | Athletics | Questionnaire | Before & After Intervention |
|        | (Meta)    | Mixed Gender  |           | Semi-Structured Interviews | Before & After Intervention |
|        | (Meta+)   | Intact        |           |               |                        |
| Year 9 | (Control) | Mixed Ability | Volleyball | Ethnographic Observations | Before, During & After Intervention |
|        | (Meta)    | Mixed Gender  |           |  Note-taking    |                        |
|        | (Meta+)   | Intact        |           |  Documentation  |                        |

School 3 (MStQ)

| Year 7 | (Control) | Mixed Ability | Dance | Questionnaire Content Questions Only | Before & After Intervention |
|        | (Meta)    | Mixed Gender  |       |                                          |                        |
|        | (Meta+)   | Intact        |       |                                          |                        |
| Year 9 | (Control) | Mixed Ability | Hockey |                       |                        |
|        | (Meta)    | Mixed Gender  |       |                                          |                        |
|        | (Meta+)   | Intact        |       |                                          |                        |
3.1.6.2  The Main Study Intervention Classes

From the pilot study (Pil), it was realised that, in practice, it was extremely difficult to differentiate between the self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables intervention setting (Meta & Meta Knowledge) and the self-questioning metacognitive strategy combined with the development of metacognitive knowledge of person and strategy variables and the development of cognitive strategies intervention setting (Meta+). The development of metacognitive knowledge of person and strategy variables involves emphasising the effects that cognitive style combinations may have on the learning processes and, therefore, interacts with the tendencies to utilise specific cognitive strategies. Hence, the Meta & Meta Knowledge intervention setting, in practice, was very similar to the Meta+ intervention setting; the interaction and overlap between the intervention settings was too strong to separate. Thus, the Meta and Meta Knowledge intervention setting was excluded. As a result, the number of classes was reduced for the main study and the final classes included,
- the control class (Control),
- the self-questioning metacognitive strategy class (Meta), and
- the self-questioning metacognitive strategy, the metacognitive knowledge of person and strategy variables and the cognitive strategies class (Meta+).

3.1.6.3  The Research Procedures in the Study Intervention

3.1.6.3.1  Research Procedures Regarding Schools:

In the main study there were to be three schools involved, ranging from low to high in terms of social deprivation according to data from the relevant County Council. School 5 (MSt) 'Apple' represented the least deprived area, School 6 (MSt) 'Yard' represented the most deprived area and school 3 (MStQ) represented an area at neither extreme of the social deprivation ratings. However, following the selection of schools, problems with access and time were evident. Details concerning access to the school and the time available for the intervention were established upon contact with the schools. It is suggested that the integration of new strategies may require frequent reinforcement because pupils sometimes lapse back into old patterns even though they may not work (Crowley & Siegler, 1993; Pennell, 1985). Yet, the amount of reinforcement the author could give depended upon the number of intervention lessons possible and, therefore, the degree of access the author had to the schools.
From the pilot study in school 4 (Pil) it appeared that the number of lessons that the author could use to re-emphasise the ideas to the pupils would be small.

Actually being allowed substantial amounts of time with classes and pupils is extremely difficult to achieve. The difficulty of persuading schools and teachers to 'put themselves out' cannot be emphasised enough. The author realised that researchers cannot simply walk into a school, lay down strict experimental or quasi-experimental rules, especially as the main study required teachers to remain 'blind', and expect teachers to react favourably. The author had to spend large amounts of time in each school, becoming a 'peripheral member researcher' (Adler & Adler, 1987: cited in Adler & Adler, 1994) whereby the interaction, openness and trust between the teachers and the author could develop. However, as the main study (MSt & MStQ) was a substantial size, juggling time between three schools, observing numerous lessons and teachers, preparing questionnaires and interviews, having questionnaires and interviews completed, preparing intervention lessons, teaching intervention lessons to every class, spending time with the department, going to school and University meetings, writing notes, structuring the study around three school timetables and trying to maintain a personal life, became incredibly confusing and tiring. There was, and always will be, great difficulty in satisfying the 'experimental' requirements of an intervention design and appreciating the complexities and practicalities of school politics, teaching and the research processes.

Ironically, while a significant amount of time was spent at each school and the author became "part of the department" in the words of one of the teachers, it was evident that the intervention would have to be short, and more specifically, would have to be undertaken during a single lesson. By having a single intervention lesson with each class would ensure that the length of the intervention was standardised between all of the schools and classes. In addition, as the pupils were required to complete pre- and post-intervention questionnaires and selected pupils were required for pre- and post-intervention interviews time constraints hindered the length of the intervention. Fortunately, Kirby & Lawson (1983) noted that even relatively brief interventions in a relevant strategy can produce improvements. Metacognitive ability has not only been developed using relatively short educational programmes but the results were also stable over time (Sawyer, Graham & Harris, 1992; Weinstein & Mayer, 1986). Although this may to some extent support the amount of time the author could spend with each class, it should be noted that the classes involved with metacognitive interventions (e.g. Sawyer, Graham & Harris, 1992) have been small, and definitely not intact classes. Meloth (1990: p796) suggested that in a natural 'classroom' setting, "...it may be unreasonable to expect immediate, dramatic improvements in knowledge
of cognition", and it has been suggested that the development of metacognitive ability will be influenced by the number of interventions and the duration of the whole intervention study (Haller, Child & Walberg, 1988). Nevertheless, Diaz-Camacho, Foley & Petty (1995) suggested that metacognitive strategies only had to be modelled once for pupils to be able to apply them independently and, therefore, offered some support for the brevity of the intervention.

3.1.6.3.2 Research Procedures Regarding Teachers:

Although there was still the aim of having both a male and female teacher in each of the main study (MSt & MStQ) schools, the pilot study (Pil) had already offered an insight into the practical and unavoidable problems that interventions in a school setting can have. For example, the female teacher in the school only had a temporary contract and was leaving half way through the unit once the permanent teacher returned from maternity leave. Furthermore, during the actual Netball unit the female teacher was away and, therefore, both the author and other members of staff were forced to cover the lessons. Hence, the desired standardisation of one teacher for all the classes prior to the intervention was completely eradicated in the pilot study (Pil), although this was not the case in the main study (MSt & MStQ). With respect to the teacher gender in the main study intervention, in school 5 (MSt) 'Apple' there was a female teacher for Year 7 and a male teacher for Year 9, in school 6 (MSt) 'Yard' there was the same female teacher for both Year 7 and Year 9, and in school 3 (MStQ) there was a female teacher for both Year 7 and Year 9. All of the teachers were experienced having spent a minimum of three years in their current school.

3.1.6.3.3 Research Procedures Regarding Classes:

The pilot study (Pil) emphasised the difficulty of finding four intact classes being taught by the same teacher and covering the same content. School 4 (Pil) did have four year 7 classes involved in Netball units, but there was a stagger in that two classes were involved in Netball in a first activity block and the second two classes were involved in Netball during a following activity block. The difference in term time could have influenced the results and as pupils from the first and second activity block could discuss what was happening, the difficulty of keeping the pupils and staff 'blind' to the study significantly increased. Although the school had been informed about the requirements of the study, the Head of Department had obviously not examined the structure of the units and the feasibility of the author's requests. In his attempt to be helpful, and probably encouraged by the author's anxious state to commence with the study, the Head of Department made some notable oversights.
The numerous alterations that the Head of Department sprung on the author which could have been foreseen, and the numerous inaccuracies in the documentation concerning units of work and department policy, led to some frustration from the author which was explained in his personal diary of the events. For example, it was intended to complete a full intervention pilot with both Year 7 and Year 9. However, it transpired during the Year 7 interventions that there was a gender separation in Year 9 and, to compound the difficulties, they were also doing completely different activities. As such, the pilot study concentrated upon a control class and three quasi-experimental classes in Year 7. Yet, these events in school 4 (Pil) emphasised that a detailed list of requirements (Appendix 10) and a meeting with the Head of the Physical Education Department in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) were imperative to discuss the practicalities of the research. Such a list and such meetings proved successful in each of the main study schools; for example, in school 5 (MSt) 'Apple' an hour long meeting helped establish the potential problems of the rolling timetable, the short lesson times, the divisions and house systems and the access to certain sport facilities.

Within each Year group of schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) the same activity area was taught to all three classes prior to the intervention by the relevant school teacher. The author observed these lessons and the pre-intervention questionnaire referred to the content in them in an attempt to establish an initial 'baseline' investigation regarding pupils' existing metacognitive ability prior to any intervention. However, there were clearly going to be slight differences between each lesson and class and, as such, the author endeavoured to take notes from each relevant lesson in an attempt to acknowledge the slight variations that occurred. For example, after the author had observed a Netball lesson in school 4 (Pil) he noted, 'The lesson went great, although I had a little more rapport and exchanges with the pupils in this lesson than with other previously observed lessons. Only problem is that they concentrated a little more on bounce...pass in this lesson...'. It was emphasised to the relevant teachers in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) that the lessons should be as similar to each other as possible. However, issues such as discipline, differing class sizes, lesson times, safety and facilities still influenced how closely the lessons matched. Such 'external influences' (Langley, 1995) may influence the effectiveness of the metacognitive and cognitive strategies utilised by pupils in a learning situation and should be acknowledged.
3.1.6.4 The Main Study Intervention Lesson

3.1.6.4.1 The Standardised Lesson Structure:

The pupils in the school 4 (Pil) quasi-experimental classes were offered the self-questioning metacognitive strategy on a laminated card. An immediate problem was that the pupils were astounded that they had been asked to read in a Physical Education lesson! It appeared that the pupils had never used even task cards previously and were, therefore, bewildered that they had been asked to read even the eight questions on the self-questioning metacognitive strategy card. Furthermore, the author appreciated that there would be difficulties in keeping the cards available during practical activities and, therefore, accessing the cards may not only break the flow of the activities for the pupils but also extend the period of time between requiring the self-questioning metacognitive strategy and actually utilising it. Therefore, posters were developed to allow the author to make reference to the self-questioning metacognitive strategy and to allow the pupils to view the questions during practical activities. The hand-held laminated cards were still utilised when the pupils were seated. The intention was to avoid the problem of memorising the questions during the practical activities in case the strategy was viewed as extra content rather than as an aid to understanding the lesson content. Rush & Moore (1991) noted that there is a memory component for retrieving strategies which can influence their effectiveness. The importance of the posters was highlighted in the school 5 (MSt) 'Apple', as hand-held cards were difficult to use during the activity of Swimming.

3.1.6.4.1.1 'Introduction and Explanation'

With respect to the Meta & Meta Knowledge and the Meta+ quasi-experimental classes in school 4 (Pil), the author experienced difficulty in explaining the connection between tactics, specific cognitive strategies, general cognitive strategies and cognitive style combinations in simplistic terminology for pupils to appreciate. In the pilot study (Pil) the author had attempted to explain the different tendencies in the wholist/analytic style dimension and the verbaliser/imager style dimension. However, presenting too much detail appeared to be perceived as extra content to remember and not as information that would help them to develop metacognitive knowledge of person variables. Therefore, only the fundamentals of the processes were mentioned in the main study; every pupil will learn differently and every pupil will have a tendency to learn in a certain way. Emphasis was also placed upon pupils attempting to balance the processing of information as a whole and as individual components, as
well as balancing and comparing verbal and image representation. In the pilot study (Pil), the explanation appeared to develop greater meaning during the first stages of teacher modelling, whereby the author delivered a commentary during a learning activity. Therefore, it appeared that the explanation needed greater integration with the early stages of teacher modelling, and this occurred in the main study interventions. For example, the commentary for the Health-Related Exercise intervention lessons (Appendix 9) mentioned how the author liked to develop an overall image of the information before breaking it down into separate, individual parts, and, therefore, as analogies are useful to develop an overall image, the tactic of thinking of bike gears as exercise intensity levels may have helped the author to achieve the heart target zone necessary to develop cardio-vascular fitness.

3.1.6.4.1.2 'Teacher Modelling'

Mawer (1995) noted that sometimes teachers have decided to try out a new teaching strategy without being aware of the need to acquire new teacher-pupil interaction skills that form the basis of that new teaching strategy. The author was only too aware that the teaching modelling processes espoused in research, like a lot of teaching processes, are generally not accompanied by sufficient guidance to the teacher concerning the communication and interaction skills required in practice (Mawer, 1995). Furthermore, without sufficient awareness or practice at certain teaching processes, then a teacher's attempts at these teaching processes are likely to be inefficient (Siedentop, 1991). Therefore, being initially uncomfortable with the teacher modelling processes in school 4 (Pil), it was inevitable that the author's attempts at teacher modelling would have been slightly inefficient. However, the pilot study (Pil) was undertaken to develop the author's experience and understanding of the nature of teacher modelling in practice and, significantly, the author's inconsistency during the teacher modelling processes reduced with the completion of each pilot study (Pil) intervention lesson. Thus, aided by the standardised lesson structure and the experience gained in school 4 (Pil), consistency and stability was maintained throughout the main study in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ). However, there were variations in lesson length between schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) which may have proved influential as the time available for each of the teacher modelling phases, and the degree of pupil practice with the self-questioning metacognitive strategy, clearly differed. This is seen as a limitation of the study as Weed, Ryan & Day (1990) suggested that more practice per instruction session helps reduce the mental effort required from a pupil for a given strategy and Langley (1995) noted that inequity in practice time and the opportunity to practise may facilitate or constrain the strategies used for learning situations.
With respect to the actual phases of teacher modelling during the pilot study (Pil) some pupils did appear to sporadically delay in providing overt explanations of their actions. When the teacher continually encouraged the pupils to question what action they were going to take in a game, it was visibly clear that, initially, the game slowed. Eylon & Linn (1988) suggested that the pupils may wish to appear intelligent to the investigator but the author felt the problem was not so much the investigator but the influence of the other pupils that delayed the responses. As Rikard & Langley (1995) stated, pupils may be hesitant to provide overt thoughts that may be overheard by fellow pupils. As such, in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) pupils were informed that they could replace overt verbalisation by covert verbalisation as soon as they wished to.

3.1.6.4.1.3 'Discussion and Co-operative Learning'

Although the encouragement of discussion and co-operative learning was considered beneficial, it was impossible to provide enough time and development of these activities without seriously diminishing the practical nature of the activities. The teacher modelling processes worked well and, where possible, the key principles of both discussion and partner work were adapted to blend into the lesson framework. For example, during the pilot study (Pil) the 'teach back' principles of encouraging pupils to explain, elaborate or defend their thoughts and actions (Brown & Campione, 1986), were adapted so that the instigation and control of the activity came from the author who questioned pupils' actions individually during both skill practices and game activities, although the pupils did not have to overtly explain their thoughts. As Patterson, Dansereau & Newbern (1992) argued, irrespective of whether strategies are used privately or publicly, it is the conscious use of strategies that will lead to more efficient learning especially when compared to the non-use of strategies. During the Netball game activities in school 4 (Pil) there were visible improvements in pupils' choices and actions. Furthermore, Sternberg (1981: cited in Borkowski & Varnhagen, 1984) noted that while self-questioning learning situations require greater effort and result in less time for automatic processing pupils can show signs of covertly questioning their actions. Thus, in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) the author again initiated questioning, asking pupils to covertly answer his questions and justify their actions to themselves.

3.1.6.4.1.4 'Motivational Issues'

Achieving success with the development of a motivational climate depends upon the pupils' perceptions of that climate, and unfortunately "there are no simple recipes or
techniques to guarantee that the relational tone of the classroom will always be positive and constructive" (Clark, 1995: p4). This became clear in school 4 (Pil) where situational frustrations and irritations quickly damaged the motivational climate in a lesson. Such situational influences were inevitable in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ); for example, in the school 5 (MSt) 'Apple' Year 9 Meta class, the intervention lesson climate was briefly made tense as the author had to reprimand two male pupils for teasing other pupils in the class.

3.1.6.5 Additional Limitations and Information Regarding the Main Study Intervention

3.1.6.5.1 The Main Study Intervention Classes:

The most significant problem faced in the main study concerned school 6 (MSt) 'Yard'. With the restricted access to the classes following the intervention lesson the author had to rely on the teachers to hand out, and to collect in, the questionnaires. Unfortunately, the teacher involved in school 6 (MSt) 'Yard' was unable to return all of the questionnaires from each class as some had been taken home by the pupils. As such, the number of pupils in each of the Yard classes who were included in the analysis of results were reduced by approximately twenty to forty-four percent. The author's frustrations were compounded by the resulting inability to utilise the school 6 (MSt) 'Yard' Year 9 post-intervention questionnaires as there were so few questionnaires (five in the Control class, one in the Meta class and six in the Meta+ class) returned, which in turn influenced what comparisons could be made between pre-intervention and post-intervention data;

- Objective (B2) that compared classes of the same Year and school regarding the development of pupils metacognitive ability could only be assessed within school 5 (MSt) 'Apple' Year 7 and Year 9 and within school 6 (MSt) 'Yard' Year 7.
- Objective (B3) that compared Year 7 and Year 9 classes from the same school regarding the development of pupils metacognitive ability could only be assessed within school 5 (MSt) 'Apple'.
- Objective (B5) that compared Year 9 classes from different schools regarding the development of pupils metacognitive ability could not be investigated.
3.1.6.5.2 The Main Study Intervention Lessons:

Both the cognitive and motivational elements of the standardised lesson were open to situational interference. As Wood (1996) stated, it seems quite clear that the context for learning cannot be immediately created by teachers simply by adapting some specific instructional strategies or methods of use. It should be evident that the environment and classroom climates are more 'a way of life' that has been mutually committed to by teachers and pupils (Wood, 1996). Indeed, the problems that emerged during the pilot study and, indeed, in schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ) were not because the intervention activities were too difficult, it was that they were different from what the pupils normally had to do in Physical Education lessons. Paraphrasing a boy from school 4 (Pil), he stated that he liked Physical Education 'because it was different to other lessons where you have to read and write.' Lester (1989) had similar difficulties attributed to classroom culture and management problems associated with teaching formats unfamiliar to the pupils, which, according to Goos & Galbraith (1996), influenced the positivity of their results. Therefore, the author had to acknowledge the unfamiliar teaching formats as a significant influence in the schools 5 (MSt) 'Apple', 6 (MSt) 'Yard' and 3 (MStQ). The strength of the influence may depend upon both content and common practices within each of the schools. For example, school 5 (MSt) 'Apple' frequently utilised task cards, and in the Health-Related Exercise unit involved in the main study, pupils had experience of writing down their results and thoughts during the activities. Therefore, they may have been more willing to accept and utilise the self-questioning metacognitive strategy.

3.1.6.6 Additional Information Regarding the Wider Data Collection in the Main Study

3.1.6.6.1 Development of the Semi-Structured Interview:

As interviews have been successfully utilised to investigate pupils' thoughts about Physical Education teaching and learning (Gonçalves, Carreiro da Costa & Piéron, 1996; Lee, Landin & Carter, 1992; Solmon & Boone, 1993) and as there can be problems with utilising questionnaires, the author decided that by selecting and interviewing two pupils per class in a semi-structured and focused format (Cohen & Manion, 1989; Hitchcock & Hughes, 1993), the questionnaire would have a validation check placed upon it. The question structure for the interview remained, as with the questionnaire, reasonably specific, investigating the same areas as the questionnaire, but open enough for the pupil to expand on their comments if they, or
the author, wished them to. There were, in general, twenty-four questions from the questionnaire that were asked during the semi-structured interview to assess whether the answers provided by the pupils in the questionnaire had some validity;

- four questions concerning pupils' metacognitive knowledge of task variables,
- five questions concerning pupils' metacognitive knowledge of person variables,
- four questions concerning pupils' metacognitive knowledge of strategy variables,
- six questions concerning interactional variables and
- five content knowledge questions.

Although interviews were not undertaken in school 4 (Pil) the overall time restrictions involved in the study timetable for schools 5 (MSt) 'Apple' and 6 (MSt) 'Yard', made it clear that there could only be a limited number of specific pupils studied. Furthermore, it had already been noted in the preliminary study (Pre) that similar interviews had taken a relatively long time due to difficulties in access to the pupils, taking pupils to and from lessons and the length of the actual interview.

The pupils were selected by the teacher involved, after being asked by the author to choose a pupil that they would consider near the top of the class in Physical Education and someone they considered to be nearer the bottom of the class in Physical Education. The criteria offered by the author for the pupil selection was kept minimal and relatively vague, but emphasised that it was not just physical ability but overall ability in Physical Education that should be considered. Throughout the classes, ability and gender were alternated, so that from the first class the 'top' girl would be selected and the 'bottom' boy, and then vice versa for the next class. Thus, there was a combined ability and gender validity check placed upon the questionnaires by the interviews. Allowing the teacher to select the pupils for interview seemed quite adequate as it is accepted that teachers are able to construct criteria for Physical Education performance and there is generally a substantial degree of agreement among teachers in their independent assessments of overall pupil performance in Physical Education (Balsdon & Clift, 1990).

The finer details of conducting interviews have been discussed previously with respect to the preliminary study (Pre). However, the guidelines for the collection and analysis of knowledge of cognition data suggested by Ericsson & Simon (1984) and Garner (1987) were generally followed to increase the validity and reliability of the data (Meloth, 1990). Notably, whereas Garner (1988) suggested that the researcher should limit the degree of inference required of the pupils, only asking pupils about what they do and think, and not why, the author did enquire about the reasons for various actions and thoughts. Similar enquiry was undertaken by Meloth (1990) during a 'Knowledge of Cognition Interview'. The intention was to encourage as
many details as possible and, as Markman (1979) suggested, to check understanding pupils must be asked to make inferences as well demonstrate 'facts'.

Unfortunately, research suggests that the time between the actual occurrence of the learning situation and the pupils' responses should be as short as possible (Brown, Bransford, Ferrarra & Campione, 1983; Nisbett & Wilson, 1977). This proved a slight problem in schools 5 (MSt) 'Apple' and 6 (MSt) 'Yard' as the access to the control and quasi-experimental classes in both schools varied between a few hours and five days. However, the purpose of the semi-structured interviews was to validate the responses to the questionnaire and, therefore, these so-called limitations actually helped emphasise the validity of the questionnaire as, even with these delays, the pupils responses to the questionnaire and interview matched.

To maintain clarity later in reporting of the results, no further reference will be made to the semi-structured interviews. It can be confirmed that the semi-structured interviews did appear to validate the metacognitive ability questionnaire. An example interview (Appendix 11) can be compared against the same pupil's pre-intervention questionnaire content analysis summary (Appendix 12).

3.1.6.6.2 The Development of the Basic Ethnographic Data:

Regular notes were made by the author with regard to the schools, the teachers, the major events during lessons, conversations with pupils, conversations overheard between pupils, insights and problems during the study, and ideas that emerged from the observations. Although these notes were not separated they appear to match the field notes format stated by Spradley (1980: p69-72: cited in Langley, 1995) who suggested three forms of notes: observational notes, a fieldwork journal and interpretive notes. Theeboom, De Knop & Weiss (1995) argued that note-taking may also act as a manipulation check examining the author's adherence to predetermined guidelines and intended patterns of behaviour (Theeboom, De Knop & Weiss, 1995). Burgess (1984) noted during a study it is important to monitor any activities as the study and the methodology will continually be defined and redefined by the researcher and in some cases by those researched. Smagorinsky (1995) emphasised that researchers must reflect on how their own implication in the research process may affect teaching and learning and, therefore, the evaluation of both. "Our effort should not be to avoid participating in the construction of data, but to recognise and account for the ways in which we inevitably contribute the shape our data take" (Smagorinsky, 1995: p 208).
As metacognitive ability and cognitive strategies are potentially influenced by the schools' location and ethos, the teachers, and the pupils' social demographic background, the author decided that there was a need to gain a significant amount of qualitative data concerning contextual variables. It has been suggested that there is a need to supply a substantial amount of information about the 'entity' studied and the setting in which the 'entity' was found. Without such information, it is impossible to make informed judgement about whether the conclusions drawn from the study of any particular site are useful in understanding other sites (Goetz & LeCompte, 1984: cited in Schofield, 1993; Schofield, 1993).

As Spindler & Spindler (1992: p67) stated, "the good ethnographer is also a good collector of artefacts, products, documents - anything that can conceivably be related to the object of the study". The author continually made notes of any 'chats', observations, types of documentation and equipment available, so that the author could engage in both description and interpretation, seeking to establish a coherent and inclusive account of a culture from the point of view of those being researched (Tesch, 1991: cited in Bryman & Burgess, 1994). As much as possible the criteria for 'good ethnography of education' (Spindler & Spindler, 1992) were followed. The role undertaken by the author was that which Adler & Adler (1987: cited in Adler & Adler, 1994) referred to as a 'peripheral member researcher', whereby the author observed and interacted closely enough with members to establish an insider's identity without participating directly in those activities constituting core membership. The author was, therefore, able to communicate relatively freely with the Physical Education Departments' staff even though the author did not actually fulfil a teacher's role. A Head of the Physical Education Department in a school involved in the study emphasised this position gained by the author by stating "You are here now, you are now part of the department." The author secured this position through simple actions such as helping design noticeboards and being willing to listen to teachers' ideas and thoughts. As Clark (1995: p15) stated, "The good teacher, they [teachers] say, is the colleague who supports me and is open to my support."

During the main study, County Council documentation and school prospectus' were obtained to provide information concerning the school, the socio-demographic details of the pupils and the catchment area. Observations were also undertaken of teachers and pupils, both formally and informally, during lessons and throughout the school day. Observation of the teachers combined with the informal conversations and discussions with these teachers allowed the author to establish a reasonably detailed profile of the teachers involved in the main study and the departments they were part of. It could be argued that the analysis was limited as not every lesson could be
observed and the teacher was likely to change teaching styles and their teaching manner throughout the unit. However, although teachers probably know a variety of teaching methods and have used them before, it was claimed that most teachers regularly use only a few (Sternberg, 1994). The author had discussions with teachers, regarding their content strengths and weaknesses and their thoughts on teaching, throughout the main study (MSt). It appeared in schools 1 (Pre) and 2 (Pre) that the teachers were initially defensive when they thought they were being 'investigated' but they were more open when they realised that they did not have to give the author any major amount of time, and that any information they gave would not be the focus of the study. It seemed, therefore, that informal discussions would be the main source of information concerning the teachers involved in the study. The author's dependence on informal discussions with teachers for information was emphasised in school 4 (Pil). Within the author's personal diary it was stated how the teacher appeared less threatened after the informal talk had occurred in the staffroom prior to the author observing her next lesson. For example, she opened up about failing a recent lifesaving course which the school had sent her to. The author believes that the previous apprehension would not have been overcome if a formal interview or discussion had been requested.

The author initially wanted to obtain pupils' school reports as additional information with regard to the pupils' Physical Education knowledge and their physical ability. Such information could be corroborated with the questionnaires, interviews and any observations to develop a clearer picture of the intervention effects. As Cohen & Manion (1989) noted, a comparative report of classrooms should not only check academic factors such as achievement tests, record cards and assessments, but also non-academic factors such as the attitudes of the pupils and the classroom relationships. It was felt by the author that only then would he achieve a more 'realistic' view of the respective classes. Unfortunately, in school 4 (Pil) it appeared that teachers had a fear of their comments in pupils' school reports being viewed and, therefore, the author did not force the issue either in the pilot study (Pil) or the main study (MSt) as he did not want to create any anxiety or any suspicion on behalf of the teachers. It became clear that schools and teachers would vary in their willingness to offer information and this had to be accepted and adapted to; for example, the author felt comfortable asking for a more formal discussion with Clive (the school 5 (MSt) 'Apple' Year 9 teacher) concerning his thoughts on teaching and learning but decided not to ask for such discussions with any of the other teachers. Unfortunately, formal planning of what information you want or will obtain can not always be strictly followed in practice.
From classroom studies, Carter (1992) argued that the author should elucidate critical contextual information, provide enough information to allow the reader to perceive relationships and interactions among events, and should answer questions about time structure so that the reader knows when events occurred and how long they lasted. For example, do the events transpire in one lesson or over several lessons, in one day or over several days. Although Carter (1992) is referring to studies of teachers, the message rings true for a study of pupil activity; the suggestion is that the actions taken by a teacher may depend on the distinct features of the class and, therefore, the descriptions of naturally-occurring classroom life may need to be included. To clarify the context, there is a need to describe the physical environment and to provide details about the pupils (i.e. age, socio-economic status, numbers, characteristics) and teachers (i.e. age, years of experience, statements about teaching, intentions for lessons). The writer must "ensure that the cases are both 'peopled' and 'placed'. If such conditions prevail, the reader...will be able to 'observe' the teacher, 'watch' visible students interacting with the teacher, 'hear' their verbal responses, 'see' their non-verbal behaviour, 'witness' the action that takes place in a particular context, and 'feel' the environmental arena in which it all takes place" (Carter, 1992: p117). The author attempted to do as much as possible to provide such data. The details of events may be even more important in Physical Education lessons as the context of these lessons varies greatly each time and varies considerably from 'normal' classroom contexts (Denscombe, 1980). Furthermore, it has been claimed that interventions are themselves a part of the context of learning and do not exist separately from the remainder of the pupils' experience; in adapting to the intervention context, pupils make decisions about how they use what the intervention offers (Ramsden, 1988). Thus, the context had to be considered not only during the observed lessons but also during the intervention lessons.

However, the author acknowledges that the time in the school was limited in terms of providing a detailed, in-depth analysis, but argues that "it is useless to deny that much of significance can be learned in short periods of time" (Spindler & Spindler, 1992: p66). No matter how long a study is "at base, all interpretive inquirers watch, listen, ask, record, and examine. How these activities may best be defined and employed depends on the inquirer's purpose for doing the inquiry" (Schwandt, 1994: p119). The purpose for utilising basic ethnographic techniques during the main study was not to create a detailed and in-depth account of the school, but to provide details of the context in which the intervention study was undertaken, and to potentially offer areas of influence upon the results; the ethnographic data that was collected (Appendix 13) adequately served this purpose.
Chapter Four

Results
4.1 Stage Four Data Analysis

4.1.1 Introduction

The examination of objectives (A1) to (A5) and objectives (B1) to (B4) were based on the content analysis of pupils' responses in the pre- and post- intervention questionnaires (the author's metacognitive ability questionnaire). Without establishing exact categories prior to the content analysis it is suggested that the author was assessing a qualitative research question of 'what is' (Bogdan & Biklin, 1982: cited in Griffin & Templin, 1989). Encompassing the content analysis, there were basic ethnographic techniques utilised to gather data regarding the schools, their departments, their teachers and their classes; data that enriched the understanding of the context in which the main study was undertaken and suggested possible influences upon the development of pupils' metacognitive ability (Appendix 13).

There were two schools, school S (MSt) 'Apple' and school 6 (MSt) 'Yard', involved in the examination of objectives (A1) to (A5) and objectives (B1) to (B4). Both schools had Year 7 and Year 9 classes involved in the examination of objectives (A1) to (A5) and Year 7 classes involved in the examination of objectives (B1) to (B4). However, only school S (MSt) 'Apple' had Year 9 classes involved in the examination of objectives (B1) to (B4).

The examination of objective (C) was based on a statistical and, therefore, a quantitative comparison between pupils' responses, with regard to their content knowledge, in the pre- and post- intervention questionnaires. A non-parametric Kruskal-Wallis statistical technique was utilised to consider the interaction between pupils' metacognitive ability and their content knowledge, and to examine whether the main study intervention settings were possibly influential in the development of pupils' content knowledge. There were three schools, school 5 (MSt) 'Apple', school 6 (MSt) 'Yard' and school 3 (MStQ), involved in the examination of objective (C). School 5 (MSt) 'Apple' and school 3 (MStQ) had Year 7 and Year 9 classes involved in the examination of objective (C), whereas school 6 (MSt) 'Yard' only had Year 7 classes involved.

To maintain clarity, the content analysis and the statistical data are considered separately in the results and the basic ethnographic data is included in the Appendices (Appendix 13). As conducting research within any school is problematic with numerous interacting and uncontrollable variables, the limitations and difficulties encountered during the analysis of the results have been incorporated into each section.
4.1.2 Content Analysis

Content analysis enabled the author to establish foundations in the study of pupils’ metacognitive ability (objectives A1 to A5) prior to the intervention, and the development of pupils’ metacognitive ability (objectives B1 to B4) following the intervention. As in any content analysis, the formation of categories and category scales and the reliability of these categories were critical. Therefore, the content analysis procedures are explained.

4.1.2.1 The Formation of Categories

It has been argued that category formation is the decisive phase of content analysis, and "it is imperative that category formation is determined by the purpose and hypotheses, and solely by these" (Sepstrup, 1981: p137). As Berelson (1971: cited in Mostyn, 1985) argued, content analysis stands or falls by its categories. Krippendorff (1980) argued that there are contrasting recommendations of deriving categories either from relevant theories or from the resulting data. However, the author was forced to develop categories with the aid of both relevant theories but mainly with the eventual data. The questionnaire was structured around general areas which had emerged from the literature and within these areas specific themes or 'dimensions' (Haggarty, 1995: p186) became evident. For example, within the general area of metacognitive knowledge of task variables, there were themes such as the desired outcomes of the activity, (Weinstein, 1988), the demands of the activity (Weinstein, 1988), the abundancy and organisation of the information (Brown, 1984), and the context in which the task was taking place (Ramsden, 1988). These were predetermined themes or dimensions within which more specific categories could be established depending upon the eventual data. As there was a distinct lack of studies assessing metacognitive ability for the author to draw upon the author was, in essence, firstly assessing what existed before assessing whether there were any patterns to that existence. Therefore, the author could not always establish predetermined categories. Although the general areas and themes could be predetermined from literature most of the specific categories could not. Carney (1972) referred to this as the 'virginity principle' where a major aim may be to find out what kinds of things turn up and not simply how often they turn up. Therefore, as suggested by Mostyn (1985), the raw data was scrutinised to assess whether any regularities occurred which may enhance the development of specific conceptual categories. The author acknowledged that the categories must reflect the purpose of the research, they must be exhaustive and they must be mutually exclusive (Holsti, 1969; Krippendorff, 1980). Furthermore, the author was wary not to develop
categories too small as this may potentially cloud major trends amid the data (Carney, 1972). The resulting categories are stated within the framework of the relevant general areas and themes from which the questions assessing pupils' metacognitive ability were based. A full explanation of each category, with examples of a pupils' responses for each of these categories is available in Appendix 14.

4.1.2.2 Content Analysis General Areas, Themes and Categories

General Area: Metacognitive Knowledge of Task Variables

Theme: The Desired Outcomes and Purpose of the Task
(based on Question 1)

Categories:
• Activity Description
• Physical Skills 7
• Mental Skills 7
• Stock Responses / Unaware
• Blank

Theme: The Influences Upon the Task
(based on Questions 2 and 5)

Categories:
• Intrinsic Physical 7
• Extrinsic Physical 7
• Intrinsic Mental 7
• Extrinsic Mental 7
• Stock Responses / Unaware
• Nothing
• Blank

7 A category that was utilised in the 'overall focus' of the content analysis results with regard to pupils' metacognitive ability.
Theme: The Abundancy and Organisation of the Information
(based on Question 3)

Abundancy Categories:
• Enough
• Not Enough
• Unsure
• Blank

Organisation (Priority) Categories:
• Physical Technique
• Mental Technique
• Activity Principle
• General Lesson Issues (GLI)
• Encouragement
• Unspecified
• Blank

Theme: The Demands of the Task
(based on Question 4)

Categories:
• General Processes
• Physical Properties
• Physical Processes
• Mental Properties
• Mental Processes
• None Required
• Stock Responses / Unaware
• Blank

Theme: The Pupils' Feelings During the Task
(based on Question 6)

Categories:
• Positive Feelings
• Neutral Feelings
• Negative Feelings
• No Feelings
• Blank
General Area: Metacognitive Knowledge of Person Variables

Theme: Intra-Individual Variables
(based on Questions 7, 10, 11 and 12)

Categories:
- Physical Properties
- Physical Processes
- Mental Properties
- Mental Processes
- General Factors
- Practical Factors
- Unaware
- Blank

Theme: Intra-Individual and Inter-Individual Variables
(Cognitive Style Dimensions; based on Questions 13 to 17)

Categories:
- Wholist - Awareness
- Wholist - No Awareness
- Analytic - Awareness
- Analytic - No Awareness
- Wholist Analytic - Awareness
- Wholist Analytic - No Awareness
- Neither - No Awareness
- Blank

Categories:
- Verbaliser - Awareness
- Verbaliser - No Awareness
- Imager - Awareness
- Imager - No Awareness
- Verbaliser Imager - Awareness
- Verbaliser Imager - No Awareness
- Neither - No Awareness
- Blank
Theme: Inter-Individual Variables
(based on Question 8)

Categories:
• Awareness
• No Awareness
• Unsure
• Don't Know
• Blank

Categories:
• Gender
• Physical Factors
• Mental Factors
• General Ability
• None
• Don't Know
• Blank

Theme: Universals of Cognition
(based on Question 9)

Categories:
• Enough - Additional
• Enough - No Ideas
• Not Enough - Additional
• Not Enough - No Ideas
• Don't Know
• Blank

General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?
(based on Questions 18, 20 and 21)

Categories:
• Physical Factors
• General Mental Techniques
• Specific Mental Techniques
• External Factors
• Nothing
• Blank
Theme: Why Use the Strategy? 
(based on Questions 18, 19 and 21)

Categories:
• Others
• Conscious Decision (Cognitive)
• Conscious Decision (Practical)
• Unconscious Decision
• No Reason
• Blank

Theme: When to Use the Strategy 
(based on Question 22)

Categories:
• In Context
• Near Transfer
• Wider Transfer
• No Context
• Not Applicable
• Don't Know
• Blank

Theme: Pupils' Monitoring of the Strategy and the Task 
(based on Question 23)

Categories:
• Change - Want
• Change - Need
• Change - Informed
• Change - No Reason
• No Change - Want
• No Change - Need
• No Change - Informed
• No Change - No Reason
• No Change - Couldn't
• Don't Know
• Blank
Theme: Pupils' Feelings During their Strategic Action and the Task
(based on Question 24)

Categories:
• Positive Feelings
• Neutral Feelings
• Negative Feelings
• Physical
• None
• Blank

General Area: Interactional Variables

Theme: Volitional Control
(based on Questions 25 to 27)

Categories:
• Volitional
• No Volitional
• Don't Know
• Blank

Theme: The Wider Purpose of Physical Education
(based on Questions 28 and 29)

Categories:
• Health and Fitness
• Physical Skills
• Mental Skills
• Social
• Enjoyment
• Satisfy Others
• Experience
• Future
• No Purpose
• Stock Response / Unaware
• Blank
Theme: Pupils' Motivational Orientation
(based on Questions 30 to 33, 43 and 44)

Categories:
• Task
• Ego
• Social
• None
• Blank

Theme: Pupils' Locus of Control
(based on Questions 34 and 35)

Categories:
• Intrinsic
• Extrinsic
• Unaware
• Blank

Theme: Self-Efficacy (perceived competence)
(based on Questions 36 and 39 to 41)

Categories:
• Positive Physical
• Positive Mental
• Positive General
• Negative Physical
• Negative Mental
• Negative General
• Unaware
• Blank

Theme: Self-Efficacy (strength)
(based on Question 37)

Categories:
• Positive Strength
• Negative Strength
• Unaware
• Not Applicable
• Blank
Theme: Self-Efficacy (generality)  
(based on Question 38)

Categories:
• Positive Generality
• Negative Generality
• Unaware
• Not Applicable
• Blank

Theme: General Self-Worth  
(based on Question 42)

Categories:
• Positive Self-Worth
• Negative but Aware Self-Worth
• Negative Self-Worth
• Unaware
• Blank

Theme: Motivational Climate  
(based on Questions 45-50)

Categories:
• Task
• Ego
• Neutral
• Unaware
• Blank

4.1.2.3 Scaling of Categories

The author wanted not only to ensure that the types of categories that emerged were assessed but also to provide clear guidance concerning the 'incidence of occurrence' of each category (Mostyn, 1985). However, it has been argued that the data may be more meaningful if there is an indication of the direction or the intensity of the views expressed by respondents (Holsti, 1969; Mostyn, 1985). As such, where possible the author developed a simple scale within each category. For example, within the general area of Metacognitive Knowledge of Task Variables and, specifically, the theme 'The Desired Outcomes and Purpose of the Task', each pupil response was not only placed in a category such as 'Activity Description' but was also labelled as being a general response (G), a specific response (S) or a poor response (P). Thus, each
response was considered in terms of specificity and, therefore, in terms of direction. Lee, Landin & Carter (1992) also utilised a specificity category scale within their research regarding pupils' skill-related thoughts during tennis instruction. As an example from the present study an 'Activity Description' response scaled as being general (G) was "You bring your legs in and push them out and then do it again" while a response scaled as being specific (S) was "you put both arms on the side, then you twist round with one arm still on the wall while the other is facing the opposite direction. As you push off from the wall you bring the hand off the wall to meet together then you carry on swimming." Although the specificity scale was the most commonly utilised throughout the content analysis, three other scales were developed.

Firstly, within the general area of Metacognitive Knowledge of Strategy Variables and, specifically, the theme 'When to Use the Strategy', each response was labelled as being good (Gd), okay (OK) or poor (Pr). Hence, each response was considered in terms of proficiency. For example, while considering when the leg push required for a back crawl start could be useful in other activities, a pupil stated "abseiling, you push off with your feet" and, therefore, implied a degree of good (Gd) 'Wider Transfer'. However, another pupil stated, "running because you kick your legs" and while this may suggest that the pupil appreciates that both the back crawl start and running require powerful leg actions the pupil's explanation was too vague to assume that it was good 'Wider Transfer' and was, therefore, scaled as okay (OK). Secondly, within the general area of Interactional Variables and, specifically, the theme 'The Wider Purpose of Physical Education', any response in the 'Health & Fitness' category was scaled to identify the direction towards mental (Men), general (Gen), or physical (Phys) health and fitness. For example, a mental (Men) scale accompanied the response "to keep you happy", whereas a general (Gen) scale accompanied the response "healthier lifestyle" and a physical (Phys) scale accompanied the response "keeps you fit." Thirdly, within the general area of Interactional Variables and, specifically, the themes of 'Motivational Orientation', 'Self-Efficacy (perceived competence)' and 'Motivational Climate', each response was categorised and then labelled as being strong (St) or weak (Wk). Thus, the intensity of each response was recognised. For example, within the theme 'Motivational Climate' the response "When we get compliments" was categorised as implying a strong (St) ego-oriented motivational climate. However, while the response "When I go up a grade" was also categorised as implying an ego-oriented motivational climate because there was a focus on external rewards and a comparison through grades, it was scaled as weak (Wk) because there was a small suggestion that the motivational climate encouraged personal improvement and, therefore, a more task-oriented focus.
In the main study, very occasionally, the coders were required to consider a scale for a certain category that, in hindsight, could only be one degree of specificity, direction or intensity. For example, in the general area of Metacognitive Knowledge of Strategy Variables and, specifically, the theme 'What Strategy?' the categories 'General Mental Techniques' and 'Specific Mental Techniques' would, by their very nature, tend towards being general (G) and specific (S), respectively, with regard to the specificity category scale. However, all of the scale options are included in the presentation of the results to maintain clarity and standardisation.

More generally, the category scale poor response (i.e. P or Pr depending upon the category scale) was offered as a scale option for the rare occasions that 'garbled knowledge' (Perkins & Simmons, 1988) was evident within a category response. For example, within the general area of Metacognitive Knowledge of Task Variables and, specifically, the theme 'The Desired Outcomes and Purpose of the Task', an 'Activity Description' response scaled as being poor (P) was "kick out and repeat" as it referred to the breaststroke leg action.

With the categories and category scales established the author was able to develop a 'Main Study Database' that summarised the content analysis for each questionnaire. A database file was established for every pupil, for both their pre- and post- intervention questionnaires. Each file included the categories and category scales for each pupil's response, the frequency that this category was referred to, and, in general, a direct quotation of each response. An example of a file from the 'Main Study Database' is available in Appendix 12.

4.1.2.4 Reliability of Categories

Category reliability was enhanced by both the author repeating the content analysis and by a secondary independent observer carrying out the analysis. As such, there was both intra-observer assessments and inter-observer assessments (Krippendorff, 1980). However, it is acknowledged that any results should still be treated with a degree of caution, as Sepstrup (1981: p139) argued, "high intercoder reliability only indicates that two or more persons have successfully been 'educated' to uniform perception." Hence, high reliability only to a limited extent indicates high validity. With respect to the main study, it was the process of labelling, or scaling, responses that created the more noticeable differences between the author's analysis and that of the independent observer. The author was aware that the problem of 'observer drift' (van der Mars, 1989) had to be considered, whereby the observers may unconsciously tend to towards each other ensuring agreement but not necessarily accuracy, or
whereby long periods of analysis may lead to an observer to interpret category definitions differently. Yet, there seemed to be few problems regarding the categorisation of pupils' responses; it was the interpretation of the scales that proved slightly more difficult at times. For example, within the general area of Interactional Variables and, specifically, the theme of 'Motivational Climate', there had been a difference between the coders' perceptions of whether responses such as "When I get it right" should be categorised as implying a strong (St) or weak (Wk) task-oriented motivational climate; although the response indicates a desire for task mastery, should the pupil be looking for improvement rather than for success? However, where differences were noted the source of disagreement was explored (McIntyre, 1980: cited in Haggarty, 1995) which resulted in an agreement of which specific category and category scale the response should be placed within. In the example offered, the response was scaled as being weak (Wk). Furthermore, the 'percentages of agreement' technique (van der Mars, 1989) was utilised to check inter-coder reliability for each response, and the levels of agreement did not fall below 80% which have been deemed sufficiently high (Hartmann, 1977: cited in van der Mars, 1989). For example, regarding school 5 (MSt) 'Apple' Control class pre-intervention questionnaire results, the levels of agreement for each general area ranged from 81.9% in the 'Metacognitive Knowledge of Person Variables' general area to 92.5% in the 'Metacognitive Knowledge of Task Variables' general area. Although such actions practically proved effective, it had to be accepted that "where analytical procedures involve individuals, errors and uncertainties invariably creep in" (Krippendorff, 1980: p55) and this would be the case with the main study.

4.1.3 Reporting the Content Analysis

Throughout the content analysis the author acknowledged that "the types and range of responses (would) vary a great deal according to the types of people who respond" (Mostyn, 1985: p127; Krippendorff, 1980). Therefore, the author utilised basic ethnographic techniques during the study, obtaining detailed documentation and information, in the hope of developing a greater appreciation of the results from the content analysis. The author intended to examine patterns of pupils' metacognitive ability, that is, patterns in the type and degree of metacognitive ability that pupils showed and developed. Objectives (A1) to (A5) and objectives (B1) to (B5) required a form of 'contingency analysis' that could suggest a "logic of association" between ideas or concepts (Carney, 1972: p189).
In general terms, the sheer volume of data caused immense problems in structuring and reporting the results. With the numerous general areas, themes, specific categories and specific category scales the complexity of the content analysis data, combined with all the additional influencing and interacting contextual variables, was tremendous and made clarifying potential patterns of metacognitive ability incredibly difficult. With hindsight, the general objective to 'study' pupils' metacognitive ability patterns and the influences upon them was possibly too inclusive. Hence, the author was left with the problem process of 'culling', whereby "the researcher must think in terms of condensing, excising and even reinterpreting the data, so that it can be written up as a meaningful communication" (Mostyn, 1985: p138). Thus, it was deemed necessary to view the study in two ways. With respect to the content analysis of pupils' responses, there was an overall study incorporating school 5 (MSt) 'Apple' and school 6 (MSt) 'Yard', three teachers, two year groups and twelve classes. However, the author also acknowledged that this overall study was, in fact, made up of a series of specific case studies as each school, department, teacher, Year group, class and pupil had their own individualities and particularities. Each of these variables could influence the emerging patterns of metacognitive ability. Nevertheless, it would have proved almost impossible to establish, report and compare every response of every pupil while considering the specific contextual variables of each situation. Hence, the author focused the data in two forms.

- Firstly, to establish some form of overall focus of pupils' metacognitive ability in school 5 (MSt) 'Apple' and school 6 (MSt) 'Yard' which would be relevant to objectives (A1) to (A5) and objectives (B1) to (B4), the author highlighted some ideal categories and category scales from each general area and theme that, if referred to, would suggest that pupils had shown some degree of efficient metacognitive ability. These ideal categories were noted during the listing of the content analysis categories in Section 4.1.2.2 and are more fully explained in the Appendices (Appendix 15). The selection of these ideal categories and category scales was a result of literature, the teachers' comments, the tasks involved in the study, the pupils' responses and the cognitive bias of the study. For example, the teachers had suggested that the purpose of most tasks was to develop specific physical and mental skills and, therefore, from the theme 'The Desired Outcomes and Purpose of the Task', the ideal categories were recognised as being 'Physical Skills' and 'Mental Skills' and the ideal category scale was deemed to be specific (S). The percentages of pupils from each class, Year and school who referred to these ideal categories and category scales were assessed individually and compared, both prior to the intervention (objectives A1 to A5) and following the
The complexity of an overall focus of pupils' metacognitive ability was reduced because the number of categories and category scales that were being assessed was reduced.

Secondly, to establish a specific focus of pupils' metacognitive ability relevant to objectives (A1) to (A5) and objectives (B1) to (B4), a single school and Year, school 5 (MSt) 'Apple' Year 7, was concentrated upon. The school and Year were selected randomly, each being drawn 'out of a hat' (Borg & Gall, 1983). As there was not the complexity of comparing classes from different schools and Years, the percentage of pupils in the three classes of school 5 (MSt) 'Apple' Year 7, who referred to each category and category scale, from each general area and theme, could be assessed individually and compared. By highlighting a specific case study it was hoped that a more detailed assessment of the influences upon pupils' metacognitive ability and the development of pupils' metacognitive ability could be ascertained.

There is an overall focus and a specific focus presented for the pre-intervention content analysis (Part One) and the comparison between the pre-intervention and the post-intervention content analysis (Part Two). Figure 4.01 illustrates how the content analysis will be reported and how it relates to the objectives (A1) to (A5) and (B1) to (B4).
Figure 4.01: The Reporting Structure for the Content Analysis and its Relationship to the Main Study Objectives (A1) to (A5) and (B1) to (B4).

4.1.4 The Presentation of the Results

There will be both an overall and specific focus upon the content analysis results presented under the headings 'Part One Main Study: Pupils' Pre-Intervention Metacognitive Ability (Objectives A1 to A5)' and 'Part Two Main Study: Comparison Between Pupils' Pre-Intervention and Post-Intervention Metacognitive Ability (Objectives B1 to B4)'. All content analysis data are presented in a tabulated format. Each table has been appropriately designed to consider the combination of objectives and focus. Thus, there is a slightly different table format for objectives (A1) to (A5) compared to the table format for objectives (B1) to (B4). Similarly, there is a different table format for the overall focus compared to the table format for the specific focus. However, each table shows the percentage of pupils in each class who referred to a specific category and specific category scale, and to clarify the percentage values in each of the content analysis results tables, Table 4.01 indicates the actual number of pupils that were in each class.
Table 4.01: The number of pupils in each quasi-experimental class who completed pre-intervention questionnaires and post-intervention questionnaires.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Pre-Intervention or Post-Intervention</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>n = 27</td>
<td>n = 27</td>
<td>n = 29</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>n = 27</td>
<td>n = 25</td>
<td>n = 29</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>n = 27</td>
<td>n = 28</td>
<td>n = 29</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>n = 28</td>
<td>n = 28</td>
<td>n = 19</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>n = 19</td>
<td>n = 17</td>
<td>n = 21</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>n = 15</td>
<td>n = 14</td>
<td>n = 13</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>Pre-intervention</td>
<td>n = 14</td>
<td>n = 11</td>
<td>n = 12</td>
</tr>
</tbody>
</table>
4.1.5 Part One Main Study: Pupils' Pre-Intervention Metacognitive Ability
(Objectives A1 to A5)

4.1.5.1 Overall Focus

For clarity,

- Two schools, school 5 (MSt) 'Apple' and school 6 (MSt) 'Yard', and two Years, Year 7 and Year 9, were involved in the overall focus of the Part One Main Study: Pupils' Pre-intervention Metacognitive Ability.

- An indication of the relevant general area precedes each section and an indication of the relevant theme, category and category scale precedes the presentation of each table.

- Objectives (A1) to (A5) are assessed separately, directly after the presentation of each table.

- With regard to the difference between schools and Years, a minus sign indicates that a greater percentage of school 6 (MSt) 'Yard' pupils had referred to the specified category and category scale compared to school 5 (MSt) 'Apple' 8 pupils, and that a greater percentage of Year 9 pupils had referred to the specified category and category scale compared to Year 7 pupils. Where there is no minus sign in the difference row, the reverse was the case.

- Within each table, the value zero (0) percent signifies that there were no pupils in the relevant class who referred to the specified category and category scale.

---

8 To ease and clarify the reporting of the results, school 5 (MSt) 'Apple' and school 6 (MSt) 'Yard' will now simply be referred to as Apple and Yard respectively.
The Desired Outcomes and Purpose of the Tasks

Physical Skills (S)

Pupils suggesting that the purpose of the tasks was the development of specific physical skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>19</td>
<td>29</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>19</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>19</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend:

Meta

Meta+

(A1) With regard to references made to physical skills in specific terms there appeared to be very little difference between pupils of the same class in either Year 7 or Year 9. The only possible exception may have been the Apple Year 9 Meta class where there was a more notable percentage of such pupils and, therefore, it could be implied that there were differences between the pupils within that class. However, a very low percentage of pupils in each class of each Year perceived the purpose of the task to have been the development of specific physical skills, although, according to the relevant teachers, a major purpose of all of these tasks was to specifically enhance pupils' physical ability. Therefore, the results suggest that most pupils in each class had a poor metacognitive knowledge of task purpose.

(A2) There was no major difference suggested between classes of the same year and school. Every class had a low percentage of pupils who appreciated that a purpose of the tasks was to develop specific physical skills. The Apple Year 9
classes appeared to have the most pupils with such an appreciation although there was no real difference evident between these three classes either.

(A3) There appeared to be a difference between the Apple Year 7 and Apple Year 9 classes with regard to the percentage of pupils who showed some appreciation of the task purpose. Although there was still a relatively low percentage of Year 9 pupils who acknowledged the development of specific physical skills as a purpose of the tasks, there was a suggestion that, as a Year, their metacognitive knowledge of task purpose was greater than that of Year 7. However, there seemed to be no difference between Year 7 and Year 9 pupils from Yard school regarding their awareness of the purpose behind the tasks.

(A4) There was no difference between Apple Year 7 and Yard Year 7 in their appreciation that the development of specific physical skills was a major purpose of the tasks. Each Year 7 class showed a distinct lack of pupils who indicated having some metacognitive knowledge of task purpose.

(A5) Apple Year 9 appeared to have a greater percentage of pupils who acknowledged the development of specific physical skills as a purpose of the tasks compared to Yard Year 9.
The Desired Outcomes and Purpose of the Task

Mental Skills (S)

Table 4.02A: Pupils suggesting that the purpose of the task was the development of specific mental skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>7</td>
<td>29</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td>7</td>
<td>29</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9 (D)</td>
<td>7</td>
<td>29</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9 (D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Legend

Meta
Meta +

(A1) Little difference could be observed between pupils of the same class in either Apple Year 7 or Yard Year 7; a very low percentage of pupils in each class from Year 7 and from Yard Year 9 perceived that the purpose of the tasks was to develop specific mental skills. However, as a major purpose of all of these tasks, according to the relevant teachers, was to specifically enhance pupils' mental ability, it implies that most pupils had a poor metacognitive knowledge of task purpose. The Apple Year 9 Meta class did suggest that almost a third of the pupils appreciated that the development of specific mental skills was a major purpose of the tasks. However, these pupils were still in the minority.
(A2) No major difference was suggested between classes of the same Year and school with regard to the percentage of pupils who appreciated that a purpose of the tasks was to develop specific mental skills; every class had a low percentage of such pupils. However, there was a greater percentage of such pupils in Apple Year 9 classes compared to other classes, although, within Apple Year 9, the Meta class had a greater percentage of such pupils compared to the Control or the Meta+ classes.

(A3) There appeared to be a noticeable difference between the Apple Year 7 and Year 9 classes with regard to the percentage of pupils who appreciated that a purpose behind the tasks was to develop specific mental skills. Although there was a relatively low percentage of Year 9 pupils who acknowledged the development of specific mental skills, there was a suggestion that, as a Year, their metacognitive knowledge of task purpose was greater than that of Year 7. However, there seemed to be no difference between Yard Year 7 and Yard Year 9 with regard to the percentage of pupils who acknowledged that a purpose behind the tasks was to develop specific mental skills.

(A4) There appeared to be no difference between Apple Year 7 and Yard Year 7 in their appreciation that the development of specific mental skills was a major purpose of the tasks. Each Year 7 class suggested a distinct lack of metacognitive knowledge of task purpose.

(A5) There seemed to be a difference between Apple Year 9 and Yard Year 9 classes with regard to the percentage of pupils who appreciated that the development of specific mental skills was a major purpose of the tasks. There was a greater percentage of pupils who acknowledged the development of mental skills as a purpose of the tasks in Apple Year 9 compared to Yard Year 9.
Theme: The Influences Upon the Task
Category & Scale: Intrinsic Physical (S)
Table 4.03A: Pupils suggesting that there were some specific intrinsic physical influences upon the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>63</td>
<td>63</td>
<td>41</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>58</td>
<td>41</td>
<td>57</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td></td>
<td>3</td>
<td>22</td>
<td>-16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>85</td>
<td>68</td>
<td>86</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>43</td>
<td>45</td>
<td>17</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td></td>
<td>42</td>
<td>23</td>
<td>69</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-22</td>
<td>-5</td>
<td>-45</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>15</td>
<td>-4</td>
<td>40</td>
</tr>
</tbody>
</table>

(A1) Each class, in general, appeared to have a majority of pupils who appreciated that there were specific intrinsic physical influences upon the tasks. There were exceptions and, noticeably, each Yard Year 9 class had a slight minority of such pupils. However, it appeared that there may have been a difference between pupils of the same class regarding their appreciation of the specific intrinsic physical influences upon the tasks. The Apple Year 9 Control class and the Apple Year 9 Meta+ class were the exceptions as both had a strong majority of pupils who appreciated some of the specific intrinsic physical influences upon the tasks. Thus, there appeared to be a greater similarity between pupils within these classes compared to any other classes.

(A2) In each Year of each school, two classes had a similar percentage of pupils who referred to some specific intrinsic physical influences upon the tasks, while the other class had a smaller percentage of such pupils. Thus, there was a degree of similarity between classes of the same Year albeit relatively small.
(A3) There appeared to be a difference between Apple Year 7 and Apple Year 9 classes with regard to the percentage of pupils who showed some appreciation of task influences. Although a majority of pupils in both Years acknowledged the specific intrinsic physical influences upon the tasks, the Year 9 majority was much stronger than that in the Year 7. The difference between Yard Year 7 and Year 9 pupils was less noticeable, although it appeared that a greater percentage of Year 7 pupils appreciated some of the specific intrinsic physical influences upon the tasks compared to Year 9 pupils.

(A4) There was no major difference between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who showed some appreciation of specific intrinsic physical influences upon the tasks. Each Year 7 class suggested that there was a slightly greater percentage of pupils who appreciated some of the specific intrinsic physical influences than those who did not.

(A5) There appeared to be a difference between Apple Year 9 and Yard Year 9 regarding the percentage of pupils who showed some metacognitive knowledge of task influences. A greater percentage of Apple Year 9 pupils appeared to have appreciated some of the specific intrinsic physical influences upon the tasks compared to Yard Year 9 pupils.
The Influences Upon the Task

Extrinsic Physical (S)

Pupils suggesting that there were some specific extrinsic physical influences upon the task:

Table 4.04A:

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>52</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>21</td>
<td>41</td>
<td>29</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>31</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>41</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>43</td>
<td>18</td>
<td>42</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>2</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>11</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-22</td>
<td>22</td>
<td>-13</td>
</tr>
</tbody>
</table>

Legend

Meta = Metacognitive Strategy Class
Meta + = Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variations and Cognitive Strategy Class

(A1) Each class, in general, appeared to have a minority of pupils who appreciated that there were specific extrinsic physical influences upon the tasks. However, as each minority was only slight it would seem that there was a difference between pupils of the same class regarding their awareness of the specific extrinsic physical influences upon the tasks.

(A2) In each Year of each school, two classes had a similar percentage of pupils who referred to some of the specific extrinsic physical influences upon the tasks, while the third class either showed a larger or smaller percentage of such pupils. It appeared that it was either the Meta class or the Meta+ class that was the irregular class. The difference between the Control, Meta and Meta+ classes in each Year 7 was not great, but in Year 9 the Meta classes seemed to have a smaller percentage of pupils who appreciated some of the specific extrinsic physical influences upon the tasks compared to the Control and the Meta+ classes.
(A3) There appeared to be a consistent, if only slight, difference between the percentage of pupils who acknowledged some of the specific extrinsic physical influences upon the tasks in Apple Year 7 and Apple Year 9; there was a greater percentage of Year 7 pupils compared to Year 9 pupils. However, in Yard it appeared that there was, in general, a greater percentage of Year 9 pupils who appreciated some of the specific extrinsic physical influences upon the tasks compared to Year 7 pupils, although the difference was not consistent across all of the classes.

(A4) Apple Year 7 classes appeared, in general, to have a greater percentage of pupils who had some appreciation of the specific extrinsic physical influences upon the tasks compared to Yard Year 7 classes. However, most of the Year 7 classes suggested that there were fewer pupils who appreciated the specific extrinsic physical influences upon the tasks than there were pupils who did.

(A5) There appeared to be very little difference between Apple Year 9 and Yard Year 9 classes regarding the percentage of pupils who showed some appreciation of the specific extrinsic physical influences upon the tasks; the difference in the percentage of such pupils, between Apple Year 9 and Yard Year 9, was small. However, it was noticeable that in both schools, the Meta classes had a smaller percentage of such pupils compared to the Control and the Meta+ classes. Thus, while there was seemingly a difference between classes of the same Year regarding the percentage of such pupils, the difference between the Year 9 classes from different schools was small.
Theme: The Influences Upon the Task
Category & Scale: Intrinsic Mental (S)
Table 4.05A: Pupils suggesting that there were some specific intrinsic mental influences upon the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>19</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td>14</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>33</td>
<td>46</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td>33</td>
<td>37</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9 (D)</td>
<td>-14</td>
<td>-42</td>
<td>-11</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9 (D)</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

(A1) Each class, in general, appeared to have very few pupils who appreciated that there were specific intrinsic mental influences upon the tasks. As such, there seemed to be some similarity between pupils of the same class regarding their lack of awareness of the influences upon the tasks. However, the Apple Year 9 classes had a greater percentage of pupils who acknowledged some specific intrinsic mental influences upon the tasks compared to the other classes and, therefore, suggested less similarity between pupils.

(A2) Within each Year of each school, it appeared that there was little difference between the classes regarding the percentage of pupils who appreciated some of the specific intrinsic mental influences upon the tasks. This was clearly evident in Yard Year 7 and Yard Year 9 where the percentage of such pupils was very small. There was a greater difference between the Apple Year 7 classes and the Apple Year 9 classes, although there was still some similarity in that the pupils who appreciated the specific intrinsic mental influences upon the tasks were in the minority.
There appeared to be a consistent difference with regard to the percentage of pupils who showed some appreciation of the specific intrinsic mental influences upon the tasks between the Apple Year 7 and Apple Year 9 classes. There was a consistently, and notably, greater percentage of Year 9 pupils who acknowledged the specific intrinsic mental influences upon the tasks compared to Year 7 pupils. However, the similarity between the Yard Year 7 and Yard Year 9 classes was remarkable. Almost all of the Yard Year 7 and Yard Year 9 pupils seemed to have a very poor appreciation of the specific intrinsic mental influences upon the tasks.

The Apple Year 7 classes, in general, appeared to have a greater percentage of pupils who showed some appreciation of the specific intrinsic mental influences upon the tasks compared to Yard Year 7 classes. However, the difference between the Year 7 classes from each school was relatively small; the percentage of pupils who showed some appreciation of the specific intrinsic mental influences upon the tasks was very small in all of the Year 7 classes.

There appeared to be a considerable and consistent difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who showed some appreciation of the specific intrinsic mental influences upon the tasks. Those pupils in the Apple Year 9 classes who acknowledged the specific intrinsic mental influences upon the tasks were in a slight minority, whereas very few pupils at all acknowledged these influences in the Yard Year 9 classes. As such, more pupils in Apple Year 9 classes, compared to Yard Year 9 classes, appeared to have an appreciation of the specific intrinsic mental influences upon the tasks.
A majority of the classes had a noteworthy percentage of pupils who acknowledged some specific extrinsic mental influences upon the tasks, although it would seem that a similar percentage of pupils failed to acknowledge such influences. Hence, there appeared to be a difference between pupils of the same class regarding their appreciation of the specific extrinsic mental influences upon the tasks.

While there was possibly a difference between pupils of the same class regarding their appreciation of the specific extrinsic mental influences upon the tasks, there appeared to be some similarity between classes of the same Year and school. There was a relatively similar percentage of pupils in each class, of the same Year and school, who acknowledged some of the specific extrinsic mental influences upon the tasks.

There appeared to be a consistent difference between Apple Year 7 and Apple Year 9 with regard to the percentage of pupils who showed some appreciation of the specific extrinsic mental influences upon the tasks. There was often a
greater percentage of such pupils in Apple Year 9 compared to Apple Year 7. However, there was a much stronger similarity between the Yard Year 7 and Yard Year 9 classes as most classes showed a relatively poor percentage of pupils who had appreciated some of the specific extrinsic mental influences upon the tasks.

(A4) The Apple Year 7 classes, in general, appeared to have a consistently smaller percentage of pupils who acknowledged some of the specific extrinsic mental influences upon the tasks compared to the Yard Year 7 classes; the difference was both consistent and noteworthy.

(A5) There appeared to be a general similarity between Apple Year 9 classes and Yard Year 9 classes regarding the percentage of pupils who showed some appreciation of the specific extrinsic mental influences upon the tasks. Although there was a slight difference in the percentage of such pupils between the Apple Year 9 and Yard Year 9 classes, the difference was neither consistent nor large in favour of a specific school.

Theme: The Abundancy and Organisation of the Information
Category & Scale: Enough
Table 4.07A: Pupils suggesting that there was an adequate abundancy of information.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>86</td>
<td>93</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>89</td>
<td>82</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-2</td>
<td>11</td>
<td>54</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>100</td>
<td>100</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-5</td>
<td>-7</td>
<td>56</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-1</td>
<td>-18</td>
<td>5</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Class
- Meta +: Metacognitive Knowledge of Topic and Strategy Variables and Cognitive Strategy Class
Within each class there was a definite majority of pupils who acknowledged that there was enough information available regarding the tasks and the activity. The exception appeared to be the Apple Year 7 Meta+ class where those pupils who seemingly had some metacognitive knowledge of information abundancy were in the minority. However, in general, there seemed little difference between pupils of the same class regarding their perceptions of information abundancy.

With most classes having a large proportion of pupils who appreciated that there was enough information available regarding the tasks, it was not surprising that there was no notable difference between classes of the same Year and school. However, due to the low percentage of such pupils in the Apple Year 7 Meta+ class, some differences were noticeable between the Apple Year 7 classes.

Apart from the Meta+ class in Year 7, Apple Year 7 and Year 9 classes showed only a small difference regarding the percentage of pupils who had appreciated that there was enough information available during the tasks; the Apple Year 9 classes appeared to have a slightly greater percentage of such pupils compared to the Apple Year 7 classes. A similar situation was evident between the Yard Year 7 classes and the Yard Year 9 classes, even though every Yard Year 9 pupil acknowledged the adequate amount of information that was available. Thus, in both Apple and Yard, the Year 9 classes appeared to have a greater percentage of pupils who showed some appreciation of the quantity of information available compared to the Year 7 classes.

Apart from the Apple Year 7 Meta+ class, all of the Year 7 classes, in both schools, were very similar in their high percentage of pupils who showed some awareness and appreciation that there was enough information available regarding the tasks.

The percentage of pupils who appreciated the adequate information abundancy was very high and strikingly similar in all of the Year 9 classes, both in Apple and Yard. Indeed, there was no difference, whatsoever, between five of the six classes as all of the pupils in these classes acknowledged that there was enough information available.
The Abundancy and Organisation of the Information

Activity Principle (S)

Pupils suggesting a specific activity principle involved in the task was prioritised.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>4</td>
<td>54</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td>4</td>
<td>54</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9 &amp; 9 (D)</td>
<td>4</td>
<td>54</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9 &amp; 9 (D)</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

(A1) The percentage of pupils who suggested a specific activity principle as being the most important piece of information was extremely low in most classes. Indeed, eight of the twelve classes had no pupils identifying or suggesting that a specific activity principle was the most important piece of information. Only the Apple Year 9 Meta class and the Apple Year 9 Meta+ class suggested that some pupils had a degree of appreciation regarding a specific activity principle. As such, apart from the Apple Year 9 Meta and Meta+ class, pupils of the same class were very similar in their poor appreciation that a specific activity principle underpinned most of the tasks.

(A2) As most of the classes appeared to have very few pupils who acknowledged a specific activity principle, there was, in general, no difference between classes of the same Year and school. An exception may have been the Apple Year 9 classes where the percentage of pupils in the Control class who had acknowledged a specific activity principle was, notably, much lower than the percentage of such pupils in either the Meta or Meta+ classes.
(A3) There was a notable difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who had acknowledged that a specific activity principle was the most important piece of information available during the tasks. The Year 9 classes consistently had a greater percentage of such pupils compared to the Year 7 classes. The difference was most evident in the Meta classes and the Meta+ classes. However, the similarity between the Yard Year 7 classes and the Yard Year 9 classes was striking as, in general, no pupils acknowledged a specific activity principle. Thus, the Year 9 classes from both schools either had the same, or a greater, percentage of pupils who acknowledged the importance of a specific activity principle compared to the Year 7 classes.

(A4) There was no difference, whatsoever, between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who had appreciated that a specific activity principle was the most important piece of information during the tasks. There were no pupils in any Year 7 class that had such an appreciation.

(A5) It appeared that the Apple Year 9 classes, in general, had more pupils who appreciated the importance of a specific activity principle than the Yard Year 9 classes. Although the Apple Year 9 Control class had a similarly low percentage of such pupils as all of the Yard Year 9 classes, the Apple Year 9 Meta class and the Apple Year 9 Meta+ class had a considerably greater percentage of such pupils.
Theme: The Demands of the Task
Category & Scale: Physical Properties (S)
Table 4.09A: Pupils suggesting that specific physical properties were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>15</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>21</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-5</td>
<td>7</td>
<td>-17</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>37</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>7</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>30</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

(A1) In all of the classes, those pupils who suggested that specific physical properties had been demanded during the tasks were clearly in the minority. Therefore, as most classes had relatively few pupils who specifically acknowledged some physical properties, it could be argued that there was relatively little difference between pupils of the same class regarding their awareness of the tasks' demands. However, there were classes, such as the Yard Year 7 Meta+ class and the Apple Year 9 Control class, that implied possible differences between the pupils' appreciation of the tasks' demands; approximately a third of the pupils in these classes specifically acknowledged some demands placed on their physical properties.

(A2) As there appeared, in general, to be a relatively small percentage of pupils who had shown some appreciation of the demands placed upon their physical properties, it was not surprising that there was little difference between classes of the same Year and school regarding the percentage of such pupils. The most noticeable difference occurred between the Yard Year 7 classes although the difference was still relatively small.
(A3) It appeared that the Apple Year 9 classes had more pupils who appreciated some of the demands placed upon their physical properties compared to the Apple Year 7 classes. Although the difference was relatively small, the difference was consistent across each class. Nevertheless, in Yard it was the Year 7 classes compared to the Year 9 classes that appeared to have a consistently greater percentage of pupils who specifically acknowledged the demands placed upon their physical properties.

(A4) Apple Year 7 and Yard Year 7 showed a similar percentage of pupils who specifically acknowledged the demands placed upon their physical properties during the tasks. The pupils who appeared to have such an appreciation were in the minority.

(A5) The difference between the Apple Year 9 and the Yard Year 9 classes was quite striking. The Apple Year 9 classes clearly and consistently had a greater percentage of pupils who were aware of the demands being placed upon their physical properties compared to the Yard Year 9 classes.
Table 4.10A: Pupils suggesting that specific mental properties were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(A1) The percentage of pupils who showed some awareness that the tasks had placed demands upon their mental properties was extremely poor. Indeed, only one of the twelve classes had any pupils who acknowledged such specific mental properties. As such, there was no difference, whatsoever, between pupils of the same class regarding their appreciation of their mental properties called upon during the tasks.

(A2) With an extremely low percentage of pupils who showed some appreciation of the demands placed upon their mental properties by the tasks, it was not surprising that there was no differences evident between the classes of the same Year and school in this respect.

(A3) There was no difference with regard to the percentage of pupils who showed some awareness of the specific mental properties required during the tasks, between Year 7 and Year 9 classes in both Apple and Yard. All of the pupils appeared to have a very poor appreciation of these specific mental properties.
(A4) There was no difference in the percentage of pupils who showed some awareness of the specific mental properties required during the tasks between Apple Year 7 classes and Yard Year 7 classes. No class appeared to show any pupils with such awareness.

(A5) There was a striking similarity between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who showed some appreciation of the demands that had been placed upon their specific mental properties. All of the pupils appeared to have very low appreciation that demands had been placed upon their mental properties.

Theme: The Demands of the Task
Category & Scale: Physical Processes (S)
Table 4.11A: Pupils suggesting that specific physical processes were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>22</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>32</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-10</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>21</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>-21</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>22</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>11</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

(A1) All of the classes had a relatively low percentage of pupils who showed some appreciation of the physical processes being required during the tasks. Thus, within each class there was a degree of similarity between pupils regarding their appreciation of the specific physical processes concerned. However, as there was almost a third of pupils who had referred to some physical processes in the Apple Year 7 Meta class and the Yard Year 7 Control class, it may be
argued that in some classes there were possible differences between pupils regarding their appreciation of the demands being placed upon their physical processes.

(A2) In Apple there was a degree of similarity between the classes of the same Year. Both Apple Year 7 and Apple Year 9 had, in general, a low percentage of pupils who showed some appreciation of the physical processes required during the tasks. In Yard, there was far less similarity between the three classes of each Year. In both Yard Year 7 and Yard Year 9 the classes varied in the percentage of pupils who acknowledged that completing the tasks demanded specific physical processes.

(A3) There was both a consistent and noticeable difference between Apple Year 7 and Apple Year 9 regarding the percentage of pupils who showed some appreciation that the tasks placed demands upon specific physical processes. There appeared to be a greater percentage of such pupils in Apple Year 7 classes compared to Apple Year 9 classes. The inconsistency in the percentage of such pupils between each class in Yard Year 7 and Yard Year 9 made comparisons difficult. However, it appeared that the Year 7 classes possibly had more pupils who acknowledged specific physical processes compared to Year 9 classes.

(A4) The Yard Year 7 Control class had the highest percentage of who referred to some specific physical processes compared to all of the Year 7 classes, whereas the Yard Year 7 Meta+ class had the lowest percentage of such pupils. The Apple Year 7 classes were much more consistent with a relatively high percentage of pupils who acknowledged some specific physical processes compared to Yard Year 7. As such, it appeared that, in general, there were more Apple Year 7 pupils who had an awareness of the specific physical processes demanded during the tasks compared to Yard Year 7 pupils.

(A5) Both Apple Year 9 and Yard Year 9 suggested that most pupils had poor awareness of the demands placed upon specific physical processes by the tasks. As such, there was relatively little difference between Apple Year 9 and Yard Year 9 regarding the percentage of such pupils.
Table 4.12A: Pupils suggesting that specific mental processes were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>(D)</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>19</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>12</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>19</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(A1) Very little difference was evident between pupils of the same class regarding their appreciation of the specific mental processes that the tasks demanded. The percentage of pupils in each class with such an appreciation was low, indeed, seven of the twelve classes had no pupils, whatsoever, who acknowledged any specific mental processes.

(A2) As there were very few pupils who acknowledged the demands placed upon specific mental processes by the tasks there was, not surprisingly, very little difference between classes of the same year and school. In the Apple Year 9 classes there was a slightly greater percentage of pupils who showed some appreciation of the demands of the tasks compared to any other classes although there was still a degree of consistency between the three Apple Year 9 classes.
(A3) The pupils in Apple Year 9 who had appreciated some demands of the tasks were clearly in the minority. However, there was a striking consistency in how Apple Year 9 classes had a greater percentage of such pupils compared to Apple Year 7 classes. There was no obvious difference between the Yard Year 7 classes and the Yard Year 9 classes regarding the percentage of such pupils, as very few Yard pupils appeared to appreciate any of the demands placed upon mental processes by the tasks.

(A4) There was no difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who showed some appreciation of the specific mental processes demanded during the tasks. There were very few Year 7 pupils who appeared to have any appreciation of the specific mental processes that were involved in completing the tasks. Indeed, five of the six classes suggested that there were no pupils at all who had such an appreciation.

(A5) There was a difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who showed some appreciation of the specific mental processes demanded during the tasks. Although the Apple Year 9 classes far from suggested that most pupils had such an appreciation, there was a greater percentage of such pupils in Apple Year 9 classes compared to Yard Year 9 classes.
Table 4.13A: The Pupils’ Feelings During the Task

Positive + Negative Feelings

Pupils suggesting that they had experienced either positive or negative feelings during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>48</td>
<td>60</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>95</td>
<td>71</td>
<td>81</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-47</td>
<td>11</td>
<td>-43</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>78</td>
<td>72</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>79</td>
<td>63</td>
<td>50</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>-1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-30</td>
<td>-12</td>
<td>-31</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>16</td>
<td>8</td>
<td>31</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Class
- Meta +: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class

(A1) Most of the classes appeared to have a majority of pupils who acknowledged either positive or negative feelings during a task. As such, a majority of pupils in each class acknowledged some form of affective metacognitive experience. However, it could not be claimed that pupils of the same class were always similar in their appreciation of metacognitive experiences. For example, a strong similarity was suggested between pupils of the Yard Year 7 Control class whereas a difference was suggested between pupils of the Apple Year 7 Control class.

(A2) There appeared to be a degree of similarity between classes of the same Year and school regarding the percentage of pupils who acknowledged positive or negative feelings during a task.
(A3) The Apple Year 7 classes showed a consistently lower percentage of pupils who had experienced or acknowledged positive or negative feelings during a task compared to the Apple Year 9 classes. However, in Yard it appeared that it was the Year 7 classes that had a more notable and consistent majority of such pupils compared to the Year 9 classes.

(A4) The Yard Year 7 classes clearly had a greater percentage of pupils who experienced or acknowledged their positive or negative feelings during a task compared to the Apple Year 7 classes. The difference was not only consistent but also relatively large. Each of the Yard Year 7 classes clearly had a majority of pupils who acknowledged some of their positive or negative feelings during a task, whereas the Apple 7 classes were struggling to even make a majority of such pupils.

(A5) It could be argued that Apple Year 9 classes had greater awareness of their positive or negative feelings during a task compared to Yard Year 9 classes. However, the difference was not obvious and the percentage of such pupils in each class was relatively similar. Nevertheless, the consistency between the Apple Year 9 classes, compared to relative inconsistency between the Yard Year 9 classes, suggested that there was some difference between Year 9 classes from different schools regarding pupils' affective metacognitive experiences during the tasks.
Table 4.14A: The Pupils' Feelings During the Task

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>15</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>37</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Apple  &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-22</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>41</td>
<td>29</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>36</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td>Apple  &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>5</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td></td>
<td>-25</td>
<td>-10</td>
<td>-28</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td></td>
<td>1</td>
<td>-21</td>
<td>8</td>
</tr>
</tbody>
</table>

(A1) Pupils who acknowledged having some positive feelings during the tasks were clearly in the minority in every class. However, there was not, in general, a clear minority of such pupils and, as such, it was suggested that there were differences between pupils of the same class regarding their experience or acknowledgement of any positive feelings.

(A2) There appeared to be a relative consistency across the classes of the same Year and school regarding the percentage of pupils who acknowledged having some positive feelings during the tasks. Although there was sometimes a slight difference between classes of the same Year and school, such as in Yard Year 9, most of the classes had a minority of pupils who experienced or acknowledged some positive feelings.

(A3) The Apple Year 9 classes had a greater percentage of pupils with an awareness of their positive feelings compared to the Apple Year 7 classes. However, there was greater similarity between the classes in Yard Year 7 and Yard Year 9 in this respect.
Although all of the Year 7 classes had a minority of pupils who acknowledged experiencing positive feelings during the tasks, the Yard Year 7 classes appeared to have consistently more pupils making such an acknowledgement compared to the Apple Year 7 classes.

There appeared to be some similarity between the Apple Year 9 classes and the Yard Year 9 classes with regard to the percentage of pupils who experienced some positive feelings during the tasks.

General Area: Metacognitive Knowledge of Person Variables

Theme: Intra-Individual Variables
Category & Scale: Physical Properties (S)
Table 4.15A: Pupils suggesting specific physical properties as intra-individual variables.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>7</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>11</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>4</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>48</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>41</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>41</td>
<td>29</td>
<td>42</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>4</td>
<td>24</td>
<td>18</td>
</tr>
</tbody>
</table>

Legend:

Meta = Metacognitive Strategy Class
Meta + = Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class

Within most of the classes there seemed to be a consistently low percentage of pupils who acknowledged specific physical properties as intra-individual variables. Thus, it could be argued that there was little difference between pupils of the same class regarding their appreciation of specific physical properties. However, Apple Year 9 classes appeared to have a relatively high
percentage of pupils who acknowledged specific physical properties as intra-individual variables. The approximately even split between those pupils who acknowledged specific physical properties and those who did not suggested that there was a difference between pupils of the same class in Apple Year 9.

(A2) There was little difference between the classes of the same Year and school with regard to the percentage of pupils who acknowledged specific physical properties as intra-individual variables. Even the Apple Year 9 classes that suggested a greater appreciation of specific physical properties compared to any of the other classes had a similar percentage of such pupils to each other.

(A3) There was a consistent difference between Apple Year 7 and Apple Year 9 regarding the percentage of pupils who showed some appreciation that specific physical properties were intra-individual variables. The Apple Year 9 classes had a much greater percentage of such pupils compared to the Apple Year 7 classes. However, the Yard Year 7 classes appeared to have a consistently greater percentage of such pupils compared to the Year 9 classes, although the difference between the Year 7 and Year 9 classes in Yard was less evident than it was in Apple.

(A4) Although the difference was not great, it seemed that the Yard Year 7 classes consistently had a greater percentage of pupils who showed some appreciation that specific physical properties were intra-individual variables compared to the Apple Year 7 classes.

(A5) The difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who showed some appreciation that specific physical properties were intra-individual variables was striking. All of the Yard Year 9 classes had an extremely low percentage of such pupils, whereas all of the Apple Year 9 classes almost had fifty percent of such pupils.
It appeared that very few pupils acknowledged that specific mental properties were intra-individual variables. Nine of the twelve classes did not have any pupils who noted some specific mental properties as intra-individual variables. Thus, there was very little difference evident between pupils of the same class regarding their awareness of their specific mental properties being intra-individual variables.

With such a poor appreciation of specific mental properties being evident in most classes, it was not surprising that there was very little difference between classes of the same Year and school regarding the percentage of pupils who acknowledged that specific mental properties were intra-individual variables.

Apple Year 9 had a consistently greater percentage of pupils who appreciated that specific mental properties were intra-individual variables compared to Apple Year 7 classes. Neither the Yard Year 7 classes nor the Yard Year 9 classes suggested any percentage of such pupils. Thus, in Yard there was no
difference between Year 7 and Year 9 regarding the percentage of pupils who acknowledged that specific mental properties were intra-individual variables.

(A4) As there were no pupils in either Apple Year 7 or Yard Year 7 who suggested that specific mental properties were intra-individual variables there was no difference at all between the Apple Year 7 classes and the Yard Year 7 classes.

(A5) Even though only a small percentage of pupils in Apple Year 9 acknowledged specific mental properties as being intra-individual variables, Apple Year 9 still had a greater percentage of such pupils compared to Yard Year 9.

Theme: Intra-Individual and Inter-Individual Variables
(Wholist/Analytic Cognitive Style Dimension)
Category & Scale: Awareness
Table 4.17A: Pupils suggesting some degree of awareness of their preferences in the wholist/analytic style dimension.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>74</td>
<td>56</td>
<td>59</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>63</td>
<td>65</td>
<td>67</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>11</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>93</td>
<td>93</td>
<td>90</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>57</td>
<td>64</td>
<td>75</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>36</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>19</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>6</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

(A1) It appeared that a majority of pupils had some form of awareness regarding their stylistic preferences on the wholist/analytic dimension. However, the size of that majority differed considerably between classes and, therefore, suggested that in some instances there was a difference between pupils of the...
same class and in other instances there was a similarity between pupils of the same class. For example, where the majority was relatively small, as in the Apple Year 7 Meta class and the Apple Year 7 Meta+ class, it could be argued that there was a difference between pupils of those classes regarding their awareness of stylistic preferences in the wholist/analytic dimension. However, where the majority was much larger, as in all of the Apple Year 9 classes, it could be argued that there was much more similarity between pupils of the same class.

(A2) There appeared to be some similarity between classes of the same Year and school regarding the percentage of pupils who showed some awareness of their stylistic preferences in the wholist/analytic dimension. This similarity was especially evident in Yard Year 7 and Apple Year 9.

(A3) There was a clear and consistent difference between Apple Year 7 classes and Apple Year 9 classes regarding the percentage of pupils who showed some awareness of their stylistic preferences on the wholist/analytic dimension. Almost all of the pupils in the Year 9 classes had some form of awareness of their preferences, whereas the percentage of pupils in the Year 7 classes was consistently lower. However, in Yard there was very little difference between the Year 7 classes and the Year 9 classes regarding the percentage of pupils who showed some awareness of their stylistic preferences on the wholist/analytic dimension.

(A4) Although there was not a major difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who showed some awareness of their stylistic preferences on the wholist/analytic dimension, it was noticeable that Yard Year 7 had more consistency between the three classes with regard to the percentage of such pupils compared to the Apple Year 7 classes.

(A5) There was a relatively clear difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who showed some awareness of their stylistic preferences on the wholist/analytic dimension. The Apple Year 9 classes had a consistently greater percentage of such pupils compared to the Yard Year 9 classes. Indeed, the percentage of such pupils in Yard Year 9 was more similar to the percentage of such pupils in Apple Year 7 and Yard Year 7.
The percentage of pupils in each Year 7 class that suggested a wholist analytic stylistic preference and some form of awareness of that preference was relatively small. Thus, it could be argued that there was a similarity between pupils of the same class in Year 7 regarding their lack of a wholist analytic stylistic preference. However, many of the classes in Year 9 had approximately a third of the pupils who suggested that they had a wholist analytic stylistic preference and some form of awareness of that preference. Thus, it may be argued that, in general, there was some differences between pupils of the same class in Year 9 in this respect.

(A2) In most cases there was a similarity between classes of the same Year and school regarding pupils having a wholist analytic stylistic preference and some form of awareness of that preference. This consistency was very strong in Apple Year 9. However, Yard Year 9 did suggest that there may be a difference between the classes regarding the percentage of pupils having a
wholist analytic stylistic preference and some form of awareness of that preference.

(A3) There was a clear difference between the Apple Year 7 classes and the Apple Year 9 classes regarding pupils' stylistic preferences and their awareness of those preferences. Very few pupils in the Apple Year 7 classes had a wholist analytic stylistic preference and some form of awareness of that preference, whereas the percentage of such pupils in the Apple Year 9 classes was dramatically and consistently higher. As the Yard Year 9 classes varied in their percentage of such pupils, any comparison with the Yard Year 7 classes was difficult. However, the range in the percentage of such pupils between the Yard Year 7 classes and the Yard Year 9 classes did appear to nestle together. Thus, it seemed that there was relatively little difference between Yard Year 7 and Yard Year 9 regarding the percentage of pupils who suggested having a wholist analytic stylistic preference and some form of awareness of that preference.

(A4) Yard Year 7 classes consistently had a greater percentage of pupils with a wholist analytic stylistic preference and some form of awareness of that preference compared to the Apple Year 7 classes. However, the percentage of such pupils in Yard Year 7 was still low.

(A5) It appeared that the Apple Year 9 classes, in general, had a greater percentage of pupils with a wholist analytic stylistic preference and some form of awareness of that preference compared to the Yard Year 9 classes. The difference was not dramatic but the percentage of such pupils in the Apple Year 9 classes was so consistent compared to the Yard Year 9 classes that some difference was implied.
There appeared to be very little difference between pupils of the same class regarding their awareness of their stylistic preferences. A large majority of pupils in each class suggested that they had some form of awareness of their stylistic preference in the verbaliser/imager dimension.

There appeared to be a little difference between classes of the same Year and school regarding the percentage of pupils who suggested having some awareness of their preferences in the verbaliser/imager style dimension. It seemed that each class had a large percentage of such pupils. The consistency between the Apple Year 9 classes was the most evident.
(A3) The percentage of pupils in each Apple Year 9 class that suggested some awareness of their stylistic preferences in the verbaliser/imager dimension was both consistent and high. Although the Apple Year 7 classes also had a high percentage of such pupils there was less similarity between the classes. Thus, Apple Year 9, as a whole, appeared to have more awareness of their stylistic preferences in the verbaliser/imager dimension compared to Apple Year 7. The difference between Yard Year 7 and Yard Year 9 was more difficult to assess. Although the Meta+ classes in each Year were quite different regarding the percentage of pupils who showed some awareness of their stylistic preference in the verbaliser/imager dimension, the Control and Meta classes in both Years had a very similar percentage of such pupils. Therefore, it was suggested that there was relatively little difference between Yard Year 7 and Yard Year 9 regarding the percentage of pupils who showed some awareness of their stylistic preference in the verbaliser/imager dimension.

(A4) It appeared that the Apple Year 7 classes had a slightly greater percentage of pupils who showed some awareness of their stylistic preferences in the verbaliser/imager dimension compared to the Yard Year 7 classes. The lowest percentage of pupils in any Apple Year 7 class, who were aware of their preferences in the verbaliser/imager style dimension, was very similar to the highest percentage of such pupils in a Yard Year 7 class.

(A5) The percentage of pupils in Apple Year 9 who had some form of awareness of their stylistic preferences in the verbaliser/imager dimension was very high and, importantly, it was consistently high. The Yard Year 9 classes showed less consistency and, apart from the Meta+ class, the percentage of such pupils was lower compared to the Apple Year 9 classes. As such, it seemed that the Apple Year 9 classes had a greater percentage of pupils with an awareness of their stylistic preferences in the verbaliser/imager dimension compared to the Yard Year 9 classes.
(A1) Some classes, such as the Apple Year 9 Control class, had a clear majority of pupils with a verbaliser imager stylistic preference and some form of awareness of that preference and, thus, it seemed that there was little difference between the pupils of the same class. However, there were also classes, such as the Yard Year 7 Control class, that only had a slender majority of pupils with such a preference and, as such, it could be argued that there was a difference between pupils of the same class regarding their stylistic preference and their awareness of that preference. Therefore, no generalised assessment could be made regarding whether differences existed between pupils of the same class.

(A2) There appeared to be no difference between the Yard Year 7 classes regarding the percentage of pupils who appeared to have a verbaliser imager stylistic preference and some form of awareness of that preference. Furthermore, while there was less consistency between the Apple Year 7 classes and the Apple
Year 9 classes there was still a degree of similarity in that each class had a majority of pupils who implied having a verbaliser imager stylistic preference and some form of awareness of that preference. However, there seemed to be no similarity between the Yard Year 9 classes; the Yard Year 9 Control class only had fifty percent of pupils who acknowledged having a verbaliser imager stylistic preference and some form of awareness of that preference, while the Yard Year 9 Meta+ class had one hundred percent of such pupils.

(A3) The range in the percentage of pupils between the Apple Year 7 classes and between the Apple Year 9 classes, who had a verbaliser imager stylistic preference and some form of awareness of that preference, appeared to overlap. However, while this suggested a degree of similarity between Apple Year 7 and Apple Year 9 regarding the percentage of such pupils, it seemed that there were more pupils in Apple Year 9 who had a verbaliser imager stylistic preference and some form of awareness of that preference compared to Apple Year 7. In Yard, apart from the Yard Year 9 Meta+ class, the classes had a relatively similar percentage of pupils with a verbaliser imager stylistic preference and some form of awareness of that preference. However, it still appeared that the Yard Year 9 classes may have had more pupils with a verbaliser imager stylistic preference and some form of awareness of that preference compared to Yard Year 7 classes. Nevertheless, these possible differences between Year 7 and Year 9, in both Apple and Yard, were definitely not obvious.

(A4) The Apple Year 7 classes appeared to have a clear and consistently greater percentage of pupils with a verbaliser imager stylistic preference and some form of awareness of that preference compared to the Yard Year 7 classes. Whereas the Apple Year 7 classes seemed to be moving towards a stable majority of pupils with a verbaliser imager stylistic preference and some form of awareness of that preference, the majority of such pupils in the Yard Year 7 classes was much more slender.

(A5) Each of the three Apple Year 9 classes had a relatively stable majority of pupils who had a verbaliser imager stylistic preference and some form of awareness of that preference. Although all of the pupils in the Yard Year 9 Meta+ class suggested having a verbaliser imager stylistic preference, the other two Yard Year 9 classes only had slightly over fifty percent of such pupils. Thus, it was suggested that Apple Year 9 had more pupils with a
verbaliser imager stylistic preference and some form of awareness of that preference compared to Yard Year 9.

Theme: Inter-Individual Variables
Category & Scale: Awareness
Table 4.21A: Pupils suggesting an awareness of inter-individual variables.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>59</td>
<td>22</td>
<td>45</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>53</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>6</td>
<td>-13</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>37</td>
<td>96</td>
<td>72</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>43</td>
<td>64</td>
<td>75</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>-16</td>
<td>32</td>
<td>-3</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>22</td>
<td>-74</td>
<td>-27</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>10</td>
<td>-29</td>
<td>-23</td>
</tr>
</tbody>
</table>

Legend
- Meta: Meta-cognitive Strategy Class

(A1) Some classes, such as the Apple Year 9 Meta class, had such a clear majority of pupils with some awareness of inter-individual variables that it seemed that there was little difference between pupils of the same class. Furthermore, there were classes, such as the Apple Year 7 Meta class, that had a clear minority of pupils with an awareness of inter-individual variables and, as such, it also appeared that in these classes there was little difference between the pupils. However, in classes such the Yard Year 7 Control class, which only had a slight majority of pupils with an awareness of inter-individual variables, it was suggested that there were differences between the pupils. Hence, no generalised assessment could be made regarding whether differences existed between pupils of the same class with regard to their awareness of inter-individual variables.

(A2) Differences were suggested between classes of the same Year and school with regard to the percentage of pupils who had some awareness of inter-individual
variables. There was very little consistency between the classes of the same Year and school regarding the percentage of such pupils.

(A3) As there was very little similarity between the classes of the same Year and school regarding the percentage of pupils who had some awareness of inter-individual variables, it was difficult to compare Year 7 and Year 9 classes. However, it appeared that there was a slightly greater percentage of such pupils in the Apple Year 9 classes compared to the Apple Year 7 classes. A similar situation was evident in Yard, although, in both Apple and Yard, these assessments were far from obvious.

(A4) It appeared that there was a degree of similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who showed some awareness of inter-individual variables.

(A5) The variety between each class in Apple Year 9 and Yard Year 9 regarding the percentage of pupils who showed some awareness of inter-individual variables made comparisons between the schools difficult. However, it was clear that there were no consistent differences between Apple Year 9 and Yard Year 9 regarding the percentage of such pupils.
The pupils who acknowledged some specific physical factors as inter-individual variables were clearly in the minority in most classes. Thus, there was a degree of similarity between pupils of the same class regarding their awareness of inter-individual variables. However, the Yard Year 7 Meta+ class showed that those pupils who suggested specific physical factors made up over a third of the class and, therefore, it could be implied that differences may have existed between pupils within this class regarding their awareness of inter-individual variables.

With all of the classes only having a minority of pupils who appreciated specific physical factors as inter-individual variables, it was not surprising that there was relatively little difference between the classes of the same Year and school.

Very little difference was evident between the Apple Year 7 classes and the Apple Year 9 classes regarding pupils' awareness of specific physical factors as inter-individual variables; all of the classes had a low percentage of such
pupils. In Yard, it was suggested that the Year 7 classes may have had a greater awareness that specific physical factors were inter-individual variables compared to the Year 9 classes.

(A4) There were not any major differences between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who showed some awareness that specific physical factors were inter-individual variables. However, it did seem that the Yard Year 7 classes, in general, had a slightly greater percentage of such pupils compared to the Apple Year 7 classes. The consistency between the three Yard classes regarding the percentage of such pupils supported this assumption.

(A5) The Yard Year 9 classes consistently, although only slightly, had a greater percentage of pupils who acknowledged specific physical factors as being inter-individual variables compared to the Apple Year 9 classes.

Theme: Inter-Individual Variables
Category & Scale: Mental Factors (S)
Table 4.23A: Pupils suggesting specific mental factors as inter-individual variables.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>9</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>11</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-4</td>
<td>36</td>
<td>-21</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-2</td>
<td>3</td>
<td>-17</td>
</tr>
</tbody>
</table>

Legend

Meta: Meta-cognitive Strategy Class
(A1) There was, in general, very little difference between pupils of the same class regarding their appreciation that specific mental factors were inter-individual variables. The percentage of pupils in each class who were aware that specific mental factors were inter-individual variables was low. However, the Apple Year 9 Meta and Meta+ classes showed a slightly greater percentage of such pupils compared to other classes; approximately thirty percent of pupils in these classes showed some awareness that specific mental factors were inter-individual variables. Thus, it was implied that differences may have existed between pupils in these classes regarding their awareness of inter-individual variables.

(A2) As there appeared to be very few pupils who acknowledged specific mental factors as being inter-individual variables there was also very little difference between the classes of the same Year and school regarding the percentage of such pupils. Even in Apple Year 9 the Control class had a relatively high percentage of pupils who suggested an awareness of specific mental factors which ensured a degree of consistency with the Meta and Meta+ classes.

(A3) The Apple Year 9 classes appeared to have a greater percentage of pupils who showed some awareness that specific mental factors were inter-individual variables compared to the Apple Year 7 classes. Although these pupils were still clearly in the minority, the percentage of such pupils in each Year 9 class was notably greater than the corresponding percentage of pupils in the Year 7 classes. However, in Yard there appeared to be more similarity between Year 7 and Year 9 regarding the percentage of pupils who had shown some awareness that specific mental factors were inter-individual variables, as all six classes in Yard had a very low percentage of such pupils.

(A4) Very little difference was evident between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who had shown some awareness that specific mental factors were inter-individual variables. All six classes had a very poor percentage of such pupils.

(A5) The Apple Year 9 classes had a greater percentage of pupils who showed some awareness that specific mental factors were inter-individual variables compared to the Yard Year 9 classes. Even though the percentage of such pupils in Apple Year 9 was still relatively low, the difference compared with the Yard Year 9 classes was quite evident.
Table 4.24A: Pupils suggesting that there had been adequate information for them personally to understand the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>75</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>89</td>
<td>77</td>
<td>90</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-14</td>
<td>22</td>
<td>-25</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>93</td>
<td>90</td>
<td>93</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>78</td>
<td>72</td>
<td>100</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>15</td>
<td>18</td>
<td>-7</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>94</td>
<td>56</td>
<td>-29</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>11</td>
<td>5</td>
<td>-10</td>
</tr>
</tbody>
</table>

(A1) In most classes there was a relatively strong majority of pupils who suggested that they had enough information available to them during the tasks. As such, there was little difference between the pupils of the same class regarding their views on the universals of cognition. However, the Apple Year 7 Meta class showed only a slender majority of such pupils and, thus, there may have been differences between pupils of this class regarding their thoughts on whether there was enough information available to them.

(A2) As most pupils acknowledged that there was enough information available to them during the tasks, it was not surprising that there was relatively little difference between classes of the same Year and school regarding the percentage of such pupils. Even when there was a slight difference in the percentage of such pupils between the classes of a specific Year and school, such as in Yard Year 9, the pattern remained that there was a strong pupil awareness that enough information was available.
(A3) There appeared to be a consistent difference between the Apple Year 7 classes and the Apple Year 9 classes with regard to the percentage of pupils who appreciated that there had been enough information available. The Apple Year 9 classes appeared to show a greater percentage of such pupils compared to the Year 7 classes. However, in Yard there appeared to be little difference between Year 7 and Year 9 regarding the percentage of such pupils. Both the Yard Year 7 classes and the Yard Year 9 classes showed a high percentage of pupils who were aware that there was enough information available for them.

(A4) Although the difference was not great, the Yard Year 7 classes consistently had more pupils who acknowledged that there was enough information made available to them compared to the Apple Year 7 classes.

(A5) Although the Yard Year 9 Meta+ class had every pupil suggest that there was enough information made available to them, it appeared that Apple Year 9 had a greater percentage of such pupils, in general, compared to Yard Year 9. This assessment was supported by the Yard Control class and the Yard Meta class having a noticeably lower percentage of such pupils compared to any of the Apple Year 9 classes.
In general, all of the classes had a relatively low percentage of pupils who suggested that some specific additional information was required. As such, it was argued that there was relatively little difference between pupils of the same class regarding their desire for some specific additional information. However, the Yard Year 7 Control class, the Yard Year 7 Meta class and the Yard Year 9 Meta class showed that almost a third of the pupils wanted some specific additional information. It could be argued that in these classes there may have been differences between pupils regarding their views on the need for additional information.

There was a slight degree of difference between classes of the same Year and school regarding the percentage of pupils who desired specific additional information. However, the over-riding pattern was that very few pupils had such a desire and, thus, there was a relative consistency and similarity between most classes of the same Year and school.
(A3) There appeared to be very little difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who desired some specific additional information. All six Apple classes had very low percentage of such pupils. A similar pattern emerged in Yard where the range in the percentage of such pupils between the Yard Year 7 classes and the range between the Yard Year 9 classes were very similar.

(A4) There appeared to be a slight difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who desired some specific additional information. The Yard Year 7 Control class and the Yard Year 7 Meta class both had a comparatively large percentage of such pupils, and, therefore, it was suggested that the Yard Year 7 classes desired more specific additional information compared to the Apple Year 7 classes.

(A5) There appeared to be very little difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who desired some specific additional information. Although the Yard Year 9 Meta class had almost a third of the pupils wanting some specific additional information, the percentage of such pupils in the three classes in Yard Year 9 was not consistent or great enough to suggest any major difference compared with the Apple Year 9 classes.
General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?
Category & Scale: Physical Factors (S)
Table 4.26A: Pupils suggesting that they had considered specific physical factors during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>7</td>
<td>74</td>
<td>56</td>
<td>52</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>47</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>27</td>
<td>50</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>70</td>
<td>68</td>
<td>79</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>50</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>20</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>4</td>
<td>-12</td>
<td>-27</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>3</td>
<td>-39</td>
<td>-12</td>
</tr>
</tbody>
</table>

Legend

Meta
Meta +

(A1) In certain classes there appeared to be a degree of similarity between pupils of the same class regarding their thoughts during the tasks. For example, the large percentage of pupils in the Apple Year 9 Meta+ class and the low percentage of pupils in the Yard Year 7 Meta class who considered specific physical factors during the tasks, both imply that there could be a degree of similarity between pupils of the same class. However, the percentage of pupils in most classes who thought about specific physical factors during the tasks, was approximately fifty percent. As such, it appeared that there may have been differences between pupils of the same class regarding their thoughts during the tasks.

(A2) There was a degree of consistency and similarity between classes of the same Year and school regarding the percentage of pupils who thought about specific physical factors during the tasks. However, the Yard Year 7 Meta class had an extremely and irregularly low percentage of such pupils who thought about
specific physical factors. As such, while there was a relative similarity between most classes of the same Year and school there were also exceptions.

(A3) The Apple Year 7 classes and the Apple Year 9 classes showed a degree of similarity regarding the percentage of pupils who thought about specific physical factors during the tasks. The pattern in each Year was fairly consistent in that there was a majority of pupils who thought about specific physical factors during the tasks. However, the Apple Year 9 classes had a consistently greater percentage of pupils who thought about specific physical factors compared to Apple Year 7 classes. While acknowledging the very low percentage of pupils in the Yard Year 7 Meta class who considered specific physical factors during the tasks, there appeared to be a degree of similarity between Yard Year 7 and Yard Year 9 regarding the percentage of such pupils. In most of the Yard classes there was approximately fifty percent of pupils who seemed to consider specific physical factors during the tasks, although it appeared that the Yard Year 9 classes had a slightly greater percentage of such pupils compared to Yard Year 7.

(A4) The percentage of pupils who acknowledged thinking about specific physical factors in the Apple Year 7 classes was consistently and noticeably greater than in the Yard Year 7 classes. Whereas in the Apple Year 7 classes the pupils who had thought about specific physical factors were in the majority, in the Yard Year 7 classes they were in the minority.

(A5) There was a consistent difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who suggested that they had thought about specific physical factors during the tasks. Whereas in the Year 9 classes such pupils were in a strong majority, in the Yard Year 9 classes they were either in the minority or there was an even split in the class between those who thought about specific physical factors and those who did not.
Theme: What Strategy?
Category & Scale: General Mental Techniques (G)
Table 4.27A: Pupils suggesting that they had utilised general mental techniques during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>19</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>21</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>26</td>
<td>43</td>
<td>45</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>0</td>
<td>45</td>
<td>8</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>25</td>
<td>2</td>
<td>37</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>21</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

(A1) It was evident that relatively few pupils appeared to consider general mental techniques during the tasks. There were classes, such as the Yard Year 9 Control class and the Apple Year 7 Meta+ class, where the pupils who utilised general mental techniques were in such a clear minority that it suggested a strong similarity between pupils of the same class regarding their lack of consideration of general mental techniques. However, there were classes, such as the Apple Year 9 Meta class and the Yard Year 9 Meta class, which had only a slender minority of pupils who utilised general mental techniques and the suggestion was that there may be differences between pupils of the same class regarding their consideration of general mental techniques.

(A2) There was little similarity between classes of the same Year and school regarding the percentage of pupils who utilised general mental techniques. Apple Year 7 was the exception and suggested a strong similarity between the three classes with regard to the percentage of such pupils. In general, one class of the three from the same Year and school appeared to be irregular in comparison to the other two classes. For example, in Yard Year 9, the Control
class and the Meta+ class showed some similarity in the extremely low percentage of pupils who utilised general mental techniques. However, the Meta class suggested that almost fifty percent of pupils had utilised general mental techniques and, as such, the class appeared completely inconsistent with the other two classes.

(A3) The Apple Year 9 classes consistently had a greater percentage of pupils who utilised general mental techniques compared to the Apple Year 7 classes. The inconsistency between the classes in both Yard Year 7 and Yard Year 9 almost implied that each Year were similar in their irregularity. However, the important difference was that the irregular class in Yard Year 7 had a much lower percentage of pupils who had utilised general mental techniques, whereas in Yard Year 9, the irregular class had a much higher percentage of such pupils.

(A4) There was little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who had utilised general mental techniques. All the classes were similar in the minority of pupils who had utilised general mental techniques.

(A5) Ironically, the irregular class in Yard Year 9 was the only class that appeared to have any similarity with the Apple Year 9 classes. The Apple Year 9 classes, in general, suggested a slight minority of pupils had utilised general mental techniques during the tasks. Only the Yard Year 9 Meta class suggested a similar trend. The Yard Year 9 Control class and the Yard Year 9 Meta+ class suggested that almost no pupils had considered general mental techniques during the tasks.
Theme: What Strategy?  
Category & Scale: Specific Mental Techniques (S) 
Table 4.28A Pupils suggesting that they had utilised specific mental techniques during the task.

<table>
<thead>
<tr>
<th>School &amp; Year</th>
<th>Quasi-Experimental Classes</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Year 7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Yard Year 7</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard 7</td>
<td>7 (D)</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Apple Year 9</td>
<td>19</td>
<td>21</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard Year 9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard 9</td>
<td>19 (D)</td>
<td>21</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple Year 7 &amp; 9</td>
<td>-12</td>
<td>-14</td>
<td>-11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard Year 7 &amp; 9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(A1) There appeared to be very few pupils who acknowledged utilising any specific mental techniques during the tasks. As such, there seemed to be very little difference between pupils of the same class regarding their usage of such specific mental techniques.

(A2) There appeared to be very little difference between classes of the same Year and school regarding the percentage of pupils who showed a utilisation of specific mental techniques. Even in the Apple Year 9 classes, where there appeared to have been a greater percentage of such pupils, there was still similarity between the three classes.

(A3) The Apple Year 9 classes appeared to have a greater percentage of pupils who utilised specific mental techniques during the tasks compared to the Apple Year 7 classes. Although the Apple Year 9 classes still had a minority of pupils who had utilised specific mental techniques, the percentage of such pupils was consistently greater compared to the Apple Year 7 classes. However, in Yard there did not appear to be any pupils, in either Year 7 or
Year 9, that utilised any specific mental techniques and, as such, there was a strong similarity between the Yard Year 7 classes and the Yard Year 9 classes in this respect.

(A4) Although the difference was very small, it appeared that the Apple Year 7 classes had a consistently greater percentage of pupils who utilised specific mental techniques compared to the Yard Year 7 classes. Clearly, the difference was not great as the percentage of pupils in the Apple Year 7 classes who had utilised specific mental techniques was extremely small, but the difference was consistent.

(A5) There was a striking difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who acknowledged utilising specific mental techniques. No pupils, whatsoever, in the Yard Year 9 classes appeared to utilise specific mental techniques, whereas in the Apple Year 9 classes, approximately twenty percent, one fifth, of the pupils utilised such specific mental techniques.

Theme: Why Use the Strategy?
Category & Scale: Conscious Decision (Cognitive.S)
Table 4.29A: Pupils suggesting that they had made a specific cognitive conscious decision to consider their strategic action.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>26</td>
<td>15</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>26</td>
<td>35</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>(D)</td>
<td>0</td>
<td>-20</td>
<td>-21</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>81</td>
<td>71</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>50</td>
<td>36</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>31</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-55</td>
<td>-56</td>
<td>-80</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-24</td>
<td>-1</td>
<td>-4</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Class
- Meta +: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class
(A1) There appeared to be a similarity between pupils of the same class in each of the Apple classes with regard to the percentage of pupils who acknowledged making specific cognitive conscious decisions, although for different reasons. In Apple Year 9 each class had a strong majority of pupils who acknowledged utilising specific cognitive conscious decisions and, as such, pupils of the same class appeared similar with respect to their reasons for their strategic actions. The Apple Year 7 classes, in general, had such a low percentage of pupils who acknowledged making specific cognitive conscious decisions that there also seemed to be a similarity between pupils of the same class. Interestingly, there appeared to be a difference suggested between pupils of the same class in all six Yard classes. There was a clear split between those pupils who had made specific cognitive conscious decisions and those who had not.

(A2) There was a degree of consistency and similarity between classes of the same Year and school regarding the percentage of pupils who appeared to make specific cognitive conscious decisions. In Apple Year 9 there was a strong majority of pupils in each class who claimed that they had made some specific cognitive conscious decisions. There was a clear minority of such pupils in each of the Apple Year 7 classes. The Yard Year 9 classes appeared to have a degree of similarity as did the Yard Year 7 classes regarding the percentage of pupils who made specific cognitive conscious decisions.

(A3) There was a clear difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who made specific cognitive conscious decisions. Each of the Apple Year 9 classes had an extremely strong majority of pupils who had made specific cognitive conscious decisions, whereas each Apple Year 7 class had a clear minority of such pupils. Although, in general, the percentage of pupils was much smaller in Yard, the Year 9 classes also consistently had a greater percentage of pupils who had made specific cognitive conscious decisions compared with the Year 7 classes.

(A4) Although there were minor suggestions that there may have been some similarity between the Apple Year 7 classes and the Yard Year 7 classes, it appeared that the Yard Year 7 classes had a slightly greater percentage of pupils who made specific cognitive conscious decisions compared to the Apple Year 7 classes. The difference was small but consistent.
Whereas each Apple Year 9 class had a strong majority of pupils who had made specific cognitive conscious decisions, each Yard Year 9 class was evenly split between those pupils who had made some specific cognitive conscious decisions and those who had not. As such, the Apple Year 9 classes consistently and clearly had a greater percentage of pupils who had made specific cognitive conscious decisions compared to the Yard Year 9 classes.

**Theme:** Why Use the Strategy?

**Category & Scale:** Conscious Decision (Practical.S)

**Table 4.30A:** Pupils suggesting that they had considered their strategic action due to practical and physical occurrences.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>56</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>16</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>40</td>
<td>2</td>
<td>-16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>33</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>36</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>5</td>
<td>16</td>
<td>-19</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>23</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-20</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>

(A1) Most classes showed a relatively low percentage of pupils who suggested that they had made specific practical conscious decisions. Some classes, such as the Apple Year 7 Meta+ class and the Yard Year 9 Meta class, suggested that there was a similarity between pupils of the same class regarding the low percentage of pupils who acknowledged making specific practical conscious decisions. However, most of the classes appeared to suggest a difference between the pupils within them. For example, in the Apple Year 7 Control class there was almost an even split between those pupils who had acknowledged making specific practical conscious decisions and those who had not. Similarly, a difference was suggested between the pupils within
classes such as the Apple Year 9 Control class and the Yard Year 9 Control class, although those pupils who had made specific practical conscious decisions were clearly in a minority.

(A2) Most of the classes of the same Year and school were similar in that the pupils who acknowledged making specific practical conscious decisions were in the minority. However, it was the size of the minority that, in some instances, suggested a difference between classes of the same Year and school. For example, both Apple Year 9 and Yard Year 9 had a single class that had a very low percentage of pupils who made specific practical conscious decisions. As such, there was a degree of similarity between pupils within each class in this respect. However, the other two classes in each Year 9 had a percentage of pupils that suggested a greater difference between pupils of the same class. Nevertheless, the difference between the three classes of the same Year and school was, in general, small. Apple Year 7 was the exception, as the Control class actually had a slight majority of pupils who had made specific practical conscious decisions while the other two classes had a clear minority of such pupils.

(A3) The Apple Year 7 classes and the Apple Year 9 classes were very similar regarding the percentage of pupils who had acknowledged making specific practical conscious decisions. The Yard Year 7 classes and the Yard Year 9 classes also suggested a degree of similarity in this respect.

(A4) There was relatively little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who acknowledged making specific practical conscious decisions. The range in the percentage of pupils who acknowledged making specific practical conscious decisions between the Apple Year 7 classes and between the Yard Year 7 classes were relatively similar.

(A5) The range in the percentage of pupils who had made specific practical conscious decisions between the Apple Year 9 classes and between the Yard Year 9 classes was remarkably similar. As such, very little difference was suggested between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of such pupils.
It appeared that, in most of the classes, the pupils who had made unconscious decisions were clearly in the minority. Indeed, the percentage of such pupils in each class was low enough to suggest that pupils of the same class were similar in their lack of unconscious decisions.

With the percentage of pupils making unconscious decisions being so low in most classes, it was not surprising that there was very little difference between classes of the same Year and school in this respect. Even in Apple Year 9, where the Control class and the Meta class had a higher percentage of pupils who had made unconscious decisions compared to any other class, the Meta+ class also had a relatively similar percentage of pupils who had made unconscious decisions.

Although the difference between the Apple Year 7 classes and the Apple Year 9 classes was not great it appeared consistent. The Apple Year 9 classes consistently had a greater percentage of pupils who had made unconscious decisions compared to the Apple Year 7 classes. However, there was no such
difference between the Yard Year 7 classes and the Yard Year 9 classes, as five of the six classes had no pupils, whatsoever, who suggested that they had made unconscious decisions.

(A4) There seemed to be a slight difference between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who had made unconscious decisions, although the difference was far from dramatic. Whereas no pupils in Yard Year 7 acknowledged any unconscious decisions there was, at least, a small percentage of such pupils in Apple Year 7.

(A5) The Apple Year 9 classes consistently had a greater percentage of pupils who acknowledged having made unconscious decisions compared to the Yard Year 9 classes. The pupils in the Apple Year 9 classes who had made such unconscious decisions were still clearly in the minority, but there was a difference between these classes and the Yard Year 9 classes regarding the percentage of such pupils.

Theme: When to Use the Strategy
Category & Scale: Wider Transfer (Gd)
Table 4.32A: Pupils suggesting a good awareness that their strategic action could transfer to a wide variety of tasks.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>19</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>26</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-7</td>
<td>-7</td>
<td>-5</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>19</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>21</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>2</td>
<td>-14</td>
<td>-3</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>0</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>5</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Legend
Meta: Metacognitive, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class
Meta: Metacognitive Strategy Class
Quasi-Experimental Classes
(A1) In most classes it appeared that very few pupils suggested any good wider transfer possibilities. As such, there seemed to be a relative similarity between pupils of the same class in this respect. However, there were classes that may have suggested a slight difference between pupils, such as the Yard Year 7 Control class, where over twenty-five percent, a quarter, of the pupils had suggested some good wider transfer possibilities. Hence, there was less similarity between pupils within this class compared to within a class, such as the Apple Year 9 Meta class, where only four percent of pupils suggested any good wider transfer possibilities.

(A2) There appeared to be a degree of similarity between classes of the same Year and school regarding the percentage of pupils who suggested some good wider transfer possibilities. The most noticeable range in the percentage of such pupils between classes of the same Year and school occurred in Apple Year 9. However, there was still a similarity in that the pupils who had made some good wider transfer possibilities were in a definite minority.

(A3) The percentage of pupils, in the Apple Year 7 classes and the Apple Year 9 classes, who suggested some good wider transfer possibilities were remarkably similar; they followed the pattern that those pupils who suggested some good wider transfer possibilities were in a minority. The strong similarity between the Year 7 classes and the Year 9 classes was also evident in Yard and, again, the classes from Yard showed that the pupils who suggested some good wider transfer possibilities were in the minority.

(A4) The percentage of pupils, in the Apple Year 7 classes and the Yard Year 7 classes, who suggested some good wider transfer possibilities were relatively similar. However, it could be argued that the Yard Year 7 classes appeared to have a slightly greater percentage of such pupils compared to the Apple Year 7 classes.

(A5) Both the Apple Year 9 classes and the Yard Year 9 classes had a relatively similar percentage of pupils who had suggested some good wider transfer possibilities. However, there appeared to be a slightly greater percentage of such pupils in the Yard Year 9 classes compared to the Apple Year 9 classes.
Theme: Pupils' Monitoring of the Strategy and the Task  
Category & Scale: Need + Want  
Table 4.33A: Pupils suggesting that they had changed or had not changed their strategic action as a response to what they needed or wanted to do.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>37</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>53</td>
<td>60</td>
<td>43</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>16</td>
<td>24</td>
<td>-19</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>74</td>
<td>65</td>
<td>58</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>50</td>
<td>18</td>
<td>49</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>24</td>
<td>47</td>
<td>9</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>37</td>
<td>29</td>
<td>-34</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>33</td>
<td>42</td>
<td>-6</td>
</tr>
</tbody>
</table>

(A1) With such a slender majority or a slight minority of pupils who implied that they had monitored their cognitive strategies during the tasks, which was evident in most classes, there appeared to be a difference amongst pupils of each class regarding the monitoring of their cognitive strategies during the tasks.

(A2) The percentage of pupils who implied that they had monitored their strategic action during the tasks was relatively similar between classes of the same Year and school. However, Yard Year 9 was the exception. The Yard Year 9 Meta class had such a small percentage of pupils who had implied that they monitored their cognitive strategies during the tasks, it appeared that there was actually a degree of similarity between pupils in the class, unlike in any other Yard Year 9 class.

(A3) The Apple Year 9 classes consistently had a greater percentage of pupils who implied that they had monitored their cognitive strategies during the tasks,
compared to the Apple Year 7 classes. Whereas those pupils who had
monitored their strategic action in the Apple Year 7 classes were clearly in the
minority, those pupils in the Apple Year 9 classes were clearly in the majority.
However, in Yard, the Year 7 classes and the Year 9 classes had a relatively
similar percentage of pupils who implied that they had monitored their
cognitive strategies during the tasks. Apart from the irregular Yard Year 9
Meta class, all of the other classes had an approximately even split between
pupils who suggested that they had monitored their cognitive strategies during
the tasks and those who did not.

(A4) The Yard Year 7 classes consistently had a greater percentage of pupils who
implied that they had monitored their cognitive strategies during the tasks
compared to the Apple Year 7 classes. Whereas all of the pupils in the Apple
Year 7 classes who suggested that they had monitored their cognitive
strategies were clearly in the minority, those pupils in the Yard Year 7 classes
were either in the majority or only in a very slight minority.

(A5) The percentage of pupils in the Apple Year 9 classes who implied that they
had monitored their strategic action during the tasks was consistently greater
than the percentage of such pupils in the Yard Year 9 classes. Those pupils in
each of the Apple Year 9 classes who suggested that they had monitored their
cognitive strategies were in the majority, unlike those pupils who implied that
they had monitored their cognitive strategies in the Yard Year 9 classes.
Theme: Pupils' Feelings During their Strategic Action and the Task

Category & Scale: Positive + Negative Feelings

Table 4.34A: Pupils suggesting that they had experienced either positive or negative feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>48</td>
<td>37</td>
<td>20</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>69</td>
<td>47</td>
<td>77</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-21</td>
<td>-10</td>
<td>-51</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>41</td>
<td>54</td>
<td>59</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>57</td>
<td>73</td>
<td>75</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>-16</td>
<td>-19</td>
<td>-16</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>12</td>
<td>39</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>12</td>
<td>26</td>
<td>2</td>
</tr>
</tbody>
</table>

(A1) The percentage of pupils in most of the classes, who acknowledged their positive or negative feelings towards their strategic action and the tasks, was relatively close to fifty percent. As such, it appeared that there may have been a difference between pupils of the same class regarding their feelings during their strategic action and the tasks.

(A2) It appeared that there was a general similarity between classes of the same Year and school regarding the percentage of pupils who acknowledged their positive or negative feelings towards their strategic action and the tasks. There was slightly less similarity between the classes in Apple Year 7, but even these classes were similar in that the pupils who acknowledged their positive or negative feelings towards their strategic action and the tasks were always in the minority.

(A3) Although the difference was very small, it appeared that there was a slightly greater percentage of pupils in the Apple Year 9 classes who experienced positive or negative feelings towards their strategic action and the tasks.
compared to the Apple Year 7 classes. In Yard, there was relatively little difference noted between the Yard Year 7 classes and the Yard Year 9 classes, regarding pupils' feelings towards their strategic action and the tasks.

(A4) It appeared that the Yard Year 7 classes had a consistently greater percentage of pupils who experienced positive or negative feelings towards their strategic action and the tasks compared to the Apple Year 7 classes.

(A5) It appeared that the Yard Year 9 classes had a greater percentage of pupils who experienced positive or negative feelings towards the tasks compared to the Apple Year 9 classes.

Theme: Pupils' Feelings During their Strategic Action and the Task
Category & Scale: Positive Feelings
Table 4.35A: Pupils suggesting that they had experienced positive feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>11</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>-7</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>26</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>7</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>19</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-22</td>
<td>-14</td>
<td>-42</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>-4</td>
<td>-18</td>
<td>-7</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Metaphorical Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta+</td>
<td>Metaphorical Strategy, Metaphorical Knowledge of Process and Strategy, Variable and Cognitive Strategy Class</td>
</tr>
</tbody>
</table>

(A1) The percentage of pupils in the Year 7 classes who experienced positive feelings towards their strategic action and the tasks was very small. The percentage of pupils in the Year 9 classes who acknowledged their positive feelings towards their strategic action and the tasks was, in general, not as small as in Year 7. However, these pupils were still clearly in the minority of
their respective classes. Therefore, with the possible exception of the pupils in the Apple Year 9 Meta+ class, there was a degree of similarity between pupils of the same class regarding their lack of experience of positive feelings.

(A2) It was evident that there was sometimes a difference in the percentage of pupils who had experienced positive feelings between classes of the same Year and school. However, in general, it appeared that there was a relative similarity between each trio of classes. The percentage of pupils who had experienced positive feelings appeared to be so low that it suggested a similarity between all pupils regarding their lack of experience of positive feelings.

(A3) There was a clear and consistent difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who experienced positive feelings towards their strategic action and the tasks. The Year 9 classes had a greater percentage of such pupils compared to the Year 7 classes. As such, it appeared that the Year 9 classes had a greater awareness of any positive feelings that they may have had during their strategic action and the tasks. Although the difference was not as dramatic as in Apple, it appeared that, in Yard, the Year 9 classes also had a generally greater percentage of pupils who experienced positive feelings compared to the Year 7 classes.

(A4) The percentage of pupils in both Apple Year 7 and Yard Year 7 who experienced positive feelings towards their strategic action and the tasks was very small. Although the Control class and the Meta+ class in Yard showed a greater percentage of such pupils compared to any of the Apple Year 7 classes there was a consistency between the Apple Year 7 classes that was not matched between the Yard Year 7 classes. Nevertheless, it did not appear that there were any notable differences between the Apple and Yard Year 7 classes regarding the percentage of pupils who experienced positive feelings.

(A5) It appeared that the Apple Year 9 classes consistently had a greater percentage of pupils who experienced positive feelings towards their strategic action and the tasks compared to the Yard Year 9 classes. As such, it was suggested that the Apple Year 9 classes were more likely to be aware of any positive feelings that they may have had during the tasks.
(A1) There were a number of classes, such as the Apple Year 9 Control class, that had a majority of pupils who claimed to have some degree of volitional control. In these classes it appeared, therefore, that there was relative similarity between pupils of the same class. However, there were also classes, such as the Yard Year 7 Meta class, that suggested that there was an even split between those pupils who assumed that they had some degree of volitional control and those who did not. In these classes, therefore, it appeared that there were differences between pupils of the same class.

(A2) There appeared to be a relative consistency and similarity between the classes of the same Year and school regarding the percentage of pupils who suggested that they had some degree of volitional control. The notable exception was the Apple Year 7 classes which had a relatively wide range in the percentage of such pupils between the three classes.
(A3) The Apple Year 9 classes had a consistently greater percentage of pupils who suggested that they had some degree of volitional control compared to the Apple Year 7 classes. Furthermore, the Apple Year 9 classes all showed a consistently high majority of pupils who acknowledged some degree of volitional control, whereas in the Apple Year 7 classes there was not only inconsistency between the classes but two of the classes also showed that there was a minority of such pupils. The Yard Year 7 classes and the Yard Year 9 classes were much more similar. Each of the six classes implied that there were differences between pupils of the same class, and each Year had a very similar range in the percentage of pupils who claimed to have some volitional control between the respective three classes.

(A4) There appeared to be very little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who suggested that they had some degree of volitional control.

(A5) The Apple Year 9 classes had a consistently greater percentage of pupils who suggested that they had some degree of volitional control compared to the Yard Year 9 classes. The consistently high majority of pupils with some degree of volitional control in the Apple Year 9 classes was in contrast with the relatively wide range in the percentage of such pupils between the Yard Year 9 classes.
Theme: The Wider Purpose of Physical Education  
Category & Scale: Mental Skills  
Table 4.37A: Pupils suggesting that a purpose of Physical Education is the development of specific mental skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Meta %</th>
<th>Meta + %</th>
<th>Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td>-1</td>
<td>5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>19</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td>19</td>
<td>4</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>-15</td>
<td>7</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

(A1) In general, the percentage of pupils who suggested that a purpose of Physical Education was to develop mental skills was extremely low in all of the classes. As such, it was argued that there was a strong similarity between pupils of the same class regarding their lack of awareness of the specific mental skills that were being developed. A possible exception may have been the Apple Year 9 Meta+ class which had a higher percentage of pupils who acknowledged the lesson had involved the development of specific mental skills and, thus, there appeared to be less consistency within this class regarding pupils' lack of awareness.

(A2) It appeared that there was a degree of similarity between the classes of the same Year and school regarding the percentage of pupils who suggested that a purpose of Physical Education was to develop mental skills. The most notable range in the percentages of such pupils between the three classes was in Apple Year 9, although there was still a degree of similarity in that those pupils who noted mental skills during the lesson were clearly in the minority of each class.
Although the difference was very small, it appeared that the Apple Year 9 classes, in general, compared with the Apple Year 7 classes, had a greater percentage of pupils who acknowledged that a purpose of Physical Education was to develop mental skills. However, the Yard Year 7 classes appeared to have a greater percentage of such pupils compared to the Yard Year 9 classes. Whereas no Yard Year 9 pupils acknowledged the development of mental skills, there was at least some pupils in the Yard Year 7 classes that did recognise the development of mental skills. Nevertheless, the percentage of pupils in every class that acknowledged the development of mental skills was extremely small and, therefore, any differences between classes, Years or schools were far from dramatic.

In general, it appeared that the Apple Year 7 classes had a greater percentage of pupils who acknowledged the development of mental skills as a purpose of Physical Education compared to the Yard Year 7 classes. The difference was not large but it appeared to be relatively consistent.

There were noticeable differences between the Apple Year 9 classes and the Yard Year 9 classes with respect to the percentage of pupils who had acknowledged the development of mental skills as a purpose of Physical Education. All of the Apple Year 9 classes had some pupils who made such an acknowledgement, whereas there were no such pupils in the Yard Year 9 classes.
**Theme:** Pupils' Motivational Orientation

**Category & Scale:** Task (St)

**Table 4.38A:** Pupils suggesting that they had a strong task-oriented motivation.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>78</td>
<td>89</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>74</td>
<td>47</td>
<td>57</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>4</td>
<td>42</td>
<td>12</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>96</td>
<td>79</td>
<td>83</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>57</td>
<td>45</td>
<td>58</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>39</td>
<td>34</td>
<td>25</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>18</td>
<td>10</td>
<td>-14</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>17</td>
<td>2</td>
<td>-1</td>
</tr>
</tbody>
</table>

(A1) In most of the classes, with the exception of the Yard Year 7 Meta class and the Yard Year 9 Meta class, it appeared that there was a majority of pupils who suggested that they had strong task-oriented motivation. In a number of classes, such as the Apple Year 9 Control class, the majority was so great it suggested that pupils were very similar regarding their motivational orientation. However, in other classes, such as the Yard Year 9 Control class, the majority was quite small and, therefore, it suggested that there may have been differences between pupils of the same class regarding their motivational orientation.

(A2) There was little difference between classes of the same Year and school regarding the percentage of pupils who suggested that they had strong task-oriented motivation. The most notable range in the percentage of such pupils was between the Yard Year 7 classes.

(A3) There did not appear to have been any consistent differences between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of
pupils who suggested that they had strong task-oriented motivation. A similar situation occurred between the Yard Year 7 classes and the Yard Year 9 classes.

(A4) It appeared that, in general, the Apple Year 7 classes had a slightly greater percentage of pupils who suggested that they had strong task-oriented motivation compared to the Yard Year 7 classes. The difference was highlighted as the Apple Year 7 classes all enjoyed a clear majority of pupils who acknowledged having a strong task-oriented motivation, whereas the Yard Year 7 classes did not.

(A5) There was a consistent difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who suggested that they had strong task-oriented motivation. All of the Apple Year 9 classes enjoyed a strong majority of pupils who acknowledged their strong task-oriented motivation, whereas the majority in the Yard Year 9 classes, if it existed, was very weak.

Theme: Pupils' Locus of Control
Category & Scale: Intrinsic
Table 4.39A: Pupils suggesting that they had an intrinsic locus of control.

<table>
<thead>
<tr>
<th>School &amp; Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple 7</td>
<td></td>
<td>67</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>Yard 7</td>
<td></td>
<td>63</td>
<td>18</td>
<td>52</td>
</tr>
<tr>
<td>Apple &amp; Yard 7</td>
<td>(D)</td>
<td>4</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>Apple 9</td>
<td></td>
<td>56</td>
<td>89</td>
<td>66</td>
</tr>
<tr>
<td>Yard 9</td>
<td></td>
<td>64</td>
<td>36</td>
<td>58</td>
</tr>
<tr>
<td>Apple &amp; Yard 9</td>
<td>(D)</td>
<td>8</td>
<td>53</td>
<td>8</td>
</tr>
<tr>
<td>Apple 7 &amp; 9</td>
<td>(D)</td>
<td>11</td>
<td>-48</td>
<td>-21</td>
</tr>
<tr>
<td>Yard 7 &amp; 9</td>
<td>(D)</td>
<td>-1</td>
<td>-18</td>
<td>-6</td>
</tr>
</tbody>
</table>

Legend:
Meta = Metacognitive Strategy Class
Meta + = Metacognitive Knowledge of Performance and Strategy Variability and Cognitive Strategy Class
(A1) It appeared that in most of the classes there was either a weak majority or a slight minority of pupils who suggested that they had an intrinsic locus of control. Thus, in general, there appeared to be a slight difference between pupils of the same class regarding their perceptions of the locus of control. However, there were two classes where a similarity between pupils of the same class was suggested, although for different reasons. In the Yard Year 7 Meta class the percentage of pupils with an intrinsic locus of control was so small it seemed that there was consistency throughout the class regarding their lack of an intrinsic locus of control. However, in the Apple Year 9 Meta class, the majority of pupils who suggested that they had an intrinsic locus of control was so great that there seemed to be a similarity in pupils' perceptions of having an intrinsic locus of control.

(A2) There appeared to be relatively little consistency between classes of the same Year and school regarding the percentage of pupils who suggested that they had an intrinsic locus of control; the percentage of such pupils in each class varied so greatly. However, there was a stable pattern in that there appeared to be a difference between pupils of the same class regarding their perceptions of the locus of control. That is, the consistency between the classes of the same Year and school was that there was a difference within each class.

(A3) It has been acknowledged that the only similarity between classes of the same Year and school was that there appeared to be a difference between the pupils within each class. However, it still seemed as if there was a slightly greater percentage of pupils who had an intrinsic locus of control in Apple Year 9 compared to Apple Year 7. Therefore, it appeared that the Apple Year 9 classes were more likely to have pupils who suggested an intrinsic locus of control compared to Apple Year 7 classes. However, there did not appear to have been any notable difference between the Yard Year 7 classes and the Yard Year 9 classes regarding the percentage of such pupils.

(A4) It appeared that there was a relative similarity between the percentage of pupils who suggested that they had an intrinsic locus of control in the Apple Year 7 classes and the percentage of such pupils in the Yard Year 7 classes. The only possible exception seemed to be the Yard Year 7 Meta class. Yet, as it has been previously stated, the major similarity was that there appeared to be a difference between pupils within each class regarding their views on the locus of control.
(A5) The Control classes and the Meta+ classes, in both Apple Year 9 and Yard Year 9, were quite similar regarding the percentage of pupils who suggested having an intrinsic locus of control. The key difference lay with the Meta classes or, more specifically, the Apple Year 9 Meta class which had a strong majority of pupils who suggested that they had an intrinsic locus of control. However, there was no consistent difference between the Apple Year 9 classes and the Yard Year 9 classes regarding pupils' views on the locus of control.

Theme: Self-Efficacy (perceived competence)
Category & Scale: Positive Mental (St)
Table 4.40A: Pupils suggesting that they strongly perceived themselves to have good mental abilities for Physical Education.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>70</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>74</td>
<td>29</td>
<td>48</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td></td>
<td>4</td>
<td>41</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>63</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>50</td>
<td>27</td>
<td>67</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td></td>
<td>13</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td></td>
<td>7</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td></td>
<td>24</td>
<td>2</td>
<td>19</td>
</tr>
</tbody>
</table>

(A1) In most classes there appeared to be either a weak majority or a slight minority of pupils who strongly perceived themselves to have good mental abilities for Physical Education. Thus, in general, there appeared to be a slight difference between pupils of the same class regarding their perceptions of their mental abilities in Physical Education. However, there were some classes, such as the Yard Year 7 Control class, that suggested a similarity between pupils of the same class as there was a more notable majority of pupils who perceived themselves to have good mental abilities for Physical Education.
(A2) There appeared to be relative consistency between the Apple Year 7 classes and between the Apple Year 9 classes regarding the percentage of pupils who strongly perceived themselves to have good mental abilities for Physical Education. However, the range in the percentage of such pupils between each respective trio of classes in Yard Year 7 and Yard Year 9 was much wider and, therefore, suggested less similarity between classes of the same Year and school. Yet, there was still a stable pattern in Yard because, with such weak majorities or slight minorities of pupils who strongly perceived themselves to have good mental abilities for Physical Education, there appeared to be a difference between pupils of the same class regarding their perceptions of their mental abilities. That is, the consistency between classes of the same Year and school was that there was a difference within each class.

(A3) It appeared that the Apple Year 7 classes had both a clear and consistently greater percentage of pupils who strongly perceived themselves to have good mental abilities for Physical Education compared to the Apple Year 9 classes. Therefore, it seemed more likely that pupils from an Apple Year 7 class would strongly perceive themselves to have good mental abilities for Physical Education compared to pupils from an Apple Year 9 class. Indeed, the pupil majority who suggested that they had good mental abilities was great enough, in the Apple Year 7 Control class and the Apple Year 7 Meta class, to suggest a strong similarity between pupils regarding their perceptions of mental self-efficacy. Interestingly, there appeared to be a much greater similarity between the Yard Year 7 classes and the Yard Year 9 classes regarding the percentage of such pupils. The range in the percentage of such pupils was very similar between each respective trio of classes in Yard Year 7 and Yard Year 9.

(A4) The consistently high percentage of pupils in all of the Apple Year 7 classes who strongly perceived themselves to have good mental abilities for Physical Education, was in contrast to the inconsistent and, in general, slightly lower percentage of such pupils in the Yard Year 7 classes. Thus, it seemed that pupils in the Apple Year 7 classes were more likely to perceive themselves as having strong mental abilities than pupils in the Yard Year 7 classes.

(A5) All of the classes in Year 9 had a percentage of pupils who strongly perceived themselves to have good mental abilities for Physical Education that suggested a difference between pupils of the same class regarding their mental self-efficacy. Thus, it appeared that there was relatively little difference between the Apple Year 9 classes and the Yard Year 9 classes regarding
pupils' perceptions of their mental abilities for Physical Education; it was the apparent inconsistency between the pupils within all six of the Year 9 classes that was the similarity and common thread between them.

Theme: Self-Efficacy (strength)
Category & Scale: Positive Strength
Table 4.41A: Pupils suggesting that they perceived themselves to have had the necessary abilities to complete the tasks.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>44</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>26</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>18</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>37</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>64</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>27</td>
<td>-4</td>
<td>1</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>-2</td>
<td>2</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>39</td>
<td>-24</td>
<td>4</td>
</tr>
</tbody>
</table>

(A1) Except for the Yard Year 9 Control class, most of the classes seemed to have a minority of pupils who perceived themselves to have the necessary abilities to complete the tasks. However, in general, it appeared that there was a difference between pupils of the same class regarding the strength of their belief in themselves to have been able to complete the tasks.

(A2) As most of the classes had a minority of pupils who strongly perceived themselves to have the necessary abilities to have completed the tasks, it was inevitable that there would be some degree of similarity between classes of the same Year and school. Indeed, there was relatively little difference between classes of the same Year and school regarding the percentage of pupils who suggested that they had the necessary abilities to have completed the tasks. However, the Yard Year 9 Control class showed a majority of pupils who
positively viewed themselves, whereas the other two Yard Year 9 classes only had a minority of such pupils and, thus, there was a difference between these classes of the same Year and school.

(A3) There was no notable difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who suggested that they had the necessary abilities to have completed the tasks. However, it appeared that there was a slightly greater percentage of such pupils in the Yard Year 9 classes compared to the Yard Year 7 classes. Although the difference was not great, it appeared that the Yard Year 9 classes were more likely than the Yard Year 7 classes to have pupils who perceived themselves as having the necessary abilities to have successfully completed the tasks.

(A4) The ranges in the percentage of pupils between the Apple Year 7 classes and between the Yard Year 7 classes, who positively perceived themselves as being able to complete the tasks, were so closely nestled together that there appeared to be a degree of similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the strength of pupils' positive self-efficacy.

(A5) It appeared that there was a relatively similar percentage of pupils who positively perceived themselves as being able to complete the tasks in both the Apple Year 9 classes and the Yard Year 9 classes. The exception was the Yard Year 9 Control class, although there still remained no consistent difference between the Year 9 classes from each school regarding the percentage of such pupils.
Most of the classes seemed to have a minority of pupils who perceived that their abilities would have been useful in other aspects of Physical Education; the only exception seemed to have been the Yard Year 9 Control class. In some classes, such as the Yard Year 7 Meta class, the minority was so small that it seemed as if pupils of the same class had similar perceptions of their abilities. In other classes, such as the Apple Year 9 Control class, the minority was only slight which suggested that there was a difference between pupils of the same class. Indeed, in general, this appeared to be the case; there seemed to have been a difference between pupils of the same class regarding their perceptions of their abilities.

There was relatively little difference between classes of the same Year and school regarding pupils' perceptions of the generality of their abilities to all aspects of Physical Education. Most classes had a minority of pupils who had positive perceptions of their abilities and, hence, there was a degree of similarity between classes of the same Year and school in this respect. The only possible exception concerned the three classes in Yard Year 9 where the
Control class had a majority of pupils with positive perceptions of their abilities and thus there seemed to be little consistency between the three classes.

(A3) It appeared that there was relatively little difference between the Apple Year 7 classes and the Apple Year 9 classes regarding pupils' perceptions of the generality of their abilities. All of the classes had a similar minority of pupils with positive perceptions of their abilities. Furthermore, the range in the percentage of such pupils between the classes in each Year nestled so closely together that no difference between them was evident. However, there appeared to be a slight difference between the Yard Year 7 classes and the Yard Year 9 classes regarding pupils' perceptions of the generality of their abilities. The Yard Year 9 classes seemed, in general, to have a greater percentage of pupils who had a positive perception of their abilities compared to the Yard Year 7 classes.

(A4) There was only a slight difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who perceived that their abilities had generality across other aspects of Physical Education. However, it appeared that the Apple Year 7 classes had a slightly greater percentage of such pupils compared to the Yard Year 7 classes.

(A5) There appeared to be relatively little difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who had positive perceptions of the generality of their abilities. The range in the percentage of such pupils, between the three classes from each school, nestled so closely together that it suggested a degree of similarity.
Theme: General Self-Worth  
Category & Scale: Positive Self-Worth  
Table 4.43A: Pupils suggesting that they viewed themselves positively.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Difference (D) Control % Meta % Meta + %</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>-10</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7 (D)</td>
<td>-10</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9 (D)</td>
<td>22</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9 (D)</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9 (D)</td>
<td>0</td>
</tr>
</tbody>
</table>

(A1) All of the classes seemed to have a minority of pupils who viewed themselves positively. In some classes, such as the Yard Year 7 Meta class, the minority was so small that it seemed as if there was similarity between pupils of the same class regarding their negative perceptions of themselves. However, in other classes, such as the Yard Year 9 Control class, the minority was only slight which suggested that there was a difference between pupils of the same class regarding their perceptions of self-worth.  

(A2) There appeared to be a similarity between the Apple Year 7 classes and between the Apple Year 9 classes regarding the percentage of pupils who viewed themselves positively. The pattern was similar in each Apple class; those who viewed themselves positively were clearly in the minority. However, in both Yard Year 7 and Yard Year 9 there was less consistency between each respective trio of classes, although those pupils in each class who suggested that they had a positive view of themselves were always in the minority.
(A3) There appeared to be relatively little difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who viewed themselves positively, as the range in the percentage of such pupils between each respective trio of classes was very similar. There was a similar situation regarding the Yard Year 7 classes and the Yard Year 9 classes.

(A4) The Apple Year 7 classes appeared to have a greater consistency between them with respect to the percentage of pupils who viewed themselves positively compared to the Yard Year 7 classes. However, there still appeared to be relatively little difference between the Apple Year 7 classes and the Yard Year 7 classes, as a whole, regarding the percentage of pupils who had a positive perception of themselves.

(A5) The Apple Year 9 classes appeared to have greater consistency between them with respect to the percentage of pupils who viewed themselves positively compared to the Yard Year 9 classes. However, as each range in the percentage of such pupils nestled so closely together, there still appeared to be relatively little difference between the Apple Year 9 classes and the Yard Year 9 classes as a whole.
Table 4.44A: Pupils suggesting that there had been elements of a strong task-oriented motivational climate during the lesson.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td></td>
<td>81</td>
<td>81</td>
<td>55</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td></td>
<td>79</td>
<td>53</td>
<td>76</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>7</td>
<td>(D)</td>
<td>72</td>
<td>28</td>
<td>-21</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td></td>
<td>74</td>
<td>82</td>
<td>66</td>
</tr>
<tr>
<td>Yard</td>
<td>9</td>
<td></td>
<td>71</td>
<td>55</td>
<td>92</td>
</tr>
<tr>
<td>Apple &amp; Yard</td>
<td>9</td>
<td>(D)</td>
<td>73</td>
<td>27</td>
<td>-26</td>
</tr>
<tr>
<td>Apple</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>7</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>Yard</td>
<td>7 &amp; 9</td>
<td>(D)</td>
<td>8</td>
<td>2</td>
<td>-16</td>
</tr>
</tbody>
</table>

(A1) All of the classes had a majority of pupils who indicated that there had been elements of a strong task-oriented motivational climate during the tasks. However, in most of the classes, such as the Yard Year 7 Meta class, the majority was so weak that there seemed to be a difference between pupils of the same class regarding their perceptions of the motivational climate. Yet, in other classes, such as the Apple Year 9 Meta class, there appeared to be a relative similarity between pupils of the same class as most pupils suggested that there had been elements of a strong task-oriented motivational climate during the tasks.

(A2) As each class had a majority of pupils who implied that there had been elements of a strong task-oriented motivational climate during the tasks, it was inevitable that there was going to be some similarity between classes of the same Year and school. However, the size of majority was the key difference between classes and was no more evident than between the Yard Year 9 classes; that is, the Yard Year 9 Meta class only had a slight majority of pupils who suggested that there had been elements of a strong task-oriented
motivational climate during the lesson, whereas the Yard Year 9 Meta+ class had almost all of the pupils make such a suggestion.

(A3) There did not appear to be any consistent difference between the Apple Year 7 and Apple Year 9 classes regarding the percentage of pupils who suggested that there had been elements of a strong task-oriented motivational climate during the tasks. A similar situation was evident between the Yard Year 7 classes and the Yard Year 9 classes.

(A4) There was a notable similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who suggested that there had been elements of a strong task-oriented motivational climate during the tasks.

(A5) It appeared that there was no consistent difference between the Apple Year 9 classes and the Yard Year 9 classes regarding the percentage of pupils who suggested that there had been elements of a strong task-oriented motivational climate during the tasks.
4.1.5.2 The Specific Focus

For clarity,

- Only the three Apple Year 7 classes were involved in the specific focus of the Part One Main Study: Pupils' Pre-Intervention Metacognitive Ability (Objectives A1 and A2).
- As there were only Apple Year 7 pupils involved, only objectives (A1) and (A2) could be assessed.
- An indication of the relevant general area precedes each section and an indication of the relevant theme precedes the presentation of each table.
- Information regarding each category and category scale is available in Section 4.1.2.2 and Appendix 14.
- Objectives (A1) and (A2) are assessed separately directly following the presentation of each table.
- Within each table, the value zero (0) percent signifies that there were no pupils in the relevant class who referred to the specified category and category scale.
- The category 'blank' is always included to show the percentage of pupils who were unable to offer any response to a specific question, as it presents some insight into those pupils who struggled with their awareness of their metacognitive ability 9.
- As pupils could potentially refer to more than one category or category scale during a single response, or during responses to more than one question relating to the same theme, the total percentage value in each class column may be greater than one hundred percent. Furthermore, as the number of pupils in each class who referred to a specific category and category scale was transformed into a percentage value, the rounding up and rounding down of a percentage may mean that the total percentage value in each class column is not exactly one hundred percent.

---

9 It should not be assumed that pupils left answers blank because they did not have enough time to complete the questionnaire. It was possible that this may have been the case in certain instances, but this was impossible to establish as pupils, in general, only sporadically left answers blank. Furthermore, the large amount of time pupils were allowed to complete each questionnaire suggested that a failure to answer all of the questions was at least partly caused by pupils struggling with their awareness and their explanations of their metacognitive ability; the semi-structured interviews supported the assumption. Thus, the category 'blank' remained as it potentially offered some insight into those pupils who struggled with their awareness of their metacognitive ability.
General Area: Metacognitive Knowledge Of Task Variables

Theme: The Desired Outcomes and Purpose of the Task

Table 4.45A: Apple Year 7 pupils' references regarding the purpose of the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity Description</td>
<td>G</td>
<td>74</td>
<td>59</td>
<td>48</td>
</tr>
<tr>
<td>Activity Description</td>
<td>S</td>
<td>26</td>
<td>22</td>
<td>31</td>
</tr>
<tr>
<td>Activity Description</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Skills</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Physical Skills</td>
<td>S</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Physical Skills</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Skills</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Mental Skills</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Mental Skills</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>

(A1) There was clearly a strong similarity between pupils of the same class regarding their perceptions of the purpose behind the tasks. A large majority in each class simply described the tasks or activities and, therefore, appeared unaware of any main purpose behind it. It was noticeable that approximately a half of the pupils in each class who provided an activity description did so in general terms. References made to the development of physical skills or mental skills were sporadic which further supported the assumption that there was little difference between pupils of the same class regarding their perceptions of the purpose behind the tasks.

(A2) There was a strong similarity between the three classes in Apple Year 7 regarding their perceptions of the purpose behind the lesson. A majority of pupils in each class made general descriptions of the activities rather than
stating any main purpose of these activities. Approximately a quarter of the pupils in each class provided more specific activity descriptions but very few, if any, pupils in each class suggested that the purpose of the lessons may have been the development of physical or mental skills. However, although there was a strong consistency within and between each class, the Meta+ class had notably more pupils who were unable to provide any answer regarding the purpose of the tasks compared to the other two classes.

Theme: The Influences Upon the Task

Table 4.46A: Apple Year 7 pupils' references regarding the influences upon the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Intrinsic Physical</td>
<td>G</td>
<td>11</td>
</tr>
<tr>
<td>Intrinsic Physical</td>
<td>S</td>
<td>63</td>
</tr>
<tr>
<td>Intrinsic Physical</td>
<td>P</td>
<td>0</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>G</td>
<td>4</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>S</td>
<td>52</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>P</td>
<td>0</td>
</tr>
<tr>
<td>Intrinsic Mental</td>
<td>G</td>
<td>15</td>
</tr>
<tr>
<td>Intrinsic Mental</td>
<td>S</td>
<td>19</td>
</tr>
<tr>
<td>Intrinsic Mental</td>
<td>P</td>
<td>0</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>G</td>
<td>11</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>S</td>
<td>26</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>P</td>
<td>0</td>
</tr>
<tr>
<td>Stock / Unaware</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Nothing</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
</tr>
</tbody>
</table>

(A1) There was no influence that was overwhelmingly suggested by the pupils within any class. Although some influences seemed to have been noted by a relatively large percentage of the pupils in each class, such as the specific
intrinsic physical influences, the percentage of pupils making such suggestions was not large enough to imply that there was great similarity between the all pupils' views. However, there was some degree of similarity between the pupils of the same class regarding their lack of comments relevant to influences such as intrinsic and extrinsic mental influences.

(A2) There was a strong similarity between the classes in Apple Year 7 regarding their thoughts on what factors may influence their performance in the tasks. Certain influences were regularly suggested in each class and the percentage of pupils who made these suggestions was very similar in each of the three classes. There was a strong indication that physical influences dominated the pupils' thoughts. Both intrinsic physical and extrinsic physical influences were mentioned by a notable percentage of pupils in each class. Interestingly, with respect to both intrinsic and extrinsic physical influences, most of the pupils who referred to them did so specifically; a specific physical influence was frequently stated. There was a much lower percentage of pupils in each class who mentioned some form of intrinsic or extrinsic mental influence. Notably, those pupils who mentioned intrinsic mental influences often did so in general terms, while those pupils who referred to extrinsic mental influences did so in more specific terms. There was a strong similarity between the classes with respect to the percentage of pupils who were unable to offer any suggestion regarding the influences upon the tasks. Although these percentages were far from large they were clearly evident. Indeed, the percentage of pupils who were unable to offer any suggestions often matched the percentage of pupils who suggested intrinsic or extrinsic mental influences.
Theme: The Abundancy and Organisation of the Information
Table 4.47A: Apple Year 7 pupils' references regarding the abundancy of information.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enough</td>
<td>-</td>
<td>86</td>
<td>93</td>
<td>41</td>
</tr>
<tr>
<td>Not Enough</td>
<td>-</td>
<td>8</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Unsure</td>
<td>-</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>7</td>
<td>4</td>
<td>41</td>
</tr>
</tbody>
</table>

(A1) Within the Control class and the Meta class there appeared to be a strong similarity between the pupils regarding their views on the abundancy of information. There was a clear majority of pupils in each class who suggested that there was enough information made available during the tasks. However, there was a greater difference implied between the pupils in the Meta+ class where there appeared to be an even split between those pupils who were actually aware of the amount of information made available and those pupils who seemed unaware.

(A2) There was clearly a strong similarity between the Control class and the Meta class as both showed a clear majority of pupils who believed that enough information had been made available during the tasks. However, the Meta+ class seemed irregular when compared with the other two classes. Whereas over ninety percent of the pupils in both the Control class and the Meta class were able to offer an opinion on the abundancy of information, over fifty percent of the pupils in the Meta+ class were unable to do so. The only point of similarity between all three classes appeared to be the low percentage of pupils who had overtly suggested that there was not enough information made available during the tasks.
**Table 4.48A:** Apple Year 7 pupils' references regarding the prioritisation of information.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Technique</td>
<td>G</td>
<td>11</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Physical Technique</td>
<td>S</td>
<td>41</td>
<td>52</td>
<td>41</td>
</tr>
<tr>
<td>Physical Technique</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Technique</td>
<td>G</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Technique</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Technique</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Activity Principle</td>
<td>G</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Activity Principle</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Activity Principle</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Lessons Issues (GLI)</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Lessons Issues (GLI)</td>
<td>S</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Lessons Issues (GLI)</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Encouragement</td>
<td>G</td>
<td>15</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Encouragement</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Encouragement</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unspecified</td>
<td>-</td>
<td>15</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>7</td>
<td>4</td>
<td>41</td>
</tr>
</tbody>
</table>

**Legend**

- **Meta** = Metacognitive Strategy Class
- **Meta +** = Metacognitive Knowledge of Process and Strategy Variables and Metacognitive Strategy Class

(A1) It appeared that there was not any information that pupils of the same class unanimously suggested should have been prioritised. Although approximately half of the pupils in each class suggested that some form of specific physical technique had been highlighted, it still appeared that there were differences between pupils of the same class regarding their thoughts on what information had been prioritised in the tasks. However, there was a strong similarity between the pupils of the same class regarding their opinion that neither mental techniques nor activity principles had been highlighted. There were
very few pupils, if any, in each class who believed that they should have prioritised the mental techniques or activity principles involved in the tasks.

(A2) In general, there appeared to be a degree of similarity between the three classes regarding their views on what information should have been prioritised. However, the Meta+ class did, at times, seemed slightly irregular in comparison to the other classes. Each of the three classes had a large percentage of the pupils who claimed that there were specific physical techniques that had been prioritised. For example, there were some pupils in the Control class and the Meta class who had suggested that some general physical technique information was important, but there were no such pupils in the Meta+ class. There was a clear similarity between the classes regarding the lack of pupils who suggested that mental techniques, activity principles or general lesson issues should have been prioritised. Furthermore, each class appeared to have a similar percentage of pupils who were unable to specify what information they should have emphasised and focused upon. However, the Meta+ class had notably more pupils, compared to the other classes, who were unable to offer any suggestion regarding what information had been highlighted.
Table 4.49A: Apple Year 7 pupils' references regarding the demands of the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Processes</td>
<td>G</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>G</td>
<td>11</td>
<td>48</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>15</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>19</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>22</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>G</td>
<td>7</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>G</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None Required</td>
<td>-</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>19</td>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

(A1) There was a strong similarity between the pupils of the same class regarding their perceptions of what demands the tasks had placed upon them. In each class, the pupils appeared to believe that the tasks had mostly placed demands on them physically as opposed to mentally. However, although there was an overall consistency between pupils of the same class, when the distribution of the class percentages were viewed in more detail, the similarity within each class were reduced. In the Control class there appeared to be a majority of
pupils who acknowledged that the tasks had placed physical demands upon them but this majority could be divided into relatively small percentages of pupils who had acknowledged physical properties in general terms, physical properties in specific terms, physical processes in general terms and physical processes in specific terms. Indeed, even though both the Meta class and the Meta+ class appeared to have a more substantial percentage of pupils who had suggested some physical properties in general terms, the overall majority of pupils who acknowledged the physical demands of the tasks could clearly be separated into the four combinations of category and category scale.

(A2) The three classes were relatively similar as they all implied that there was a majority of pupils who appreciated some of the physical demands placed upon them. Furthermore, within each class there were pupils who considered physical properties in general terms, pupils who referred to physical properties in specific terms, pupils who suggested there were demands on physical processes in general terms and pupils who claimed that there were demands on physical processes in specific terms. Each class had a relatively similar percentage of pupils who referred to these four combinations of category and category scale. Notably, the classes appeared consistent in the lack of pupil awareness regarding the mental demands placed upon them. Furthermore, if there were pupils who acknowledged some mental demands, the comments they made were often general in nature. There was a slight variation between the classes in the percentage of pupils who were unable to offer any opinion regarding the demands placed upon them. It was noticeable that in the Control class and the Meta+ class the percentage of such pupils was relatively large.
Theme: The Pupils' Feelings During the Task
Table 4.50A: Apple Year 7 pupils' references regarding their feelings during the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scale</td>
</tr>
<tr>
<td>Positive</td>
<td>-</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
</tr>
<tr>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>None</td>
<td>-</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
</tr>
</tbody>
</table>

(A1) There were clearly differences between pupils of the same class with respect to their feelings during the tasks. However, the pupils within each of the classes showed some similarity in that very few of them experienced positive feelings during the tasks, as opposed to neutral or negative feelings. Yet, with a clear percentage of pupils within each class suggesting positive, neutral and negative feelings, it implied that there were differences between pupils of the same class regarding their feelings during the tasks.

(A2) There was a degree of similarity between the classes with each showing a clear percentage of pupils who suggested that they experienced positive, neutral or negative feelings. All three classes also showed a lack of pupils who had positive affective metacognitive experiences. Furthermore, in both the Control class and the Meta+ class the largest percentage of pupils appeared to suggest having experienced neutral feelings, which implies a lack of any definite affective metacognitive experience. The lack of affective metacognitive experiences for pupils in the Meta+ class was confirmed by the large percentage of pupils who were unable to offer any opinion about their feelings during the tasks. Interestingly, a large percentage of pupils in the Meta class appeared to have negative feelings during the tasks. Although negative feelings were obviously not desired, they do imply that these pupils had some affective metacognitive experiences. In general, the three classes seemed relatively similar regarding pupils' affective metacognitive
experiences, although the Meta+ class did indicate an irregularly high percentage of pupils who were unable to state what their feelings were.

**General Area:** Metacognitive Knowledge Of Person Variables

**Theme:** Intra-Individual Variables

**Table 4.51A:** Apple Year 7 pupils’ references regarding intra-individual variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Properties</td>
<td>G</td>
<td>4</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>S</td>
<td>7</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>G</td>
<td>26</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>S</td>
<td>78</td>
<td>67</td>
<td>48</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>G</td>
<td>0</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>G</td>
<td>0</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>S</td>
<td>11</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Factors</td>
<td>G</td>
<td>0</td>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td>General Factors</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Practical Factors</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Practical Factors</td>
<td>S</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Practical Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>67</td>
<td>30</td>
<td>52</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>33</td>
<td>59</td>
<td>48</td>
</tr>
</tbody>
</table>

**Legend**

Meta = Metacognitive Strategy Class
Meta + = Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class
In the Control class a large percentage of the pupils suggested some specific physical processes as being important intra-individual variables. The large percentage of such pupils, especially when considered alongside the percentage of pupils who referred to physical processes in more general terms, implied that there was a degree of similarity between pupils of the Control class. Physical processes appeared to be the hub of the pupils' thoughts about intra-individual variables. However, a large percentage of pupils, including a percentage of those who noted some specific physical processes, suggested that they were unaware of any intra-individual variables. As such, it was implied that there were differences between pupils in the Control class and confusion concerning intra-individual variables. Yet, pupils of the Control class showed some similarity in that most of them completely ignored any mental properties or mental processes as possible intra-individual variables. Indeed, in all three classes, pupils of the same class were similar in this respect; mental properties and mental processes were largely not mentioned. Physical properties, as a whole, were also frequently ignored by pupils in each class. As such, there were both similarities and differences evident between pupils of the same class regarding their metacognitive knowledge of person intra-individual variables.

The three classes showed some similarity regarding what the pupils viewed as the important intra-individual variables. There was a clear tendency to view physical processes as being these major variables. With respect to physical processes each class had a similar percentage of pupils who referred to them in specific terms, although the Meta+ class showed less pupils who referred to them in general terms compared to the other classes. While physical properties were not often noted by pupils in any class, they were considered by a greater percentage of pupils in the Meta+ class compared to the other classes. The striking similarity between the classes was the lack of pupils who suggested any mental properties or processes, even in general terms, as being intra-individual variables. Furthermore, the percentage of pupils in each class who were unaware of any intra-individual variables, or were unable to offer a response concerning such variables, was remarkably high. There also appeared to be confusion within each class regarding intra-individual variables. While some pupils made comments about intra-individual variables, referring to such categories as physical processes, a notable percentage of these same pupils must have also stated that they were unaware of any such variables. The suggestion, therefore, was that a large percentage of the pupils in each class were actually unaware, or were at least unsure, of their own
strengths and weaknesses. This was especially true regarding pupils' mental abilities but was also evident regarding their physical abilities.

Theme: Intra-Individual and Inter-Individual Variables (Wholist/Analytic Cognitive Style Dimension)

Table 4.52A: Apple Year 7 pupils' references regarding the wholist/analytic style dimension.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholist - Awareness</td>
<td>-</td>
<td>52</td>
<td>44</td>
<td>41</td>
</tr>
<tr>
<td>Wholist - No Awareness</td>
<td>-</td>
<td>26</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Analytic - Awareness</td>
<td>-</td>
<td>26</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Analytic - No Awareness</td>
<td>-</td>
<td>11</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Wholist Analytic - Awareness</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Wholist Analytic - No Awareness</td>
<td>-</td>
<td>4</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Neither - No Awareness</td>
<td>-</td>
<td>15</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>30</td>
<td>44</td>
<td>41</td>
</tr>
</tbody>
</table>

(A1) Differences were immediately suggested between pupils of the same class regarding their awareness of their preferences in the wholist/analytic style dimension. With only a small majority of pupils in each class suggesting any such awareness, it was implied that there was a difference between pupils regarding their awareness of their processing cognitive style. In all three classes there were at least fifty percent of pupils who failed to show consistency in their suggested preferences in the wholist/analytic style dimension. Furthermore, a relatively large percentage of pupils in each class were unable to offer an opinion regarding their stylistic preferences. As such, many of the pupils appeared to show a slight confusion, or unawareness, of their preferences in the wholist/analytic style dimension. Therefore, even though the wholist preference was suggested most in each class, the percentage was not great enough in comparison with other categories to suggest any similarity between all pupils of the same class. However, a
noticeable similarity between pupils of the same class was the lack of a wholist analytic preference in the wholist/analytic style dimension; most pupils appeared to specify either one of the two preferences and did not suggest that they were happy processing information in either manner. 

(A2) Each class was similar in that they had a slight majority of pupils who suggested some form of awareness regarding their preferences in the wholist/analytic style dimension. Notably, a majority of pupils in each class suggested that they were wholists as opposed to analytics, although the stability of pupils' suggestions did appear questionable. There seemed to be, at least, a degree of confusion or instability about the pupils' suggestions of their preferences in the wholist/analytic style dimension. Possibly the most striking similarity between the classes, however, concerned the lack of pupils who suggested that they did not have a strong specific preference for either the wholistic processing or analytic processing of information. Furthermore, even if pupils did suggest such a wholist analytic preference in the wholist analytic style dimension this was generally not accompanied by an awareness of that preference.
Theme: Intra-Individual and Inter-Individual Variables
(Verbaliser/Imager Cognitive Style Dimension)

Table 4.53A: Apple Year 7 pupils' references regarding the verbaliser/imager style dimension.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbaliser - Awareness</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Verbaliser - No Awareness</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Imager - Awareness</td>
<td>-</td>
<td>78</td>
<td>67</td>
<td>62</td>
</tr>
<tr>
<td>Imager - No Awareness</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Verbaliser Imager - Awareness</td>
<td>-</td>
<td>81</td>
<td>59</td>
<td>79</td>
</tr>
<tr>
<td>Verbaliser Imager - No Awareness</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Neither - No Awareness</td>
<td>-</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
<td>22</td>
<td>21</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Monocognitive Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta +</td>
<td>Monocognitive Strategy, Monocognitive Knowledge of Person and Strategy Variance and Cognitive Strategy Class</td>
</tr>
</tbody>
</table>

(A1) There appeared to be a strong similarity between pupils of the same class regarding their preferences in the verbaliser/imager style dimension. There was a large majority of pupils in each class who suggested that they had some form of awareness of their stylistic preferences. With such a large percentage of pupils suggesting a preference for imager representation and large percentage of pupils suggesting no strong preference for either verbaliser or imager representation, it could be argued that there may have been a lack of stability in the pupils' preferences. However, it appeared that all these pupils remained in the imager half of the verbaliser/imager stylistic continuum, suggesting that the pupils of the same class actually had similar preferences and had a similar stability with those preferences. The lack of pupils in each class who suggested having verbaliser representation preferences confirmed the similarity between pupils of the same class. However, it was interesting that there was a noticeable percentage of pupils in each class who were, at least once, unable to offer an opinion on their stylistic preferences in the verbaliser/imager dimension.
All three classes showed a very similar percentage of pupils who had an awareness of their preferences in the verbaliser/imager style dimension, and showed a similar percentage of pupils who suggested a preference for imager representation or suggested no strong preference for either verbaliser or imager representation. As such, there was very little difference between these classes of the same Year and school. Most pupils suggested having a preference within the imager half of the verbaliser/imager stylistic continuum and suggested having some form of awareness of that preference.

Theme: Inter-Individual Variables

Table 4.54A: Apple Year 7 pupils' references regarding their awareness of inter-individual variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Awareness</td>
<td>59</td>
</tr>
<tr>
<td>No Awarenesss</td>
<td>22</td>
</tr>
<tr>
<td>Unsure</td>
<td>7</td>
</tr>
<tr>
<td>Don't Know</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td>4</td>
</tr>
</tbody>
</table>

There appeared to be a possible difference between pupils of the same class regarding their awareness of inter-individual variables. In both the Control class and the Meta+ class there appeared to be an approximately even split between those pupils who suggested that they had some awareness of inter-individual variables and those who suggested that they lacked such awareness. In the Meta class, there was a greater similarity between pupils as a majority appeared to lack the required awareness of inter-individual variables. However, the majority was not overwhelming and, as such, it could still be suggested that there was a slight difference between pupils of the same class.

The three classes, as a whole, did suggest slight differences with each other. The Meta class appeared irregular due to the small percentage of pupils who suggested that they had some awareness of inter-individual variables. The
other two classes had approximately fifty percent of the pupils with such awareness. However, it was the Control class that showed some irregularity regarding the percentage of pupils who were not decisive in whether they had awareness of inter-individual variables or not. Assuming that those pupils who were unable to offer any response were unsure of their awareness, there was much greater uncertainty in the Meta class and the Meta+ class than there was in the Control class.

Theme: Inter-Individual Variables

Table 4.55A: Apple Year 7 pupils' references regarding the types of inter-individual variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
<th>Physical Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
</tbody>
</table>

(A1) There was clearly a difference between the pupils of the same class regarding their perceptions of inter-individual variables. Yet, there was a relatively similar, but small, percentage of pupils within each class who suggested that
the main inter-individual variables were physical or mental. A large percentage of pupils in each class suggested that general ability was the important inter-individual variable. However, the percentage of such pupils was not large enough to suggest any large degree of similarity between pupils of the same class. The difference between pupils of the same class was confirmed in the Meta class and the Meta+ class by the relatively large percentage of pupils who were unable to offer any opinion on inter-individual variables. As such, there was a clear split between pupils in these classes regarding those pupils who suggested some inter-individual variables and those who did not.

(A2) The three classes showed both similarities and differences with each other regarding pupils' perceptions of inter-individual variables. Gender did not appear to be an issue with the Apple Year 7 pupils as nobody suggested that this was a reason for inter-individual differences. Furthermore, each class showed a relatively low percentage of pupils who acknowledged either physical or mental differences between individuals. However, it was noticeable that the Control class had more pupils who suggested physical or mental inter-individual variables compared to the other two classes. There was a greater percentage of pupils in the Meta class and the Meta+ class who were unable to offer any opinion regarding inter-individual variables compared to the Control class. In the Control class there was a similar percentage of pupils who suggested physical factors in general terms as there were pupils who suggested physical factors in specific terms, as was evident regarding the Control pupils' references to mental factors. This pattern was only evident in the Meta class regarding physical factors, and in the Meta+ class regarding mental factors. The most striking similarity between the classes concerned the relatively large percentage of pupils who suggested that general ability was an important inter-individual variable.
Theme: Universals of Cognition
Table 4.56A: Apple Year 7 pupils' references regarding the universals of cognition.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enough - Additional</td>
<td>G</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Enough - Additional</td>
<td>S</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Enough - Additional</td>
<td>P</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Enough - No Ideas</td>
<td>-</td>
<td>56</td>
<td>44</td>
<td>55</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>S</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not Enough - No Ideas</td>
<td>-</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Don't Know</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
<td>30</td>
<td>31</td>
</tr>
</tbody>
</table>

(A1) Although there was a majority of pupils in each class who suggested that there was enough information made available, the majority was far from overwhelming. As such, it appeared that there was a degree of difference between pupils of the same class regarding their awareness of the amount of information that was available to them. Assuming those pupils who were unable to offer an opinion concerning the universals of cognition were actually unsure of their awareness, it appeared that the Meta class and the Meta+ class had over a third of pupils who lacked awareness of their comprehension and the potential need for certain information. There was also a notable percentage of the pupils in the Control class who lacked such awareness. However, within each class there was a slight similarity between the pupils, as only a small percentage of pupils actually requested any general or specific additional information.

(A2) There were both similarities and differences between the three classes regarding pupils' perceptions of the universals of cognition. Each class had a
very similar percentage of pupils who had suggested that there was enough information for them and they had no ideas for any additional information. Over a half of each class suggested that there was no need, or they lacked ideas, for any additional information. However, whereas in the Control class and the Meta+ class this was matched by the pupils suggesting that they had enough information, over ten percent of those pupils in the Meta class who stated that there was no need, or they lacked ideas, for any additional information had also suggested that they did not have enough information. Therefore, these pupils perceived themselves in need of additional information but were unable to offer any ideas regarding what information they required. The classes showed a similar percentage of pupils, approximately ten percent, who sought additional information, be it general or specific, even though they had suggested enough information was available. However, the Control class also had over ten percent of the pupils who sought poor additional information. Interestingly, the Meta+ class did not have any pupils who directly stated that they did not have enough information. Both the Control class and the Meta class had approximately ten percent of pupils who stated that there was not enough information for them, but whereas the pupils in the Control class had suggested some specific additional information, the pupils in the Meta class had offered no ideas for additional information.
Table 4.57A: Apple Year 7 pupils' references regarding what strategies or strategic thoughts were utilised.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Factors</td>
<td>G</td>
<td>7</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>S</td>
<td>74</td>
<td>56</td>
<td>52</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>G</td>
<td>19</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Specific Mental Techniques</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Specific Mental Techniques</td>
<td>S</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>External Factors</td>
<td>G</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>External Factors</td>
<td>S</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>External Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nothing</td>
<td>-</td>
<td>63</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>33</td>
<td>52</td>
<td>52</td>
</tr>
</tbody>
</table>

(A1) A majority of pupils in each class had thought about physical factors during the tasks and generally focused on specific, rather than general, factors. However, the percentage of such pupils in each class was not overwhelming and, thus, there was a possibility of slight differences between pupils of the same class regarding their strategic thoughts. However, pupils of the same class were similar in their lack of attention and awareness regarding specific mental techniques. There was also a degree of similarity in that there were relatively few pupils who even considered more general mental techniques. In addition, there was a relatively large percentage of pupils in each class, at
some time during the tasks, who had not been considering anything relevant or useful to the completion of the tasks.

(A2) The three classes had been similar in that each showed a slight majority of pupils who considered specific physical factors more than any other category during the tasks. Furthermore, the relatively small percentage of pupils who considered general mental techniques was very similar in each of the classes, as was the very small percentage of pupils who had thought about specific mental techniques. Yet, the most notable similarity between the three classes concerned the percentage of pupils who implied that they were not thinking of anything relevant or useful to the completion of the tasks. All three classes had a majority of pupils who suggested that, at some time during the tasks, they were not thinking of anything in particular. Over fifty percent of pupils in the Meta and Meta+ classes were unable to offer any suggestion on what they were thinking about during the tasks. Possibly even worse, the Control class had fifteen percent of pupils who admitted thinking about some specific external factor completely off-task.
Table 4.58A: Apple Year 7 pupils' references regarding why they considered utilising certain strategies or strategic thoughts.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conscious Decision</td>
<td>CogG</td>
<td>33</td>
<td>44</td>
<td>34</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>CogS</td>
<td>25</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>CogP</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractG</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractS</td>
<td>56</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractP</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unconscious Decision</td>
<td></td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>G</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td>S</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>P</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No Reason</td>
<td></td>
<td>30</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>48</td>
<td>63</td>
<td>69</td>
</tr>
</tbody>
</table>

(A1) It appeared that there were some similarities and some differences between pupils of the same class regarding the reasons why they had certain thoughts during a task. The noticeable, but far from overwhelming, percentage of pupils who had made a conscious cognitive decision based on general factors, implies that there may have been differences between pupils within each class. This appeared the case again in the Control class regarding the percentage of pupils who made conscious cognitive decisions based on specific factors. However, the small percentage of such pupils in the Meta class and the Meta+ class suggested that, within each of these classes, the pupils showed some similarities. With respect to the pupils who made conscious practical decisions based on specific occurrences, it appeared that in the Control class there was a definite split between pupils who made such decisions and those who did not. However, again in the Meta and the Meta+ classes, the percentage of pupils making such decisions was small enough to suggest that in these classes there
was some similarity between pupils. There was similarity between pupils of the same class with respect to their general failure to acknowledge any unconscious decisions. Yet, the percentage of pupils who implied that they had no reason or failed to offer a response suggested possible differences between the pupils of the same class. Indeed, there was almost an even split in each class between those pupils who could not always offer a reason and those who could.

(A2) The three classes showed a similar percentage of pupils who had made a conscious cognitive decision based on general factors. However, with respect to those pupils who had suggested making conscious cognitive decisions based on specific factors, there were differences between the classes. The classes were similar in that there was a minority of such pupils in each one, but, whereas the Control class had approximately a quarter of the pupils making such decisions, the Meta+ class suggested very few pupils had made such decisions at all. Interestingly, all three classes had a noticeable percentage of pupils who had made conscious practical decisions based on specific factors, yet, again, there was a slight difference between the classes as the Control class suggested a majority of such pupils where the other two classes suggested a clear minority of such pupils. Notably, in all three classes there had been a greater percentage of pupils making cognitive decisions based on general factors than there had been pupils making decisions based on specific factors. This was the opposite with respect to pupils making practical decisions where those pupils making such decisions based on specific factors clearly outnumbered those pupils making such decisions based on general factors. Indeed, in the Meta class and the Meta+ class, no pupils at all made such conscious practical decisions based on general factors. Thus, it appeared that the Control class, as a whole, seemed to make more conscious decisions, or more regularly make conscious decisions, than either of the other two classes. Yet, there were clearly more conscious decisions made in each class than unconscious decisions. Very few pupils suggested that they had made unconscious decisions, although there were clearly more pupils in each class who stated that they had no reason, or implied that they could not offer a reason, why they had undertaken their actions during the tasks. Indeed, there was almost an even split in each class of those pupils who could not always offer a reason for their strategic actions and those who could. As a final point, it was notable that the Meta+ class appeared irregular regarding pupils' perceptions that others had made the decision for them. Although the percentage of such pupils was very small, there seemed to be more pupils in
the Meta+ class who claimed that others had made the decision for them compared to the other classes.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>In Context</td>
<td>Gd</td>
</tr>
<tr>
<td>In Context</td>
<td>OK</td>
</tr>
<tr>
<td>In Context</td>
<td>Pr</td>
</tr>
<tr>
<td>Near Transfer</td>
<td>Gd</td>
</tr>
<tr>
<td>Near Transfer</td>
<td>OK</td>
</tr>
<tr>
<td>Near Transfer</td>
<td>Pr</td>
</tr>
<tr>
<td>Wider Transfer</td>
<td>Gd</td>
</tr>
<tr>
<td>Wider Transfer</td>
<td>OK</td>
</tr>
<tr>
<td>Wider Transfer</td>
<td>Pr</td>
</tr>
<tr>
<td>No Context</td>
<td>-</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>-</td>
</tr>
<tr>
<td>Don't Know</td>
<td>-</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
</tr>
</tbody>
</table>

(A1) There were clear differences between pupils of the same class regarding their appreciation of when specific cognitive strategies were transferable, or useful, in other activities. There was a noticeable split between those pupils who suggested some awareness of when the specific cognitive strategies would be useful, either in context of the activity in which they had participated, or with respect to other activities, and those pupils who were unable to offer any opinion regarding when the specific cognitive strategies would be useful.

(A2) There appeared to have been relatively strong, general, similarities between the three classes regarding the pupils' awareness of when specific cognitive
strategies could be utilised. However, there were slight differences between the classes in that the Meta class and the Meta+ class had a greater percentage of pupils, compared to the Control class, who appreciated that the specific cognitive strategies would be useful in the context of the activity in which they had participated. However, this was balanced out with the percentage of pupils in the Control class who noted that the cognitive strategies would be useful for closely related activities and, therefore, near transfer. There were no such pupils in either of the other two classes. All three classes had a similar percentage of pupils who had suggested a wider transfer of the specific cognitive strategies utilised. Furthermore, combining the categories where pupils implied that they were unaware of when specific cognitive strategies could be used, either in the activity in which they had participated or in other activities, it appeared that over a half of the pupils in each class showed a lack of such awareness. As such, it appeared there was a greater percentage of pupils in each class who were unaware of when to utilise specific cognitive strategies compared to the percentage of pupils who showed some awareness.
Theme: Pupils' Monitoring of the Strategy and the Task

Table 4.60A: Apple Year 7 pupils' references regarding their monitoring of their strategic action and the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change - Want</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Change - Need</td>
<td>-</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Change - Informed</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change - No Reason</td>
<td>-</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No Change - Want</td>
<td>-</td>
<td>11</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>No Change - Need</td>
<td>-</td>
<td>19</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>No Change - Informed</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>No Change - No Reason</td>
<td>-</td>
<td>11</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>No Change - Couldn't</td>
<td>-</td>
<td>15</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Don't Know</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>30</td>
<td>37</td>
<td>48</td>
</tr>
</tbody>
</table>

(A1) There appeared to be a strong similarity between pupils of the same class with regard to the fact that most pupils did not change the specific cognitive strategy or their strategic action during the tasks. However, as a large percentage of each class were unable to offer any idea of whether or not they had monitored their specific cognitive strategies it could not be claimed for certain that there was such a lack of change. Furthermore, the reasons offered by the pupils of each class regarding why they did or did not change their specific cognitive strategy during the tasks were clearly varied and, as such, it was suggested that there were differences between pupils of the same class regarding their monitoring of the tasks.

(A2) There were similarities between the three classes in that there were more pupils who did not change the specific cognitive strategy that they were using during the tasks, than there were pupils who did change their specific cognitive strategy. Furthermore, there was a large percentage of pupils in each
class, especially the Meta+ class, who were unable to suggest any idea of whether they had changed their specific cognitive strategy or not. More noticeable differences between the classes regarded the pupils' reasons for making their decisions. Whereas a greater percentage of pupils in the Meta class appeared to base their decisions on what they wanted to do or what they were informed to do, more pupils in the other classes suggested that they had based their decisions on what they needed to do. As a final point, it was interesting that over ten percent of pupils in the Control class claimed that, for some reason, they could not have changed their specific cognitive strategy. This percentage of pupils was not matched in either of the other classes.

Theme: Pupils' Feelings During their Strategic Action and the Task

Table 4.61A: Apple Year 7 pupils' references regarding their feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
<td>19</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Negative</td>
<td>-</td>
<td>44</td>
<td>33</td>
<td>17</td>
</tr>
<tr>
<td>Physical</td>
<td>-</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>None</td>
<td>-</td>
<td>4</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>26</td>
<td>26</td>
<td>45</td>
</tr>
</tbody>
</table>

(A1) There was similarity between pupils of the same class regarding their lack of positive feelings about their strategic action during the tasks. There was a noticeable percentage of pupils in each class who suggested that they had experienced neutral or negative feelings, but the obvious variety in the form that these affective metacognitive experiences had taken meant that, as a whole, there was little similarity between pupils of the same class regarding their feelings during the tasks.

(A2) There were some strong similarities between the three classes regarding pupils' feelings during the lessons. For example, all three classes had very few
pupils who experienced positive feelings. A noticeable percentage of pupils experienced negative feelings, although more so in the Control class and the Meta class than in the Meta+ class. However, the most striking similarity between the classes concerned the percentage of pupils who had suggested they did not have any form of affective metacognitive experience during the tasks. Although the percentage was far greater in the Meta+ class compared to the other two classes, a large percentage of pupils in all three classes claimed that they had no feelings, or implied that were unaware of any feelings, during the tasks.

General Area: Interactional Variables

Theme: Pupils' Volitional Control
Table 4.62A: Apple Year 7 pupils' references regarding their volitional control.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Volitional</td>
<td>70</td>
</tr>
<tr>
<td>No Volitional</td>
<td>56</td>
</tr>
<tr>
<td>Don't Know</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>30</td>
</tr>
</tbody>
</table>

(A1) While a majority of pupils in the Control class suggested that they had some degree of volitional control, a percentage of these same pupils must have also stated that they had no volitional control, stated that they were unaware of whether they had volitional control, or were unable to offer any idea of what volitional control they had. As such, there appeared to be inconsistencies within an individual pupil regarding their perceptions of their volitional control. Similar individual inconsistencies were also evident in the pupils of the Meta and the Meta+ classes. However, in these classes there was a greater percentage of pupils who were unable to suggest what volitional control they had, rather than, as in the Control class, a greater percentage of pupils who claimed to have volitional control. With such inconsistencies within a large
percentage of individual pupils it seemed apparent that there were going to be few similarities between pupils of the same class as a whole.

(A2) A much larger percentage of pupils in the Control class claimed to have some degree of volitional control compared with the other two classes. However, the opposite appeared true regarding the percentage of pupils who, at some time, were unable to suggest what volitional control they had. The percentage of such pupils in the Meta and the Meta+ classes was much greater than the percentage of such pupils in the Control class. Nevertheless, all three classes showed some similarity in that approximately half of each class claimed that, at some point during the tasks, they had no volitional control. Furthermore, all three classes were similar in that a notable percentage of pupils in each had shown an inconsistency in their perceptions of their volitional control.

Theme: The Wider Purpose of Physical Education

Table 4.63A: Apple Year 7 pupils' references regarding their perceptions of the purpose of Physical Education.
(A1) In each class there was a clear majority of pupils who suggested that a main purpose of Physical Education was to develop pupils' health and fitness. As such, there was a degree of similarity between pupils of the same class in this respect. Furthermore, in the Control class and the Meta class, the pupils' views of Physical Education were based on the development of the physical aspects of health and fitness and on the development of physical skills, as opposed to the development of the mental aspects of health and fitness and the development of mental skills. Indeed, pupils of the same class were similar in their perceptions that the purpose of Physical Education was to improve physical factors rather than mental factors such as understanding the principles behind Physical Education lessons. There was a large percentage of pupils in the Control class who stated that enjoyment was a purpose of Physical Education but this was not supported by the majority of the class. All three classes had a noticeable percentage of pupils who suggested that they were unaware of what purpose Physical Education had, or were unable to state what the purpose was. However, these percentages were not great enough to suggest strong similarities between pupils of the same class in this respect. However, it should be noted that there were not any pupils who claimed that Physical Education had no purpose and, therefore, pupils of the same class were similar in that they appreciated Physical Education had a purpose even if they were not necessarily aware of it.

(A2) The three classes were similar in that health and fitness was viewed as a main purpose of Physical Education by the pupils. Furthermore, each class had a large percentage of pupils who suggested that physical factors were more important than mental factors and, as such, the purpose of Physical Education was to develop physical health and fitness rather than develop mental appreciation of health and fitness, and to develop physical skills as opposed to mental skills. However, the Meta+ class did have a lower percentage of pupils who specifically acknowledged the physical aspects of health and fitness compared to the other classes, as more pupils appeared to have noted general factors and blended both physical and mental factors together. Indeed, the difference between the percentage of pupils who had noted physical skills and those who had noted mental skills was much less in this Meta+ class than it was in the other two classes. Other differences between the classes concerned the large percentage of pupils in the Control class who claimed that enjoyment was a main purpose of Physical Education, and the comparatively large percentage of pupils in the Meta class who were unaware of any purpose behind Physical Education lessons. Furthermore, although the percentages
were very small, more pupils in the Meta and the Meta+ classes, compared to the Control class, appeared to appreciate the social purpose behind Physical Education compared to the Control class. In addition, they had more pupils who suggested that a main reason for Physical Education in school was to satisfy other people or to comply to rules.

Theme: Pupils' Motivational Orientation

Table 4.64A: Apple Year 7 pupils' references regarding their motivational orientation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>St</td>
<td>Control %</td>
</tr>
<tr>
<td>Task</td>
<td>Wk</td>
<td></td>
</tr>
<tr>
<td>Ego</td>
<td>St</td>
<td>37</td>
</tr>
<tr>
<td>Ego</td>
<td>Wk</td>
<td>56</td>
</tr>
<tr>
<td>Social</td>
<td>St</td>
<td>7</td>
</tr>
<tr>
<td>Social</td>
<td>Wk</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>33</td>
</tr>
</tbody>
</table>

(A1) There appeared to be similarities between pupils of the same class regarding the suggestion that, at times, they had a task-oriented motivation and, more specifically, a strong task-oriented motivation. Furthermore, pupils of the same class were also similar in that they generally did not suggest a social motivational orientation. However, a large percentage of pupils in each class also implied that they had an ego-oriented motivation during the lesson or, indeed, failed to show any tendencies towards either motivational orientation. As such, pupils showed a degree of individual inconsistency with regard to their motivational orientation. Thus, there were three notable similarities between the pupils of the same class, firstly, most of the pupils suggested that they had a task-oriented motivation, secondly, most pupils failed to show a tendency towards a social motivational orientation, and thirdly, most pupils
implied that their perceptions of their motivational orientation were inconsistent.

(A2) All three classes were similar in that each showed a large percentage of pupils who suggested that, at times, they had a either a strong or weak task-oriented motivation. However, the percentage of such pupils was notably lower in the Meta+ class compared to the other two classes. With respect to ego-oriented motivation, all three classes showed a similar percentage of pupils who had suggested a strong ego-orientation at some time during the lessons. Yet, the Meta+ class showed a lower percentage of pupils, compared to the other classes, who implied that they had a weak ego-oriented motivation. The Meta+ class appeared irregular once more with an additional ten percent of pupils, compared to the other classes, who acknowledged a social-oriented motivation. Nevertheless, in general, the patterns in each class were similar, a task-oriented motivation had been suggested by a majority of pupils, there were individual inconsistencies regarding pupils' perceptions of their motivational orientation and a large percentage of pupils in each class, at times, failed to show any tendencies towards either motivational orientation or failed to offer any suggestions regarding motivational orientation.

Theme: Pupils' Locus of Control

Table 4.65A: Apple Year 7 pupils' references regarding their perceptions of the locus of control.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic</td>
<td>-</td>
<td>67</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>-</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>19</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>30</td>
<td>63</td>
<td>55</td>
</tr>
</tbody>
</table>
In all three classes, those pupils who suggested that they had an intrinsic locus of control were either in a weak majority or a slight minority. As such, there appeared to be slight differences between pupils of the same class in this respect. Indeed, the only notable similarity between the pupils of the same class concerned their suggestions that they did not have an extrinsic locus of control.

Although all three class showed a large percentage of pupils who implied that they had an intrinsic locus of control; those pupils in the Control class made up a majority, whereas those pupils in the other two classes made up minorities. The reverse appeared to be the case with respect to the percentage of pupils who were unable to offer any indication of their locus of control; the percentage of such pupils in the Meta and Meta+ classes being approximately double that in the Control class. However, all three classes showed strong similarities regarding the percentage of pupils who were unaware of their locus of control and the very low percentage of pupils who suggested that they had an extrinsic locus of control.
A large percentage of pupils in each class perceived themselves as having strong mental abilities and, thus, there appeared to be a degree of similarity between pupils of the same class in this respect. However, in general, there were no strong similarities between the pupils of the same class regarding their self-efficacy. Nevertheless, it was interesting that a large percentage of pupils in each class were either unaware of their strengths and weaknesses or were unable to offer any indication of their self-efficacy. In addition, when pupils appeared to be aware of any strengths or weaknesses they were definite strengths or definite weaknesses. There were very few pupils within a class who stated that they had a strength, such mental ability, but suggested that this strength was only slightly above average (Wk).
There were, in general, strong similarities between the three classes. All three classes suggested that over fifty percent of the pupils perceived themselves as having strong physical abilities. Each class had an even larger percentage of pupils who claimed to have strong mental abilities. With respect to both positive and mental ability, those pupils who claimed to have such abilities appeared confident that these abilities were good. As such, predictably, relatively few pupils in each class claimed to have weak physical or mental abilities. Further similarities were evident in the overall percentage of pupils who were unaware of their strengths and weaknesses or were unable to offer any indication of their self-efficacy. However, there appeared to be slight differences between the classes with respect to pupils' perceptions of their general abilities. Although each class had a relatively large percentage of pupils who made reference to general abilities, and more pupils perceived themselves as having positive general ability rather than negative general ability, the overall percentage of such pupils appeared less in the Control class than in the other two classes.

Theme: Self-Efficacy (strength).

Table 4.67A: Apple Year 7 pupils' references regarding the strength of their self-efficacy.

<table>
<thead>
<tr>
<th>Category</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>Positive Strength</td>
<td>- 44</td>
</tr>
<tr>
<td>Negative Strength</td>
<td>- 11</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>- 19</td>
</tr>
<tr>
<td>Unaware</td>
<td>- 0</td>
</tr>
<tr>
<td>Blank</td>
<td>- 25</td>
</tr>
</tbody>
</table>

(A1) There appeared to be some differences between pupils of the same class regarding the strength of their perceptions of whether they had the necessary abilities to complete the tasks. In the Control class there was a large percentage of pupils who strongly perceived that they had the abilities to complete the tasks, but these pupils were still in the minority. In the Meta and
the Meta+ classes there was approximately fifty percent of the pupils who were unable to offer any indication of how strongly they perceived their abilities to be. However, the percentages did not imply that there were strong similarities between pupils of the same class. Thus, all three classes appeared to consist of pupils who were different with regard to the strength of their self-efficacy.

(A2) In all three classes there was a relatively large percentage of pupils who either perceived themselves as having the necessary abilities to complete the tasks or, were unable to offer any indication of how strongly they perceived their abilities to be. However, whereas more pupils had strong, positive perceptions of their abilities in the Control class, more pupils in the other two classes were unable to provide any insight into the strength of their perceived self-efficacy. The most noticeable differences between the classes revolved around the comparatively higher percentage of pupils in the Control class who perceived their abilities as not good enough to complete the tasks, the comparatively higher percentage of pupils in the Control class whose answers were not applicable, and the comparatively higher percentage of pupils in the Meta+ class who were unaware of the strength of their abilities.

Theme: Self-Efficacy (generality)

Table 4.68A: Apple Year 7 pupils' references regarding the generality of their self-efficacy.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta+ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Generality</td>
<td></td>
<td>26</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>Negative Generality</td>
<td></td>
<td>26</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Not Applicable</td>
<td></td>
<td>15</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>33</td>
<td>52</td>
<td>41</td>
</tr>
</tbody>
</table>

(A1) There appeared to be little similarity between pupils of the same class with regard to their perceptions of the generality of their abilities. However, in the
Meta class the pupils did show some similarity in that none of them perceived that their abilities could not generalise to other tasks.

(A2) In general, there was a relatively strong similarity between the three classes with regard to pupils' perceptions of the generality of their abilities. There was a similar percentage of pupils in each class who positively perceived that their abilities would generalise across other tasks, and a similar percentage of pupils who were unable to offer any insight into the generality of their abilities. Very few pupils in any of the classes stated that they were unaware of the generality of their abilities, although a noticeable percentage of pupils in each class provided responses that were not applicable. The only notable difference between the classes concerned the percentage of pupils who did not perceive that their abilities could generalise across other tasks. There were no such pupils in the Meta class, whereas there was a noticeable percentage of such pupils in the other two classes.

Theme: General Self-Worth

Table 4.69A: Apple Year 7 pupils' references regarding their general self-worth.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td></td>
<td>22</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Negative but Aware</td>
<td>St</td>
<td>26</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Negative but Aware</td>
<td>Wk</td>
<td>30</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>19</td>
<td>19</td>
<td>38</td>
</tr>
</tbody>
</table>

(A1) All pupils of the same class had shown that if they had a negative self-worth they also had an awareness of their weaknesses. However, the relatively large and relatively similar percentage of pupils who either viewed themselves positively or viewed themselves negatively implied that there was not any
strong similarity between pupils of the same class regarding their general self-worth.

(A2) Each class followed a similar pattern regarding pupils' general self-worth. The majority of pupils in each class were aware of how they perceived themselves. In the Meta+ class more pupils perceived themselves positively, whereas in the other two classes more pupils perceived themselves negatively. Each class was similar in that the percentage of pupils who had a strong negative view of themselves was approximately the same as the percentage of pupils who had a less intense negative view of themselves. Interestingly, there was a greater percentage of pupils in the Meta+ class, compared with the other two classes, who were unable to offer an insight into their self-worth.

Theme: Motivational Climate
Table 4.70A: Apple Year 7 pupils' references regarding their perceptions of the motivational climate during the lesson.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>St</td>
<td>81</td>
<td>81</td>
<td>55</td>
</tr>
<tr>
<td>Task</td>
<td>Wk</td>
<td>48</td>
<td>52</td>
<td>17</td>
</tr>
<tr>
<td>Ego</td>
<td>St</td>
<td>78</td>
<td>52</td>
<td>45</td>
</tr>
<tr>
<td>Ego</td>
<td>Wk</td>
<td>11</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td>4</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>7</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>22</td>
<td>52</td>
<td>69</td>
</tr>
</tbody>
</table>

(A1) Within each of the classes it was apparent that pupils had shown a degree of inconsistency in their perceptions of the motivational climate. Thus, it was inevitable that it would appear as though there were differences between pupils of the same class. Nevertheless, it was evident that most pupils were aware of a motivational climate at some point and most pupils suggested that the climate was not neutral.
It appeared that the Meta+ class was sometimes irregular in comparison to the other two classes; the Meta+ class had a lower percentage of pupils who suggested that the motivational climate was task-oriented and a lower percentage of pupils who stated that the motivational climate was ego-oriented compared to the other classes. However, the pattern that there were more pupils who suggested that the climate was strong as opposed to weak, be it task- or ego-oriented, was similar between all three classes. Furthermore, the pattern that more pupils viewed the climate as being strongly task-oriented rather than strongly ego-oriented was also similar between all three classes. In addition, it would seem that pupils from all three classes were, at least sometimes, aware of the motivational climate and perceived it not to be neutral.

4.1.6 Part Two Main Study: Comparison Between Pupils' Pre-Intervention and Post-Intervention Metacognitive Ability (Objectives B1 to B4)

4.1.6.1 The Overall Focus

For clarity,
- Apple Year 7, Apple Year 9 and Yard Year 7 were involved in the overall focus of the Part Two Main Study Comparison Between Pupils' Pre-Intervention and Post-Intervention Metacognitive Ability
- An indication of the relevant general area precedes each section and an indication of the relevant theme, category and category scale precedes the presentation of each table.
- Objectives (B1) to (B4) are assessed separately directly after the presentation of each table.
- With regard to the difference between pre- and post-intervention questionnaires, a minus sign indicates that a greater percentage of pupils referred to the specified category and category scale in the post-intervention questionnaire compared to the pre-intervention questionnaire. Where there is no minus sign in the difference row, the reverse was the case.
- Within each table, the value zero (0) percent signifies that there were no pupils in the relevant class who referred to the specified category and category scale.
General Area: Metacognitive Knowledge of Task Variables

Table 4.01B: Pupils suggesting that the purpose of the task was the development of specific physical skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>-</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>11</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>11</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>11</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>11</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) There appeared to be a relative similarity between pupils of the same class regarding their poor appreciation that a purpose of the tasks was to develop specific physical skills.

(B2) The Meta classes and the Meta+ classes, of each Year and school, consistently suggested that there were no improvements in any pupils' appreciation that a purpose of the tasks was to develop specific physical skills. There was a slight increase in the Year 7 Control classes regarding the percentage of pupils who acknowledged that specific physical skills were being developed, but it still appeared that most pupils did not have such appreciation.

(B3) In general, there was very little difference between the Apple Year 7 and the Apple Year 9 classes regarding the percentage of pupils who appreciated that a purpose of the tasks was to develop specific physical skills. However, Apple...
Year 9 had shown a decrease in the percentage of such pupils that was not as evident in Apple Year 7, although the Apple Year 9 classes had shown a greater percentage of such pupils, compared to the Apple Year 7 classes, prior to the intervention.

(B4) There was a striking similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who appreciated that a purpose of the tasks was to develop specific physical skills. There was a very low percentage of such pupils in each class and, whereas the percentage of such pupils either decreased or remained the same in both of the Meta classes and in both of the Meta+ classes, it increased slightly in both Control classes.

Theme: The Desired Outcomes and Purpose of the Task
Category & Scale: Mental Skills (S)
Table 4.02B: Pupils suggesting that the purpose of the task was the development of specific mental skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>0</td>
<td>Control %</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post -intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>7</td>
<td>29</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post -intervention</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post -intervention</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) It appeared that there was a similarity between pupils of the same class regarding their very poor appreciation that a purpose of the tasks was to develop specific mental skills.
(B2) There was no difference between the classes of the same school in Year 7 regarding the percentage of pupils who showed some appreciation that a purpose of the tasks was to develop specific mental skills. However, there was a slight difference between the Apple Year 9 classes in this respect, as the Control class appeared to show a slight increase in the percentage of such pupils, whereas the Apple Year 9 Meta and Meta+ classes, in contrast, showed a large decrease in the percentage of such pupils.

(B3) Following the intervention there was, in general, very little difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who appreciated that a purpose of the tasks was to develop specific mental skills. However, prior to the intervention there had been a difference between the Meta classes and the Meta+ classes from each Year in this respect. The new found similarity was due to the large decrease in the percentage of such pupils in Apple Year 9.

(B4) There appeared to be a strong similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who appreciated that a purpose of the tasks was to develop specific mental skills. Prior to the intervention there had been a very low percentage of such pupils in each class and this remained unchanged following the intervention.
Theme: The Influences Upon the Task
Category & Scale: Intrinsic Physical (S)
Table 4.03B: Pupils suggesting that there were some specific intrinsic physical influences upon the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>41</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>71</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>47</td>
</tr>
</tbody>
</table>

(B1) Prior to the intervention, most of the classes appeared to have a majority of pupils who acknowledged some specific intrinsic physical influences during the tasks, but, following the intervention, most of the classes showed a minority of such pupils. However, each minority was only a slight minority and, hence, there still appeared to be a difference between pupils of the same class regarding their awareness of specific intrinsic physical influences during the tasks.

(B2) There appeared to be a degree of similarity between classes of the same Year and school regarding the change in the percentage of pupils who identified some specific intrinsic physical influences during the tasks. Prior to the intervention, each trio of classes appeared to have one class that had a different percentage of such pupils compared to the other two classes. This remained unaltered following the intervention as each class in the same Year and school appeared to show a decrease, of a similar size, in the percentage of pupils who identified some specific intrinsic physical influences during the
tasks. The Apple Year 9 Control class was the exception, as it showed a smaller decrease in the percentage of such pupils compared to the Meta and Meta+ classes.

(B3) Following the intervention, the Apple Year 7 classes and the Apple Year 9 classes had, as a whole, shown a greater similarity regarding the percentage of pupils who identified some intrinsic physical influences during the tasks. However, the Apple Year 7 Meta+ class, which had previously shown a lower percentage of such pupils in comparison to all of the other Apple classes, remained isolated. Similarly, the Apple Year 9 Control class which had shown a comparatively high percentage of such pupils, remained isolated at the opposite extreme. Nevertheless, all of the classes in Apple appeared to show a decrease in the percentage of pupils who acknowledged some intrinsic physical influences during the tasks and, therefore, each class showed a degree of similarity regarding their response to the intervention.

(B4) There appeared to be little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who identified some intrinsic physical influences during the tasks. Prior to the intervention, each class had shown a relatively similar percentage of such pupils and, in general, this changed very little following the intervention. However, it was noticeable that the Yard Year 7 classes showed a slightly smaller decrease in the percentage of such pupils in comparison to the decrease in the Apple Year 7 classes.
Theme: The Influences Upon the Task
Category & Scale: Extrinsic Physical (S)
Table 4.04B: Pupils suggesting that there were some specific extrinsic physical influences upon the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>52</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>41</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre &amp; Post - intervention</td>
<td>(D)</td>
<td>11</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>41</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>36</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre &amp; Post - intervention</td>
<td>(D)</td>
<td>5</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>21</td>
<td>41</td>
<td>29</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>20</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre &amp; Post - intervention</td>
<td>(D)</td>
<td>1</td>
<td>12</td>
<td>-2</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Meta +</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metacognitive Strategy Class</td>
</tr>
<tr>
<td></td>
<td>Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variability and Cognitive Strategy Class</td>
</tr>
</tbody>
</table>

(B1) It appeared that, in most classes, the percentage of pupils who had identified some specific extrinsic physical influences during the tasks had changed very little following the intervention; there appeared to be a very slight decrease in the percentage of such pupils. Thus, it still appeared that there was a difference between pupils of the same class regarding their appreciation of specific extrinsic physical influences during the tasks.

(B2) Although most classes of the same Year and school showed a decrease in the percentage of pupils who suggested some specific extrinsic physical influences during the tasks, there did not seem to be any pattern with respect to the size of the decrease. Yet, following the intervention, the classes of the same Year and school did seem to show a greater similarity regarding the percentage of such pupils. Nevertheless, three classes did appear slightly irregular when compared to the other classes in the same Year and school; the Apple Year 9 Meta class showed no difference in the percentage of such pupils following the intervention, the Apple Year 9 Meta+ class showed the
largest decrease in the percentage of such pupils, and the Yard Year 7 Meta+ class showed the only increase in the percentage of such pupils.

(B3) In general, the classes in both Apple Year 7 and Apple Year 9 showed a small decrease in the percentage of pupils who acknowledged some specific extrinsic physical influences during the tasks. However, the size of the decrease in each class varied more between the Apple Year 9 classes than between the Apple Year 7 classes.

(B4) Whereas the Apple Year 7 classes suggested a relatively consistent decrease in the percentage of pupils who identified some specific extrinsic physical influences during the tasks, the Yard Year 7 classes seemed to vary in their response to the intervention; the Control class maintained a similar percentage of such pupils, the Meta class showed a decrease in the percentage of such pupils, and the Meta+ class actually suggested a slight increase in the percentage of such pupils.

Theme: The Influences Upon the Task
Category & Scale: Intrinsic Mental (S)
Table 4.05B: Pupils suggesting that there were some specific intrinsic mental influences upon the task.
As a whole, there had been little change in the percentage of pupils who identified some specific intrinsic mental influences following the intervention; such pupils remained in the minority. However, there was a variation between classes regarding whether the percentage of pupils had stayed the same, had decreased or had increased. Hence, there were classes, such as the Yard Year 7 Control class, that maintained a strong similarity between pupils regarding their poor appreciation of the specific intrinsic mental influences during the tasks. There were also classes, such as the Apple Year 9 Meta class, that showed a decrease in the percentage of such pupils, which, in turn, increased the similarity between pupils of these classes regarding their poor appreciation of the specific intrinsic mental influences during the tasks. However, there were classes, such as the Apple Year 9 Meta+ class, that appeared to have an increase in the percentage of pupils who identified some specific intrinsic mental influences and, as such, a greater difference between pupils of these classes was suggested regarding their appreciation of the specific intrinsic mental influences during the tasks.

Following the intervention, there appeared to be a greater consistency between the three Apple Year 7 classes regarding the percentage of pupils who had suggested some specific intrinsic mental influences during the tasks. There remained a minority of such pupils in each class but both the Meta and Meta+ classes showed an increase in the percentage of such pupils, while the Control class maintained exactly the same percentage of such pupils. The Apple Year 9 classes also showed a greater consistency following the intervention; both the Control and Meta classes showed a decrease in the percentage of pupils who suggested some specific intrinsic mental influences during the tasks, while the Meta+ class showed a clear increase in the percentage of such pupils. Notably, the increase in the percentage of such pupils in the Meta+ class had meant that the Meta+ class was more likely to include pupils who showed some awareness of the specific intrinsic mental influences during the tasks compared to the other two classes, even though, prior to the intervention, it had been the least likely. Finally, the percentage of pupils who showed some awareness of the specific intrinsic mental influences during the tasks, in Yard Year 7, was so small that there was very little difference between the three classes either prior to or following the intervention.
(B3) Prior to the intervention there had been a consistently greater percentage of pupils in the Apple Year 9 classes who identified some specific intrinsic mental influences during the tasks compared to the Apple Year 7 classes. However, following the intervention the Apple Year 9 Control and Meta classes both showed a decrease in the percentage of such pupils, whereas the Apple Year 7 Control and Meta classes maintained the same percentage of such pupils and increased the percentage of such pupils respectively. Both the Apple Year 7 and Apple Year 9 Meta+ classes showed an increase in the percentage of such pupils, although the increase was more noticeable in the Year 9 class compared to the Year 7 class. As a result of the intervention it appeared that there was a decrease in the difference between Apple 7 and Apple Year 9 classes regarding the percentage of pupils who identified some specific intrinsic mental influences during the tasks.

(B4) Prior to the intervention the Apple Year 7 classes had shown a greater percentage of pupils who identified some specific intrinsic mental influences during the tasks compared to the Yard Year 7 classes. Following the intervention these differences were increased further. Neither Control class appeared to show any real change in the percentage of such pupils, but while there was also no change in the percentage of such pupils in the Yard Year 7 Meta and Meta+ classes, there was an increase in the percentage of such pupils in the corresponding Apple Year 7 classes.
The percentage of pupils who suggested some specific extrinsic mental influences during the tasks implied that there may have been a possible difference between pupils of the same class regarding their appreciation of such influences upon the tasks. However, there did appear to be a general increase in the percentage of pupils who suggested some specific extrinsic mental influences in each class following the intervention. Thus, in certain classes, such as the Apple Year 7 Meta class, the increase in the percentage of such pupils had meant that there was no longer similarity between pupils of those classes regarding their low awareness of specific intrinsic mental influences. Yet, in other classes, such as the Apple Year 9 Meta+ class, the increase in the percentage of such pupils had meant that there was a stronger similarity between pupils of those classes regarding their good appreciation of specific intrinsic mental influences.

(B2) Following the intervention it appeared that most of the classes showed an increase in the percentage of pupils who appreciated that there were going to
be some specific extrinsic mental influences during the tasks. Furthermore, the variation in the size of this increase had meant that there appeared to be a greater consistency between classes of the same Year and school regarding the percentage of such pupils. For example, in Yard Year 7 the range in the percentage of such pupils between the three classes had previously been seventeen percent, yet following the intervention, the range had decreased to four percent. In Apple Year 7 there was a difference between the response of the three classes to the intervention; there had been no change in the percentage of pupils who appreciated that there were specific extrinsic mental influences during the tasks in the Control class, whereas both the Meta and the Meta+ classes showed a dramatic increase in the percentage of such pupils. Notably, both the Apple Year 7 Meta and Meta+ classes had previously shown a lower percentage of such pupils compared to the Control class, yet following the intervention, they both showed a higher percentage of such pupils; the most striking change being in the Meta class. Although all three of the Apple Year 9 classes showed an increase in the percentage of pupils who appreciated some of the specific extrinsic mental influences during the tasks, it was the Control class that showed the greatest increase. Prior to the intervention, the Control class had shown the lowest percentage of such pupils, but the increase in the percentage of such pupils following the intervention was dramatic, and made the range in the percentage of such pupils between the three Apple Year 9 classes smaller. Interestingly, the Apple Year 9 Meta+ class had a greater increase in the percentage of pupils who appreciated some of the specific extrinsic mental influences during the tasks compared to the Meta class. In Yard Year 7 there was only a very small change in the percentage of such pupils within the Control and Meta+ classes, while the Meta class showed a dramatic increase in the percentage of such pupils, making the three classes appear much more similar regarding the percentage of pupils who appreciated some of the specific extrinsic mental influences during the tasks.

(B3) The Apple Year 9 Control and Meta+ classes showed a greater increase in the percentage of pupils who appreciated some of the specific extrinsic mental influences during the tasks compared to the corresponding Apple Year 7 classes. As such, the difference between these classes, that had been suggested prior to the intervention, was increased further. However, while the difference between the Apple Year 7 and the Apple Year 9 Meta classes regarding the percentage of such pupils remained large, it was notably reduced.
Following the intervention, the Yard Year 7 classes still appeared to have a greater percentage of pupils who appreciated that there were specific extrinsic mental influences during the tasks compared to the Apple Year 7 classes. Indeed, both of the Control classes showed no notable increase in the percentage of such pupils, while there was an increase of, approximately, twenty-five percent of such pupils in both of the Meta classes. However, while the Yard Year 7 Meta+ class changed very little, the Apple Year 7 Meta+ showed an increase in the percentage of pupils who noted some specific extrinsic mental influences during the tasks, which, in turn, increased the similarity between the two Year 7 Meta+ classes regarding the percentage of such pupils.

Theme: The Abundancy and Organisation of the Information
Category & Scale: Enough
Table 4.07B: Pupils suggesting that there was an adequate abundancy of information.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>2</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>93</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>7</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>87</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>2</td>
</tr>
</tbody>
</table>

(B1) There appeared to be little difference between pupils of the same class regarding the percentage of pupils who appreciated that there was enough information available during the tasks. Prior to the intervention most pupils seemed to appreciate the abundancy of information and this was maintained
following the intervention. Furthermore, the Apple Year 7 Meta+ class had shown a dramatic increase in the percentage of such pupils and, thus, also increased the similarity between pupils within this class regarding their appreciation of the abundancy of information. However, the Yard Year 7 Meta+ class showed a decrease in the percentage of such pupils and indicated that there was a possible difference between pupils of this class regarding their views on the abundancy of information.

(B2) Following the intervention, the Apple Year 7 classes showed a greater similarity regarding the percentage of pupils who suggested that there was enough information available during the tasks. However, this similarity emerged as there was relatively no increase in the percentage of such pupils in the Control and Meta classes, whereas there was a striking increase in the percentage of such pupils in the Meta+ class. There was very little change in the percentage of such pupils in the Apple Year 9 classes as most pupils continued to appreciate that there was an adequate abundancy of information. In the Yard Year 7 classes, where there had previously been a degree of similarity between the classes regarding the percentage of such pupils, a difference was evident following the intervention. Notably, the Control and Meta classes actually showed a greater similarity regarding the percentage of pupils who acknowledged that enough information had been made available during the tasks, but the Meta+ class showed a large decrease in the percentage of such pupils, thereby breaking the overall similarity between the three Yard Year 7 classes.

(B3) While the Apple Year 9 classes maintained a greater percentage of pupils who appreciated that there was an adequate abundancy of information during the tasks compared to the Apple Year 7 classes, the difference between them was notably reduced. The slight increase in the percentage of such pupils in the Apple Year 7 Meta class, and the dramatic increase in the percentage of such pupils in the Apple Year 7 Meta+ class, had clearly helped to increase the similarity between Apple Year 7 and Year 9 classes.

(B4) Both of the Year 7 Control classes and the Year 7 Meta classes showed a very similar percentage of pupils who acknowledged that there had been enough information available during the tasks. However, there was a distinctive difference between the two Meta+ classes regarding the percentage of such pupils. Prior to the intervention, the Apple Year 7 Meta+ class suggested that a relatively low percentage of pupils appreciated the adequate abundancy of
information during the tasks. However, following the intervention there was a dramatic increase in the percentage of such pupils. The Yard Year 7 Meta+ class had previously shown that a high percentage of pupils who appeared to appreciate the adequate amount of information that was available during the tasks, but, following the intervention, there was a dramatic decrease in the percentage of such pupils. Therefore, while both of the Meta+ classes showed a considerable change in the percentage of such pupils following the intervention, one changed positively and one changed negatively.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention (D)</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>4</td>
<td>54</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>11</td>
<td>37</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention (D)</td>
<td>4</td>
<td>43</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention (D)</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

(B1) Following the intervention, there continued to be a very small percentage of pupils who noted the importance of a specific activity principle during the tasks. Interestingly, the Apple Year 7 Meta class and the Yard Year 7 Meta+ class did show very small signs that there was a greater percentage of such pupils compared to before the intervention, but the increase was far from dramatic. Prior to the intervention, only the Apple Year 9 Meta and Meta+ classes had shown a clear percentage of pupils who acknowledged an activity
principle involved in the tasks but, following the intervention, the Apple Year 9 Meta class showed a decrease in the percentage of such pupils and the Apple Year 9 Meta+ class showed no noticeable change in the percentage of such pupils. Hence, following the intervention, there seemed to be a similarity between pupils of the same class regarding their poor awareness of the specific activity principles involved in the tasks.

(B2) Both prior to, and following, the intervention, there was a similarity between the Year 7 classes of the same school regarding the very low percentage of pupils who acknowledged an activity principle involved in the tasks. However, it was noticeable that the Apple Year 7 Meta class and the Yard Year 7 Meta+ class showed small signs of an increase in the percentage of such pupils. In Apple Year 9 the percentage of such pupils altered very little in both the Control class and the Meta+ class and, therefore, the relatively large difference between the classes regarding the percentage of pupils who acknowledged an activity principle involved in the tasks remained. However, the Apple Year 9 Meta class showed a dramatic decrease in the percentage of such pupils, which increased the similarity between the Control class and Meta class considerably.

(B3) There was no difference between the Apple Year 7 and the Apple Year 9 Control classes regarding the percentage of pupils who acknowledged an activity principle involved in the tasks. Following the intervention neither class suggested having any such pupils. However, while the Apple Year 7 Meta class showed an increase in the percentage of such pupils, the Apple Year 9 Meta class showed a dramatic decrease in the percentage of such pupils. As a result, following the intervention both of the Meta classes showed a similarity regarding the percentage of pupils who acknowledged an activity principle involved in the tasks. Neither of the Meta+ classes showed a change in the percentage of such pupils but, whereas this meant that no pupils in the Apple Year Meta+ 7 class had any appreciation of a specific activity principle, over a third of the pupils in the Year 9 Meta+ class had some appreciation of a specific activity principle involved in the tasks.

(B4) There was a similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the very low percentage of pupils who acknowledged a specific activity principle involved in the tasks. Furthermore, following the intervention, the Apple Year 7 Meta class and the Yard Year 7 Meta+ class did show similar signs of an increase in the percentage of such pupils.
The Demands of the Task

Table 4.09B: Pupils suggesting that specific physical properties were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>15</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>41</td>
<td>44</td>
<td>55</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>26</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>21</td>
<td>36</td>
<td>26</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>16</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>21</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>13</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>8</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>

Legend

Meta: Metacognitive Strategy Class
Meta+: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class

(B1) Both prior to and following the intervention, those pupils who suggested that specific physical properties were required to complete the tasks were in the minority. In Apple Year 7 it appeared that there was a possible difference between pupils within each class regarding their appreciation that the tasks had placed demands on their physical properties. Such a difference was not evident prior to the intervention where pupils had shown a similar lack of appreciation regarding what physical properties were required to complete the tasks. Although there was a slight change in the Apple Year 9 classes regarding the percentage of such pupils, these pupils were still in a slight minority and, thus, it seemed that there may still be a difference between pupils within each class regarding their appreciation of the interaction between task demands and their physical properties. In Yard Year 7, each class had a small percentage of pupils who appreciated that the tasks had placed demands on their physical properties, which implied that there was a degree of similarity between pupils within each class regarding their poor awareness; a similarity that was not as evident prior to the intervention.
A similarity between the classes of the same Year and school regarding the percentage of pupils who appreciated that the tasks had placed demands on their physical properties was maintained following the intervention. The Apple Year 7 classes all showed a considerable increase in the percentage of such pupils, the range in the percentage of such pupils between the Apple Year 9 classes remained approximately the same, and the range in the percentage of such pupils between the Yard Year 7 classes actually decreased slightly. Interestingly, in both Apple Year 9 and Yard Year 7 each class did vary in its response to the intervention. The Apple Year 9 Control class, which had previously shown a higher percentage of pupils who appreciated that the tasks had placed demands on their physical properties compared to the other Apple Year 9 classes, showed the lowest percentage of such pupils following the intervention. Furthermore, the Meta class which had previously shown the lowest percentage of such pupils showed the highest percentage of such pupils following the intervention; the Meta class was the only Apple Year 9 class that showed an increase in the percentage of such pupils. Similarly, in Yard Year 7, the Meta class was the only class to show an increase in the percentage of pupils who appreciated that the tasks had placed demands on their physical properties.

Prior to the intervention, the Apple Year 7 classes had shown a lower percentage of pupils who appreciated that the tasks had placed demands on their physical properties in comparison to the Apple Year 9 classes. However, following the intervention the Apple Year 7 classes consistently showed a greater percentage of such pupils compared to the Apple Year 9 classes. All of the Apple Year 7 classes showed an increase in the percentage of pupils who appreciated that the tasks had placed demands on their physical properties, whereas in Apple Year 9 it was only the Meta class that showed any increase in the percentage of such pupils; the Control and Meta+ classes showed a decrease in the percentage of such pupils.

There was a noticeable difference between the Apple Year 7 and the Yard Year 7 classes regarding the percentage of pupils who appreciated that the tasks had placed demands on their physical properties. Prior to the intervention, both the Apple Year 7 classes and the Yard Year 7 classes suggested that most pupils lacked any awareness that specific physical properties were required to complete the tasks. However, while this situation was maintained in the Yard Year 7 classes following the intervention, there
was an increase in the percentage of pupils who appreciated that the tasks had placed demands on their physical properties in the Apple Year 7 classes.

**Theme:** The Demands of the Task

**Category & Scale:** Mental Properties (S)

**Table 4.10B:** Pupils suggesting that specific mental properties were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>7</td>
<td>0</td>
<td>-16</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) Prior to the intervention there was a very low percentage of pupils who appreciated that the tasks had placed demands on their mental properties. Such poor appreciation and awareness did not change following the intervention and only the Apple Year 9 Meta+ class showed any sign that there was an increase in the percentage of such pupils. Therefore, it appeared that pupils of the same class were very similar in their poor appreciation of specific mental properties and the demands placed upon them during the tasks.

(B2) There was a strong similarity between classes of the same Year and school regarding the poor percentage of pupils who appreciated that the tasks had placed demands on their mental properties. The only exception may have been the Apple Year 9 classes where it appeared that the Meta+ class showed an
increase in the percentage of such pupils that was not matched in either the Control class or the Meta class.

(B3) There was a similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the poor percentage of pupils who were aware of the demands being placed upon their mental properties. The only difference between Apple Year 7 and Apple Year 9 appeared to involve the Meta+ classes; while the Apple Year 7 Meta+ class remained with no pupils who appreciated that the tasks had placed demands on their mental properties, the Apple Year 9 Meta+ class showed a slight increase in the percentage of such pupils.

(B4) With no pupils in Year 7 specifically acknowledging that the tasks had placed demands on their mental properties, there was no difference between the Apple Year 7 classes and the Yard Year 7 classes regarding pupils' awareness of their mental properties.

Theme: The Demands of the Task
Category & Scale: Physical Processes (S)
Table 4.11B: Pupils suggesting that specific physical processes were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>22</td>
<td>Control %</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>18</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>60</td>
<td>36</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>-28</td>
</tr>
</tbody>
</table>

Legend:

<table>
<thead>
<tr>
<th>Meta</th>
<th>Metacognitive Strategy Class</th>
</tr>
</thead>
</table>

| Meta+ | Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class |
(B1) There remained a relatively low percentage of pupils who appreciated that the tasks had placed demands upon physical processes in the Apple classes. Indeed, in the Apple Year 7 and Apple Year 9 classes the percentage of such pupils actually decreased, and it appeared that pupils of these classes showed similarity in their poor awareness of the interaction between task demands and physical processes. However, each Yard Year 7 class showed an increase in the percentage of pupils who appreciated that the tasks had placed demands upon physical processes, and the increase was dramatic enough to suggest that pupils from these classes could not be generalised as having poor awareness of the interaction between task demands and physical processes. The Yard Year 7 Control class even showed a majority of pupils who appeared to acknowledge that demands had been placed on specific physical processes during the tasks.

(B2) Following the intervention, there was a similarity between the classes of the same Year in Apple regarding the poor percentage of pupils who appreciated that the tasks had placed demands upon physical processes. However, in Yard Year 7 each class showed a similar increase in the percentage of pupils who had some awareness of the demands placed upon physical processes and, thus, the relatively large range in the percentage of such pupils between the three Yard Year 7 classes remained.

(B3) Prior to the intervention, there had been a consistent and noticeable difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who appreciated that the tasks had placed demands upon physical processes. The difference remained following the intervention, even though the Apple Year 7 classes showed a decrease in the percentage of such pupils which reduced the size of the difference. Moreover, as well as the difference being reduced between Year 7 and Year 9 there was a pattern within all of the Apple classes that, in general, very few pupils were aware of the demands placed upon specific physical processes during the tasks.

(B4) Prior to the intervention, the Apple Year 7 classes had a slightly greater percentage of pupils who appreciated that the tasks had placed demands upon physical processes compared to the Yard Year 7 classes. However, following the intervention, all of the Apple Year 7 classes appeared to have a decrease in the percentage of such pupils, while there was a large increase in the percentage of such pupils in the Yard Year 7 classes. As such, the direction of
the difference reversed in favour of Yard Year 7 and the difference became consistent and considerable.

Theme: The Demands of the Task
Category & Scale: Mental Processes (S)
Table 4.12B: Pupils suggesting that specific mental processes were required for the completion of the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-&amp; Post-intervention</td>
<td>(D)</td>
<td>0</td>
<td>-4</td>
<td>-3</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>19</td>
<td>21</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>0</td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-&amp; Post-intervention</td>
<td>(D)</td>
<td>19</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-&amp; Post-intervention</td>
<td>(D)</td>
<td>-7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) Most pupils were unaware of the mental processes required to complete the tasks and, as such, there was a similarity between pupils of the same class regarding the poor appreciation that the tasks had placed demands upon their mental processes.

(B2) There was a similarity between classes of the same Year and school regarding the poor percentage of pupils who appreciated that the tasks had placed demands upon mental processes. However, there was a slight difference between the response of each class to the intervention. In Apple Year 7, both the Meta class and the Meta+ class showed a slight increase in the percentage of pupils who were aware of the mental processes required for the completion of the tasks, whereas the Control class remained without any pupils having such awareness. In Apple Year 9, while the Control class and the Meta class
showed a notable decrease in the percentage of pupils who appreciated that the tasks had placed demands upon mental processes, the Meta+ class maintained the same percentage of such pupils. In Yard Year 7 the Control class showed a very slight increase in the percentage of such pupils, whereas the Meta and Meta+ classes continued to show that no pupils had any appreciation that the tasks had placed demands upon their mental processes.

(B3) Prior to the intervention, the Apple Year 9 classes had a consistently greater percentage of pupils who appreciated that the tasks had placed demands upon mental processes compared to the Apple Year 7 classes. However, following the intervention, the corresponding Control, Meta and Meta+ classes in each Year were relatively similar with respect to the percentage of such pupils. This similarity was mainly due to the Apple Year 9 Control and Meta classes showing a decrease in the percentage of such pupils, and the Apple Year 7 Meta class showing a slight increase in the percentage of such pupils. Notably, both the Apple Year 7 and the Apple Year 9 Meta+ classes showed a very slight increase in the percentage of pupils who appreciated that the tasks had placed demands upon mental processes.

(B4) In general, there was a strong similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the poor percentage of pupils who appreciated that the tasks had placed demands upon mental processes. However, it is noticeable that, while the Apple Year 7 Meta and Meta+ classes indicated that more pupils had become aware of the mental processes required for the tasks, the corresponding classes in Yard Year 7 remained without any pupils showing such awareness. Instead, it was the Control class in Yard Year 7 that showed an increase in the percentage of pupils who appreciated that the tasks had placed demands upon mental processes.
Theme: The Pupils’ Feelings During the Task
Category & Scale: Positive + Negative Feelings
Table 4.13B: Pupils suggesting that they had experienced either positive or negative feelings during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>48</td>
<td>60</td>
<td>38</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>59</td>
<td>36</td>
<td>62</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre &amp; Post-intervention</td>
<td>(D)</td>
<td>-11</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>78</td>
<td>72</td>
<td>69</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>61</td>
<td>61</td>
<td>85</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre &amp; Post-intervention</td>
<td>(D)</td>
<td>-17</td>
<td>11</td>
<td>-16</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>95</td>
<td>71</td>
<td>81</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>73</td>
<td>92</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre &amp; Post-intervention</td>
<td>(D)</td>
<td>22</td>
<td>-21</td>
<td>12</td>
</tr>
</tbody>
</table>

(B1) Following the intervention there remained a majority of pupils who had acknowledged having either positive or negative feelings during the tasks, although, in general, this majority was relatively small. As such, it appeared that there was a difference between pupils of the same class regarding their awareness of their feelings during the tasks. The major exceptions seemed to be the Apple Year 9 Meta+ class and the Yard Year 7 Meta class, as both classes suggested an increase in the percentage of pupils who showed some awareness of their positive or negative feelings during the tasks, which, as a result, suggested a similarity between pupils within each class regarding their awareness of their feelings.

(B2) The classes within each Year and school that had previously suggested the lowest percentage of pupils who showed some awareness of their positive or negative feelings during the tasks, appeared to show the highest percentage of such pupils following the intervention. In Apple Year 7 and Apple Year 9 it appeared to be the Meta+ class, whereas in Yard Year 7 it appeared to be the
Meta class. Therefore, while there remained a relatively consistent range in the percentage of pupils who were aware of their feelings between the classes of the same Year and school, there was a variation in whether classes indicated an increase or a decrease in the percentage of such pupils.

(B3) Both the Apple Year 7 and the Apple Year 9 Meta+ classes showed an increase the percentage of pupils who acknowledged their positive or negative feelings during the tasks. However, whereas the increase in the percentage of such pupils did not alter the similarity between the three Apple Year 7 classes, it clearly reduced the similarity between the three Apple Year 9 classes. Notably, both of the Meta classes showed a decrease in the percentage of pupils who acknowledged their positive or negative feelings during the tasks. Yet, while the Year 9 Control class suggested a similar decrease in the percentage of such pupils, the Apple Year 7 Control class showed an increase in the percentage of such pupils. Hence, following the intervention, the Control classes eventually showed a degree of similarity regarding the percentage of pupils who acknowledged their positive or negative feelings during the tasks.

(B4) The Apple Year 7 Control and Meta+ classes both suggested that there had been an increase in the percentage of pupils who acknowledged their positive or negative feelings during the tasks. However, there was a decrease in the percentage of such pupils in the corresponding Yard Year 7 classes, which resulted in the Control classes and the Meta+ classes from each school showing a greater similarity. However, the difference between the Apple Year 7 Meta class and the Yard Year 7 Meta class was magnified following the intervention; the Apple Year 7 class showed a decrease in the percentage of pupils who acknowledged their positive or negative feelings during the tasks, whereas the Yard Year 7 Meta class showed a large increase in the percentage of such pupils.
The Pupils’ Feelings During the Task

Table 4.14B: Pupils suggesting that they had experienced positive feelings during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>15</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>37</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-22</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>41</td>
<td>29</td>
<td>38</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>54</td>
<td>25</td>
<td>74</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-13</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>33</td>
<td>21</td>
<td>54</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>1</td>
<td>3</td>
<td>25</td>
</tr>
</tbody>
</table>

Legend:

<table>
<thead>
<tr>
<th>Meta</th>
<th>Metacognitive Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met +</td>
<td>Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class</td>
</tr>
</tbody>
</table>

(B1) Following the intervention there continued to be a possible difference between pupils of the same class regarding their experience of any positive feelings during the tasks. Most classes either had a slight majority of such pupils or a slight minority of such pupils, and it was noticeable that many of the classes showed an increase in the percentage of pupils who had experienced some positive feelings during the tasks.

(B2) There appeared to be less similarity between the classes of the same Year and school following the intervention. The Meta+ classes in each Year and school showed a dramatic increase in the percentage of pupils who indicated that they had positive feelings during the tasks, the Meta classes in each Year and school maintained approximately the same percentage of such pupils, while the Control classes showed an increase in the percentage of such pupils in Apple and a decrease in the percentage of such pupils in Yard. Therefore, the range in the percentage of pupils who experienced some positive feelings during the tasks widened between the classes of the same Year and school.
(B3) Apple Year 9 maintained a consistently higher percentage of pupils in each class who experienced positive feelings compared to the Apple Year 7 as they both responded similarly following the intervention. Both of the Control classes showed a similar increase in the percentage of such pupils, both of the Meta classes maintained approximately the same percentage of such pupils, and both of the Meta+ classes showed a dramatic increase in the percentage of such pupils.

(B4) Prior to the intervention, it appeared that the Yard Year 7 classes had a greater percentage of pupils who experienced some positive feelings during the tasks compared to the Apple Year 7 classes. However, following the intervention, any difference between the Apple Year 7 classes and the Yard Year 7 classes seemed to vanish. The Apple Year 7 Control class showed an increase in the percentage of such pupils, while the Yard Year 7 Control class maintained a similar percentage of such pupils; the Meta classes from each Year 7 approximately maintained the same percentage of such pupils, although the very slight change within each Meta class actually lessened the difference between them; and the Meta+ classes both showed a striking increase in the percentage of such pupils, although the increase in the percentage of such pupils was larger in the Apple Year 7 class compared to the Yard Year 7 class. As a result of these changes, each corresponding class in Apple Year 7 and Yard Year 7 had an very similar percentage of pupils who experienced some positive feelings during the tasks.
Following the intervention, there remained a minority of pupils in each class who appreciated their own specific physical properties. Furthermore, with the dramatic decrease in the percentage of such pupils in Apple Year 9, pupils of the same class showed a similarity regarding their lack of awareness of specific physical properties as intra-individual variables.

There was relatively little difference between the classes of the same Year and school regarding the percentage of pupils who showed some awareness of their specific physical properties. Classes of the same Year and school appeared to show a similar increase or decrease in the percentage of such pupils.

Following the intervention, the distinctive difference between the Apple Year 7 classes and the Apple Year 9 classes reduced considerably; all three Apple
Year 7 classes maintained a similar percentage of pupils who appreciated specific physical properties as intra-individual variables, whereas all three Apple Year 9 classes showed a dramatic decrease in the percentage of such pupils. However, the Apple Year 9 classes continued to show a consistently greater percentage of pupils who appreciated their own specific physical properties compared to the Apple Year 7 classes.

(B4) In Year 7 there was a very low percentage of pupils who appeared to appreciate their own specific physical properties. Yet, whereas the Apple Year 7 classes maintained a similar percentage of pupils who appreciated specific physical properties as intra-individual variables, the Yard Year 7 classes showed a clear decrease in the percentage of such pupils. Thus, there seemed to be a difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of such pupils.

Theme: Intra-Individual Variables
Category & Scale: Mental Properties (S)
Table 4.16B: Pupils suggesting specific mental properties as intra-individual variables.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>15</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend

Meta | Metacognitive Strategy Class
Meta + | Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class
(B1) Following the intervention, there remained a very small percentage of pupils in each class who appreciated their own specific mental properties and, therefore, viewed specific mental properties as intra-individual variables. Thus, there was very little difference between pupils of the same class regarding their awareness of their specific mental properties.

(B2) There was a strong similarity between the classes of the same Year and school regarding the poor percentage of pupils who were aware of their specific mental properties. The Apple Year 9 classes remained the only classes to suggest that some pupils were aware of their specific mental properties, but the percentage of such pupils had decreased following the intervention.

(B3) Following the intervention, there was a strong similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the poor percentage of pupils who suggested some awareness of their mental properties.

(B4) Without any pupils in either Apple Year 7 or Yard Year 7 having suggested some awareness of their specific mental properties, there was no difference evident between the Apple Year 7 classes and the Yard Year 7 classes regarding pupils' awareness of specific mental properties as being intra-individual variables.
Following the intervention, each class maintained a majority of pupils who had some form of awareness of their stylistic preferences on the wholist/analytic dimension. However, there was still a difference between classes regarding the size of the majority and, therefore, while the pupils in some classes, such as the Apple Year 9 Control class, appeared to show a similarity regarding their good awareness of their wholist/analytic stylistic preferences, the pupils in other classes, such as the Apple Year 7 Meta class, appeared to show a difference between each other regarding their awareness of their wholist/analytic stylistic preferences.

In Apple Year 7 there remained a degree of similarity between the classes regarding the percentage of pupils who had some form of awareness of their wholist/analytic stylistic preferences. However, it was noticeable how the Meta+ class showed a greater increase in the percentage of such pupils compared to the Control and Meta classes. In Apple Year 9, all three classes
maintained a strong majority of pupils who had some form of awareness of their wholist/analytic stylistic preferences but, whereas the Control class showed a slight decrease in the percentage of such pupils, both the Meta and the Meta+ classes showed a slight increase in the percentage of such pupils. The Yard Year 7 classes maintained a similarity regarding the percentage of pupils who had some form of awareness of their stylistic preferences in the wholist/analytic dimension, but, notably, both the Meta and Meta+ classes showed a greater increase in the percentage of such pupils compared to the Control class. Thus, there was some similarity between the classes of the same Year and school regarding the percentage of pupils who had some form of awareness of their wholist/analytic stylistic preferences. However, there was an equal or a greater increase in the percentage of such pupils in the Meta and the Meta+ classes compared to the Control classes.

(B3) There was a similarity between Apple Year 7 and Apple Year 9 regarding the increase in the percentage of pupils who showed some form of awareness of their wholist/analytic stylistic preferences, indicated in both of the Meta classes and both of the Meta+ classes. There was a difference in the size of this increase, but the Apple Year 7 classes had more potential to show an increase in the percentage of such pupils compared to the Apple Year 9 classes, and the Apple Year 9 classes still maintained a consistently greater percentage of such pupils compared to the Apple Year 7 classes.

(B4) There was a similarity between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who had some form of awareness of their stylistic preferences in the wholist/analytic dimension. The increase in the percentage of such pupils was relatively similar in each corresponding class, but whereas both of the Meta+ classes showed a clear increase in the percentage of such pupils, the Yard Year 7 Meta class showed a greater increase in the percentage of such pupils compared to the Apple Year 7 Meta class.
Intra-Individual and Inter-Individual Variables (Wholist/Analytic Cognitive Style Dimension)

**Wholist Analytic - Awareness**

**Table 4.18B:** Pupils suggesting a wholist analytic preference in the wholist/analytic style dimension and suggesting some degree of awareness of that preference.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>46</td>
<td>50</td>
<td>53</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>9</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>21</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>14</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

(B1) In both Apple Year 7 and Yard Year 7 the percentage of pupils who suggested a wholist analytic preference and some form of awareness of that preference remained relatively small following the intervention. Indeed, the percentage of such pupils was so low that there appeared to a similarity between pupils of the same class regarding their lack of a wholist analytic preference and some form of awareness of that preference. However, whereas the Apple Year 7 classes showed a greater percentage of pupils beginning to suggest a wholist analytic preference, the Yard Year 7 classes showed a definite decrease in the percentage of such pupils. In Apple Year 9 there was an increase in the percentage of pupils who appeared to have a wholist analytic preference and some form of awareness of that preference and, thus, there appeared to be a much more even split between those pupils who suggested having such a preference and awareness, and those pupils who did not.
In Apple Year 7, it appeared that all of the classes showed a very slight increase in the percentage of pupils who suggested having a wholist analytic preference and some form of awareness of that preference. As such, there remained a similarity between the Apple Year 7 classes regarding the percentage of such pupils. In all three Apple Year 9 classes there appeared to be an increase in the percentage of pupils who suggested having a wholist analytic preference and some form of awareness of that preference. However, there was a greater increase in the percentage of such pupils in the Meta class and, especially, in the Meta+ class, compared to the Control class. Therefore, while there was still a strong similarity between the three classes regarding the percentage of such pupils, there was less similarity than there had been prior to the intervention. In all of the Yard Year 7 classes, there was a similar decrease in the percentage of pupils who suggested having a wholist analytic preference and some form of awareness of that preference. As such, there remained very little difference between these three classes regarding the percentage of such pupils.

All of the Apple Year 7 and the Apple Year 9 classes showed an increase in the percentage of pupils who had a wholist analytic preference and some form of awareness of that preference. However, the increase appeared to be greater in the Year 9 classes compared to the Year 7 classes. Furthermore, whereas the increase in the percentage of such pupils was consistent in the three Year 7 classes, the increase in the percentage of such pupils was more variable in the Year 9 classes; the most notable increase in the percentage of pupils who had a wholist analytic preference and some form of awareness of that preference was in the Apple Year 9 Meta and Meta+ classes. With a greater increase in the percentage of such pupils in the Apple Year 9 classes compared to the Apple Year 7 classes, the difference between Apple Year 7 and Apple Year 9 regarding the percentage of such pupils was increased.

Whereas the Apple Year 7 classes appeared to show a slight but consistent increase in the percentage of pupils who had a wholist analytic preference and some form of awareness of that preference, the Yard Year 7 classes appeared to show a notable decrease in the percentage of such pupils. However, following the intervention, this resulted in a greater similarity between Apple Year 7 and Yard Year 7 regarding the percentage of such pupils.
Table 4.19B: Pupils suggesting some degree of awareness of their preferences in the verbaliser/imager style dimension.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td></td>
<td>100</td>
<td>78</td>
<td>90</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td></td>
<td>100</td>
<td>78</td>
<td>90</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td></td>
<td>19</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td></td>
<td>100</td>
<td>96</td>
<td>97</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td></td>
<td>96</td>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td></td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td></td>
<td>84</td>
<td>82</td>
<td>62</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td></td>
<td>67</td>
<td>86</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td></td>
<td>17</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

(B1) There appeared to be a similarity between pupils of the same class regarding their good awareness of their stylistic preferences in the verbaliser/imager dimension. There was no notable change in the percentage of such pupils, although all three Meta classes and both of the Year 7 Meta+ classes, showed a slight increase. All three Control classes showed a very slight decrease in the percentage of such pupils.

(B2) Following the intervention, there was a degree of similarity between the Apple Year 7 classes and between the Yard Year 7 classes regarding the percentage of pupils who suggested having some awareness of their stylistic preferences in the verbaliser/imager dimension. However, while both of the Control classes showed a decrease in the percentage of such pupils, both of the Meta classes and both of the Meta+ classes showed an increase in the percentage of such pupils. There remained a degree of similarity between the Apple Year 9 classes regarding the percentage of such pupils, although, interestingly, while
the Control and Meta+ classes showed a decrease in the percentage of pupils who had an awareness of their verbaliser/imager stylistic preferences, the Meta class showed an increase in the percentage of such pupils.

(B3) The percentage of pupils who were aware of their stylistic preferences in the verbaliser/imager dimension remained higher in the Apple Year 9 classes compared to the Apple Year 7 classes. There was a similarity regarding the decrease in the percentage of such pupils shown in the Control classes and the increase in the percentage of such pupils shown in the Meta classes. However, while there was a slight increase in the percentage of pupils who showed some awareness of their stylistic preferences in the verbaliser/imager dimension in the Apple Year 7 Meta+ class, this was not matched in the corresponding Apple Year 9 Meta+ class.

(B4) Following the intervention, it still appeared that the Apple Year 7 classes had a greater percentage of pupils who had some form of awareness of their stylistic preferences in the verbaliser/imager dimension compared to the Yard Year 7 classes. However, there was a similarity regarding the change in the percentage of such pupils within each corresponding class; both Control classes had a relatively large decrease in the percentage of pupils who had some form of awareness of their stylistic preferences in the verbaliser/imager dimension, while both of the Year 7 Meta classes and both of the Year 7 Meta+ classes showed an increase in the percentage of such pupils.
Intra-Individual and Inter-Individual Variables
(Verbaliser/Imager Cognitive Style Dimension)

Table 4.20B: Pupils suggesting a verbaliser imager preference in the verbaliser/imager style dimension and suggesting some degree of awareness of that preference.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta+ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>81</td>
<td>59</td>
<td>79</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>78</td>
<td>64</td>
<td>79</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>3</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>93</td>
<td>82</td>
<td>72</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>79</td>
<td>71</td>
<td>84</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>14</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>53</td>
<td>53</td>
<td>57</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>53</td>
<td>71</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>0</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

(B1) There was a majority of pupils who suggested that they had a verbaliser imager stylistic preference and some form of awareness of that preference. However, the majority of such pupils in most classes was not overwhelming, and, therefore, it appeared that there was a difference between pupils of the same class regarding their verbaliser/imager stylistic preferences.

(B2) Following the intervention, there was a greater similarity between the Apple Year 7 classes regarding the percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference. Hence, each Apple Year 7 class had shown a different response to the intervention; the Control class showed a decrease in the percentage of such pupils, the Meta class showed an increase in the percentage of such pupils and the Meta+ class maintained the same percentage of such pupils. A relative similarity between the Apple Year 9 classes was also maintained regarding the
percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference, although the Control and Meta classes showed a decrease in the percentage of such pupils and the Meta+ class showed an increase in the percentage of such pupils. Prior to the intervention, there had been a strong similarity between the Yard Year 7 classes regarding the percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference. However, following the intervention the similarity decreased; the Control class maintained the same percentage of such pupils but the Meta and Meta+ classes showed a notable increase in the percentage of such pupils.

(B3) Following the intervention, there was a stronger similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference.

(B4) There was a similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference. The Apple Year 7 classes, as a whole, appeared to have a greater percentage of such pupils but the difference between Apple Year 7 and Yard Year 7 was only small. Interestingly, both of the Meta classes showed an increase in the percentage of such pupils, but, while the Yard Year 7 Meta+ class showed a similar increase in the percentage of pupils who suggested having a verbaliser imager stylistic preference and some form of awareness of that preference, the corresponding Apple Year 7 Meta+ class maintained the same percentage of such pupils.
### Table 4.21B: Pupils suggesting an awareness of inter-individual variables.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>59</td>
<td>22</td>
<td>45</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>44</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>15</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>96</td>
<td>72</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-Intervention</td>
<td></td>
<td>64</td>
<td>89</td>
<td>68</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-27</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>53</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>20</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>33</td>
<td>-15</td>
<td>-2</td>
</tr>
</tbody>
</table>

(B1) Both prior to the intervention and following the intervention, there was variation between classes regarding whether pupils of the same class differed in their awareness of inter-individual variables. The pupils of some classes, such as in the Apple Year 9 Meta class, showed a strong similarity regarding their good awareness of inter-individual variables. Pupils of other classes, such as the Apple Year 7 Meta class, suggested a similarity regarding their poor awareness of inter-individual variables. However, many of the classes, such as the Yard Year 7 Meta class, showed an approximately even split between those pupils who suggested having an awareness of inter-individual variables and those pupils who did not suggest having any awareness of such variables; thus, there appeared to be a difference between pupils within these classes regarding their awareness of inter-individual variables.

(B2) Following the intervention, there was still a degree of difference between classes of the same Year and school regarding the percentage of pupils who suggested having an awareness of inter-individual variables. However, there was a slightly greater similarity between classes, especially between the Apple...
Year 7 classes and between the Apple Year 9 classes, where the Control classes had shown a notable decrease and an increase in the percentage of such pupils respectively. Interestingly, there was a difference between the three Yard Year 7 classes regarding their response to the intervention and, thus, regarding the final percentage of such pupils; the Control class showed a dramatic decrease in the percentage of pupils who were aware of inter-individual variables, the Meta class showed an increase in the percentage of such pupils, and the Meta+ class maintained a very similar percentage of such pupils.

(B3) Apple Year 9 maintained a greater percentage of pupils who suggested having an awareness of inter-individual variables compared to Apple Year 7. However, whereas both of the Meta classes and both of the Meta+ classes showed only a small change in the percentage of such pupils, the Apple Year 7 Control class showed a notable decrease in the percentage of such pupils and the Apple Year 9 Control class showed a dramatic increase in the percentage of such pupils.

(B4) The range in the percentage of pupils who suggested having an awareness of inter-individual variables, across the Apple Year 7 classes and across the Yard Year 7 classes, remained relatively similar. Furthermore, both Control classes showed a clear decrease in the percentage of such pupils. However, whereas the Apple Year 7 Meta and Meta+ classes showed a slight decrease in the percentage of such pupils, the corresponding classes in Yard Year 7 showed an increase in the percentage of such pupils.
### Inter-Individual Variables

**Physical Factors (S)**  
**Pupils suggesting specific physical factors as inter-individual variables.**

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>23</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>18</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre &amp; Post-intervention (D)</td>
<td>5</td>
<td>12</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>14</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre &amp; Post-intervention (D)</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>21</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>14</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre &amp; Post-intervention (D)</td>
<td>7</td>
<td>-19</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

**Legend**  
- **Meta**: Metacognitive Strategy Class  
- **Meta +**: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variable and Cognitive Strategy Class

**B1** Following the intervention, the percentage of pupils who suggested some specific physical factors as being inter-individual variables remained relatively low in most classes. Therefore, pupils within these classes were similar regarding their poor awareness that specific physical factors are inter-individual variables. However, both the Yard Year 7 Meta and Meta+ classes showed a clear increase in the percentage of pupils who suggested some specific physical factors as being inter-individual variables and, thus, showed an approximately even split between pupils who were aware that specific physical factors can be inter-individual variables and pupils who were not aware. As such, there was a possible difference between the pupils within each of these classes regarding their awareness that specific physical factors can be inter-individual variables.

**B2** Following the intervention, there remained a relative similarity between classes of the same Year in Apple regarding the percentage of pupils who suggested some specific physical factors as being inter-individual variables.
However, classes did vary in their response to the intervention; for example, the Apple Year 7 Control class showed a decrease in the percentage of such pupils, the Apple Year 7 Meta class showed an increase in the percentage of such pupils and the Apple Year 7 Meta+ class maintained the same percentage of such pupils. In contrast to Apple, the Yard Year 7 classes showed a greater difference following the intervention, as both the Meta class and the Meta+ class showed a notable increase in the percentage of pupils who noted some specific physical factors, whereas the Control class showed a clear decrease in the percentage of such pupils.

(B3) Following the intervention, the Apple Year 7 classes and the Apple Year 9 classes maintained their relative similarity regarding the percentage of pupils who suggested some specific physical factors as being inter-individual variables. However, the only class that showed a positive increase in the percentage of such pupils was the Apple Year 7 Meta class, and this change suggested that there could be a very slight difference between Apple Year 7 and Apple Year 9 regarding the percentage of such pupils.

(B4) Following the intervention, it appeared that Yard Year 7 had a greater percentage of pupils who suggested some specific physical factors as being inter-individual variables compared to Apple Year 7. Whereas both Year 7 Control classes remained very similar regarding the percentage of such pupils, the difference between the Apple Year 7 and Yard Year 7 Meta classes and Meta+ classes, regarding the percentage of such pupils, was magnified. Although both Meta classes showed an increase in the percentage of pupils who suggested some specific physical factors as being inter-individual variables, the increase was greater in the Yard Year 7 class compared to the Apple Year 7 class, as well as the pre-intervention percentage of such pupils being greater. There was no change in the percentage of pupils who suggested some specific physical factors as being inter-individual variables in the Apple Year 7 Meta+ class, but there was a clear increase in the percentage of such pupils in the Yard Year 7 Meta+ class, and again, the increase came from a pre-intervention percentage of such pupils that was greater.
Following the intervention, the percentage of pupils who suggested some specific mental factors as being inter-individual variables remained relatively small in most classes. As such, pupils of the same class showed a similarity regarding their poor awareness that specific mental factors can be inter-individual variables. However, both of the Apple Meta+ classes showed an increase in the percentage of pupils who suggested some specific mental factors as being inter-individual variables, although, while pupils in the Apple Year 7 Meta+ class remained similar regarding their lack of awareness that specific mental factors can be inter-individual variables, there seemed to be a difference between pupils in the Apple Year 9 Meta+ class in this respect.

Although the range in the percentage of pupils who suggested some specific mental factors as being inter-individual variables widened in Apple Year 7, there still appeared to be a degree of similarity between the three classes. However, it was notable that, while the Control class showed a decrease in the percentage of such pupils and the Meta class maintained a similar percentage
of such pupils, the Meta+ class showed a clear increase in the percentage of such pupils. In Apple Year 9, both the Control class and the Meta+ class showed an increase in the percentage of pupils who suggested some specific mental factors as being inter-individual variables, whereas the Meta class showed a clear decrease in the percentage of such pupils. These changes appeared to increase the similarity between the Control class and Meta class but decrease the overall similarity between the three classes regarding the percentage of pupils who suggested some specific mental factors as being inter-individual variables. In Yard Year 7, the Meta+ class remained without any pupils who referred to specific mental factors as being inter-individual variables, while there was a slight increase in the percentage of such pupils in the Control and Meta classes. Again, these changes appeared to increase the similarity between the Control class and the Meta class but decrease the overall similarity between the three classes regarding the percentage of pupils who suggested some specific mental factors as being inter-individual variables.

(B3) Apple Year 9 maintained a greater percentage of pupils who suggested some specific mental factors as being inter-individual variables compared to Apple Year 7. However, it was noticeable that both of the Meta+ classes showed a clear increase in the percentage of such pupils, ensuring that both Meta+ classes showed a greater percentage of such pupils compared to the other classes in the same Year.

(B4) Although there was a degree of overall similarity between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who suggested some specific mental factors as being inter-individual variables, there was a difference between the response of each corresponding class to the intervention. Notably, the increase in the percentage of such pupils in the Yard Year 7 Control and Meta classes was not matched in the corresponding Apple Year 7 classes, and the increase in the percentage of such pupils in the Apple Year 7 Meta+ class was not matched in the corresponding Yard Year 7 class.
Table 4.24B: Pupils suggesting that there had been adequate information for them personally to understand the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>75</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>85</td>
<td>88</td>
<td>82</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>-10</td>
<td>33</td>
<td>17</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>93</td>
<td>90</td>
<td>93</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>93</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>89</td>
<td>77</td>
<td>90</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>87</td>
<td>86</td>
<td>54</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>2</td>
<td>9</td>
<td>36</td>
</tr>
</tbody>
</table>

Legend

Meta
Meta+ Metacognitive Strategy Class

(B1) Following the intervention, there appeared to be a strong similarity between pupils of the same class in Apple Year 7 and Apple Year 9 regarding their suggestion that there had been enough information made available for them to understand the tasks. There also appeared to be a similarity between pupils in the Yard Year 7 Control and Meta classes, but the decrease in the percentage of such pupils in the Yard Year 7 Meta+ class implied that pupils within the class did not all agree that there had been enough information made available for them to understand the tasks.

(B2) All three Apple Year 7 classes showed a differently sized increase in the percentage of pupils who suggested that there had been enough information made available for them to understand the tasks, which resulted in a greater similarity between the classes following the intervention. The most dramatic increase in the percentage of such pupils occurred in the Meta and Meta+ classes. In Apple Year 9, there remained a strong similarity between the three classes regarding the percentage of pupils who suggested that there had been
enough information made available for them to understand the tasks; the only slight increase in the percentage of such pupils occurred in the Meta+ class. The Yard Year 7 Control and Meta classes also maintained a degree of similarity following the intervention but the dramatic decrease in the percentage of such pupils in the Yard Year 7 Meta+ class destroyed the overall consistency between the three classes.

(B3) Although the Apple Year 9 classes continued to have a consistently greater percentage of pupils who suggested that there had been enough information made available for them to understand the tasks compared to the Apple Year 7 classes, the difference between the classes of Year had clearly decreased. Notably, there was more potential for there to be an increase in the percentage of such pupils in the Apple Year 7 classes compared to the Apple Year 9 classes, but it was still evident that, following the intervention, Apple Year 7 and Apple Year 9 showed a greater similarity regarding the percentage of pupils who suggested that there had been enough information made available for them to understand the tasks.

(B4) Both of the Year 7 Control classes and both of the Year 7 Meta classes showed a great similarity regarding the percentage of pupils who suggested that there had been enough information made available for them to understand the tasks. However, the corresponding Meta+ classes differed greatly following the intervention, much more so than had previously been evident; whereas the Apple Year 7 Meta+ class showed an increase in the percentage of such pupils, the Yard Year 7 Meta+ class showed a dramatic decrease in the percentage of such pupils.
Following the intervention, most pupils continued to show a degree of similarity regarding their lack of desire for any additional information. Very few classes showed a dramatic change in the percentage of pupils who wanted some specific additional information, apart from the Yard Year 7 Meta+ that showed an increase in the percentage of such pupils.

The Apple classes showed very little change regarding the percentage of pupils who wanted some specific additional information; no class showed an increase in the percentage of such pupils, and any decrease in the percentage of such pupils was only very slight. Thus, Apple maintained a strong similarity between classes of the same Year regarding the low percentage of pupils who wanted some specific additional information. Following the intervention, the Yard Year 7 classes also showed a similarity regarding the percentage of pupils who wanted some specific additional information; due mainly to the noticeable increase in the percentage of such pupils in the Meta+ class.
There appeared to be a degree of similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the low percentage of pupils who wanted some specific additional information. None of the six classes showed an increase in the percentage of such pupils, although, while the Apple Year 9 Meta and Meta+ classes showed a decrease in the percentage of such pupils, the corresponding Apple Year 7 classes maintained the same percentage of such pupils.

The Yard Year 7 classes maintained a consistently greater percentage of pupils who wanted some specific additional information compared to the Apple Year 7 classes. Indeed, only the Yard Year 7 Meta+ class showed any noteworthy increase in the percentage of such pupils.

General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?

Category & Scale: Physical Factors (S)

Table 4.26B: Pupils suggesting that they had considered specific physical factors during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>74</td>
<td>56</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>33</td>
<td>52</td>
<td>59</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>41</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>70</td>
<td>68</td>
<td>79</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>18</td>
<td>4</td>
<td>37</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>52</td>
<td>64</td>
<td>42</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>47</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>67</td>
<td>43</td>
<td>69</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-20</td>
<td>37</td>
<td>31</td>
</tr>
</tbody>
</table>

Legend

Meta
Metacognitive Strategy Class

Meta +
Metacognitive Strategy, Metacognitive Knowledge of Form and Strategy Variables and Cognitive Strategy Class
Following the intervention, pupils within most classes appeared to differ regarding their consideration of specific physical factors during the tasks; there were classes, such as the Apple Year 7 Meta class, that suggested almost an even split between those pupils who acknowledged considering specific physical factors during the tasks and those who did not. However, there appeared to be a similarity between pupils within some classes, such as the Apple Year 9 Meta class, regarding their lack of consideration towards specific physical factors during the tasks.

There remained a degree of similarity between the three Apple Year 7 classes regarding the percentage of pupils who acknowledged considering specific physical factors during the tasks, although the Control class showed a dramatic decrease in the percentage of such pupils that was not matched in either of the other two classes. Notably, the Apple Year 7 Meta class only showed a small decrease in the percentage of such pupils and the Apple Year 7 Meta+ class actually showed a slight increase in the percentage of such pupils. All of the Apple Year 9 classes showed a large decrease in the percentage of pupils who acknowledged considering specific physical factors during the tasks, although the extent of this decrease differed, and thus, following the intervention, there was less similarity between the Apple Year 9 classes regarding the percentage of such pupils. Interestingly, the Apple Year 9 Meta+ class showed the smallest decrease in the percentage of such pupils. In contrast, the Yard Year 7 classes all showed an increase in the percentage of such pupils, and the variety in the extent of this increase, resulted in a greater similarity between the Yard Year 7 classes following the intervention. Notably, the Yard Year 7 Meta and Meta+ classes showed a greater increase in the percentage of such pupils compared to the Yard Year 7 Control class.

As the Apple Year 9 Meta and Meta+ classes showed a dramatic decrease in the percentage of pupils who acknowledged considering specific physical factors during the tasks, that was not matched in the corresponding Apple Year 7 classes, there was less similarity between each Year regarding the percentage of such pupils. The only similarity between Apple Year 7 and Apple Year 9 appeared to be the relatively similar decrease in the percentage of such pupils shown in each of the Control classes.

With respect to the Apple Year 7 classes, only the Meta+ class showed any increase in the percentage of pupils who acknowledged considering specific physical factors during the tasks; the Control class showed a large decrease in
the percentage of such pupils and the Meta class showed a slight decrease in
the percentage of such pupils. However, all three Yard Year 7 classes showed
a relatively large increase in the percentage of such pupils; a larger increase
being shown in the Meta and the Meta+ classes compared to the Control class.
As such, while the Meta and the Meta+ classes from Apple Year 7 and Yard
Year 7 showed some similarity regarding the percentage of pupils who
acknowledged considering specific physical factors during the tasks, there was
a greater percentage of such pupils in the Yard Year 7 Control class compared
to the Apple Year 7 Control class.

Theme: What Strategy?
Category & Scale: General Mental Techniques (G)
Table 4.27B: Pupils suggesting that they had utilised general mental
techniques during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta+ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>19</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>0</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>43</td>
<td>45</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>14</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>12</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>21</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>13</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>8</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) Following the intervention, most of the classes showed either a decrease in the
percentage of pupils who suggested a consideration of general mental
techniques during the tasks, or they maintained a similar percentage of such pupils. Therefore, pupils within most classes appeared to show a similarity regarding their lack of consideration of general mental techniques during the tasks.
(B2) Following the intervention, the Apple Year 7 classes only showed a slight alteration in the percentage of pupils who suggested a consideration of general mental techniques during the tasks, but these alterations resulted in the three class showing a greater similarity regarding the percentage of such pupils. Interestingly, the only increase in the percentage of such pupils was shown in the Apple Year 7 Meta+ class. In Apple Year 9, all three classes showed a clear decrease in the percentage of pupils who suggested a consideration of general mental techniques during the tasks. The smallest decrease in the percentage of such pupils was in the Meta+ class, which resulted in the Meta+ class showing a greater percentage of such pupils compared to the Control and Meta classes. As occurred in Apple Year 7, each of the classes in Yard Year 7 responded differently following the intervention. While the Control class showed a decrease in the percentage of pupils who suggested a consideration of general mental techniques during the tasks, the Meta class showed an increase in the percentage of such pupils and the Meta+ class remained without any such pupils. These alterations reduced the similarity between the three classes regarding the percentage of pupils who suggested a consideration of general mental techniques during the tasks.

(B3) Following the intervention, there was a greater similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the poor percentage of pupils who suggested a consideration of general mental techniques during the tasks; the Apple Year 9 classes showed a dramatic decrease in the percentage of such pupils that was not matched in the Apple Year 7 classes. Interestingly, while the only decrease in the percentage of pupils who suggested a consideration of general mental techniques during the tasks in Apple Year 7 was shown in the Meta class, it was also the Meta class that showed a greater decrease in the percentage of such pupils compared to the Control and Meta+ classes in Apple Year 9.

(B4) There remained a degree of similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who suggested a consideration of general mental techniques during the tasks; there was no great alteration in the percentage of such pupils in any class. Yet, the corresponding classes from each school did appear to respond differently following the intervention; the Apple Year 7 Control class and the Yard Year 7 Meta+ class maintained the same percentage of such pupils, the Apple Year 7 Meta class and the Yard Year 7 Control class showed a decrease in the
percentage of such pupils, and the Apple Year 7 Meta+ class and the Yard Year 7 Meta class showed an increase in the percentage of such pupils.

Theme: What Strategy?
Category & Scale: Specific Mental Techniques (S)
Table 4.28B: Pupils suggesting that they had utilised specific mental techniques during the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>(D)</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>18</td>
<td>39</td>
<td>16</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>1</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(B1) There continued to be very few pupils who suggested a consideration of specific mental techniques during the tasks and, as such, there remained a degree of similarity between pupils of the same class regarding their lack of consideration of specific mental techniques. However, the Apple Year 9 Meta class may have been the exception, as it showed an increase in the percentage of such pupils that suggested pupils within the class may have differed in their consideration of specific mental techniques during the tasks.

(B2) There remained a strong similarity between the classes in Apple Year 7 and between the classes in Yard Year 7 regarding the poor percentage of pupils who suggested a consideration of specific mental techniques during the tasks. However, in Apple Year 9, the dramatic increase in the percentage of such
pupils within the Meta class reduced the degree of similarity between the three Apple Year 9 classes that had previously been evident.

(B3) Apple Year 9 maintained a greater percentage of pupils who suggested a consideration of specific mental techniques during the tasks compared to Apple Year 7. However, there was a degree of similarity between each Year, as both of the Control classes showed a slight decrease in the percentage of such pupils, and both of the Meta+ classes showed a slight increase in the percentage of such pupils. Yet, whereas the Apple Year 7 Meta class showed a decrease in the percentage of pupils who suggested a consideration of specific mental techniques during the tasks, the corresponding Apple Year 9 class showed a dramatic increase in the percentage of such pupils.

(B4) Following the intervention, there was a great similarity between both of the Year 7 Control classes and between both of the Year 7 Meta classes, regarding the lack of any pupils who suggested a consideration of specific mental techniques during the tasks. Furthermore, while the Apple Year 7 Meta+ class showed a slight increase in the percentage of such pupils that was not matched in the Yard Year 7 Meta+ class, the difference between each class was still extremely small and, thus, there also remained a degree of similarity between the Year 7 Meta+ classes.
Why Use the Strategy?

Conscious Decision (Cognitive.S)

Table 4.29B: Pupils suggesting that they had made a specific cognitive conscious decision to consider their strategic action.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>37</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-11</td>
<td>-13</td>
<td>-49</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>81</td>
<td>71</td>
<td>83</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>29</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>52</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>35</td>
<td>24</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>20</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>6</td>
<td>28</td>
<td>1</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Class
- Meta+: Metacognitive Strategy, Metacognitive Knowledge of Power and Strategy Variables and Cognitive Strategy Class

(B1) Following the intervention, most pupils appeared not to have made specific cognitive conscious decisions during the tasks. Pupils within most classes appeared to differ regarding their suggestions of having made specific cognitive conscious decisions during the tasks; a situation that had not always been evident prior to the intervention. For example, the Apple Year 7 Meta+ class had previously suggested that pupils were similar in their failure to make specific cognitive conscious decisions during the tasks, but following the intervention there appeared to be an even split between those pupils who suggested making specific cognitive conscious decisions and those who did not.

(B2) The Apple Year 7 classes all showed an increase in the percentage of pupils who suggested having made specific cognitive conscious decisions during the tasks and, as such, there remained a degree of similarity between the three classes regarding the percentage of such pupils. Interestingly, the Meta+ class was the only Apple Year 7 class to show a majority of pupils who suggested...
having made specific cognitive conscious decisions, and it showed an increase in the percentage of such pupils that was over three times the size of that in either the Control class or the Meta class. Although all of the Apple Year 9 classes showed a decrease in the percentage of pupils who suggested having made specific cognitive conscious decisions during the tasks, the extent of the decrease differed; the Control class showed a greater decrease in the percentage of such pupils compared to the Meta and Meta+ classes. All of the Yard Year 7 classes also showed a decrease in the percentage of pupils who suggested having made specific cognitive conscious decisions during the tasks and, again, each class varied in the extent of the decrease; the Meta class showed a greater decrease in the percentage of such pupils compared to the Control and Meta+ classes. As a result, the similarity between the Yard Year 7 classes regarding the percentage of such pupils, decreased following the intervention.

(B3) Following the intervention, the Apple Year 7 classes and the Apple Year 9 classes showed a similarity regarding the percentage of pupils who suggested having made specific cognitive conscious decisions during the tasks. The greater similarity appeared to be the result of a relatively large increase in the percentage of such pupils in the Apple Year 7 classes, especially in the Meta+ class, and a large decrease in the percentage of such pupils in the Apple Year 9 classes, especially in the Control class.

(B4) Following the intervention, the Apple Year 7 classes showed a greater percentage of pupils who suggested having made specific cognitive conscious decisions during the tasks compared to the Yard Year 7 classes; in complete contrast to the situation prior to the intervention. Interestingly, although both of the Meta+ classes had previously shown a smaller percentage of such pupils compared to the other classes in the same Year, this situation was also reversed following the intervention; the Apple Year 7 Meta+ class showed a greater increase, and the Yard Year 7 Meta+ class showed a smaller decrease, in the percentage of such pupils compared to the other classes in the same Year.
Most of the classes showed a decrease in the percentage of pupils who suggested having made specific practical conscious decisions during the tasks. The alteration in percentage of such pupils was not great, but it was evident that pupils who suggested having made specific practical conscious decisions during the tasks were in the minority and, as such, pupils of the same class showed a greater similarity regarding their failure to make specific practical conscious decisions during the tasks.

All three Apple Year 7 classes showed a decrease in the percentage of pupils who suggested having made specific practical conscious decisions during the tasks. Yet, as the largest decrease occurred in the Control class, there was a greater similarity between the three Apple Year 7 classes regarding the percentage of such pupils. The Apple Year 9 classes also showed a greater similarity following the intervention, aided by the decrease in the percentage of pupils who suggested having made specific practical conscious decisions in the Control and Meta classes, and an increase in the percentage of such pupils.
in the Meta+ class. The range in the percentage of such pupils between the Yard Year 7 classes also decreased following the intervention, although the increased similarity between the three classes was not as noticeable as it had been in Apple Year 7 and Apple Year 9. Interestingly, while the Yard Year 7 Control class actually showed an increase in the percentage of pupils who suggested having made specific practical conscious decisions during the tasks, both the Meta and Meta+ classes showed a decrease in the percentage of such pupils; a dramatic decrease in the Meta+ class.

(B3) Following the intervention, the Apple Year 7 and the Apple Year 9 classes, as a whole, showed a slightly greater similarity regarding the percentage of pupils who suggested having made specific practical conscious decisions during the tasks. However, while both of the Control and Meta classes showed a decrease in the percentage of such pupils, only the Apple Year 7 Meta+ class also showed a decrease in the percentage of such pupils; the corresponding Apple Year 9 Meta+ class showed an increase in the percentage of such pupils.

(B4) Following the intervention, there was relatively little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who suggested having made specific practical conscious decisions during the tasks. Furthermore, there was a similarity in that both Meta and Meta+ classes showed a decrease in the percentage of such pupils, although the decrease was greater in the Yard Year 7 classes compared to the Apple Year 7 classes. However, the main difference between Apple Year 7 and Yard Year 7 concerned the dramatic decrease in the percentage of such pupils in the Apple Year 7 Control class, while the corresponding Yard Year 7 Control class showed a slight increase in the percentage of such pupils.
Theme: Why Use the Strategy?
Category & Scale: Unconscious Decision
Table 4.31B: Pupils suggesting that they had automatically or unconsciously considered their strategic action.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>12</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>13</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Class
- Meta+: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class

(B1) There remained a minority of pupils in each class who suggested having made unconscious decisions during the tasks, and there appeared to be a strong similarity between pupils of the same class regarding the very poor percentage of such pupils.

(B2) As most of the classes showed a small percentage of pupils who suggested having made unconscious decisions during the tasks, there remained a strong similarity between classes of the same Year and school. Notably, the Meta class in each Year and school showed a decrease in the percentage of such pupils whereas the Meta+ class in each Year and school showed an increase in the percentage of such pupils. While the Control classes in Apple Year 7 and Apple Year 9 showed a decrease in the percentage of pupils who suggested having made unconscious decisions during the tasks, the Yard Year 7 Control class showed an increase in the percentage of such pupils.
(B3) The Apple Year 9 classes maintained a slight but consistently greater percentage of pupils who suggested having made unconscious decisions during the tasks compared to the Apple Year 7 classes. However, there was a similarity between each Year regarding the response of the corresponding classes following the intervention; both of the Control and Meta classes showed a decrease in the percentage of such pupils, whereas both of the Meta+ classes showed an increase in the percentage of such pupils.

(B4) Following the intervention, there was possibly a greater percentage of pupils in Yard Year 7 who suggested having made unconscious decisions during the tasks compared to Apple Year 7; this was in contrast to the situation prior to the intervention. Notably, the Apple Year 7 Control class showed a decrease in the percentage of pupils who suggested having made unconscious decisions during the tasks, whereas the Yard Year 7 Control class showed an increase in the percentage of such pupils. Although the Apple Year 7 Meta class showed a slight decrease in the percentage of pupils who suggested having made unconscious decisions, it maintained a greater percentage of such pupils compared to the Yard Year 7 Meta class. Finally, both of the Meta+ classes showed a slight increase in the percentage of pupils who suggested having made unconscious decisions during the tasks, although there was a greater increase in the percentage of such pupils in the Yard Year 7 Meta+ class compared to the Apple Year 7 Meta+ class. Nevertheless, the slight difference between each of the classes did not overshadow that very few pupils implied having made unconscious decisions during the tasks.
Table 4.32B: Pupils suggesting a good awareness that their strategic action could transfer to a wide variety of tasks.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>7</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>12</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>14</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>5</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>26</td>
<td>4</td>
<td>11</td>
</tr>
</tbody>
</table>

(B1) There remained very few pupils who suggested some good wider transfer possibilities for their strategic action; most classes showed a decrease in the percentage of such pupils. The clear minority of such pupils implied that there was a great similarity between pupils of the same class regarding their poor awareness of wider transfer possibilities for their strategic action.

(B2) All three Apple Year 7 classes showed a decrease in the percentage of pupils who suggested some good wider transfer possibilities for their strategic action and, as such, they maintained a degree of similarity regarding the percentage of such pupils. Yet, interestingly, the Meta+ class showed the smallest decrease in the percentage of such pupils while the Control class showed the largest decrease in the percentage of such pupils. Following the intervention, the Apple Year 9 classes showed a greater similarity regarding the percentage of pupils who suggested some good wider transfer possibilities for their strategic action; the result of an increase in the percentage of such pupils in the Meta class that was not matched in either of the other two classes. All three
Yard Year 7 classes showed a decrease in the percentage of pupils who suggested some good wider transfer possibilities for their strategic action, and, as such, they maintained a degree of similarity regarding the percentage of such pupils. However, the Control class showed a dramatic decrease in the percentage of such pupils that was not matched in either the Meta class or the Meta+ class.

(B3) Prior to the intervention, the corresponding Apple Year 7 and Apple Year 9 Control classes and Meta+ classes showed exactly the same percentage of pupils who suggested some good wider transfer possibilities for their strategic action. Following the intervention, all four classes showed a decrease in the percentage of such pupils, and while the Apple Year 7 Control class showed a greater decrease in the percentage of such pupils compared to the Apple Year 9 Control class, both of the Meta+ classes showed a similarly slight decrease in the percentage of such pupils. The main difference between the Apple Year 7 and the Apple Year 9 classes concerned the decrease in the percentage of pupils who suggested some good wider transfer possibilities for their strategic action in the Apple Year 7 Meta class, compared to the increase in the percentage of such pupils in the Apple Year 9 Meta class. As a result of these alterations, it appeared that the Apple Year 9 classes had a slightly greater percentage of pupils who suggested some good wider transfer possibilities for their strategic action compared to the Apple Year 7 classes.

(B4) All of the Year 7 classes showed a decrease in the percentage of pupils who suggested some good wider transfer possibilities for their strategic action, although both of the Control classes showed a greater decrease in the percentage of such pupils compared to their respective Meta and Meta+ classes. Furthermore, both the range in the percentage of such pupils between the Apple Year 7 classes and between the Yard Year 7 classes showed a slight increase. Thus, following the intervention, there appeared to be a degree of similarity between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who suggested some good wider transfer possibilities for their strategic action.
Theme: Pupils' Monitoring of the Strategy and the Task
Category & Scale: Need + Want
Table 4.33B: Pupils suggesting that they had changed or had not changed their strategic action as a response to what they needed or wanted to do.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>36</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>29</td>
<td>44</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>8</td>
<td>8</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>74</td>
<td>65</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>29</td>
<td>46</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>45</td>
<td>19</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>53</td>
<td>60</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>54</td>
<td>56</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

- Meta:
- Meta +:

(B1) Apart from the Apple Year 9 Control class, most classes only showed a small change in the percentage of pupils who implied that they had independently monitored their strategic action during the tasks. Therefore, as had been the situation prior to the intervention, pupils within most of the classes seemed to differ regarding the monitoring of their strategic action during the tasks.

(B2) Although there remained a degree of similarity between the Apple Year 7 classes regarding the percentage of pupils who implied that they had independently monitored their strategic action during the tasks, there had been a difference in the response of each class following the intervention; the Control class showed a decrease in the percentage of such pupils, the Meta class showed an increase in the percentage of such pupils, and the Meta+ maintained the same percentage of such pupils. All of the Apple Year 9 classes showed a decrease in the percentage of pupils who implied that they had monitored their strategies during the tasks, although the dramatic decrease
in the percentage of such pupils in the Control class had made the difference between the classes much greater than they had been prior to the intervention. The Yard Year 7 classes maintained a similarity regarding the percentage of pupils who implied that they had independently monitored their strategic action during the tasks, as there was such a small change in the percentage of such pupils in each class.

(B3) Following the intervention, there was a great similarity between the corresponding Apple Year 7 and Apple Year 9 Control classes and Meta classes regarding the percentage of pupils who implied that they had independently monitored their strategic action during the tasks; prior to the intervention, the Apple year 9 classes had a greater percentage of such pupils compared to the Apple Year 7 classes. However, the Apple Year 9 Meta+ class maintained over double the percentage of such pupils compared to the corresponding Apple Year 7 class.

(B4) The Yard Year 7 classes maintained a greater percentage of pupils who implied that they had independently monitored their strategic action during the tasks compared to the Apple Year 7 classes. However, whereas the difference between the corresponding Control classes increased slightly, the difference between corresponding Meta and Meta+ classes was actually reduced; the Apple Year 7 Meta class showed slight increase in the percentage of such pupils and the Apple Year 7 Meta+ maintained a similar percentage of such pupils, while the Yard Year 7 Meta and Meta+ classes showed a decrease in the percentage of such pupils. It was noticeable that there was a smaller percentage of such pupils in both of the Meta+ classes compared to the respective Control and Meta classes.
Following the intervention, there was a decrease in the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks in most classes; the only two classes that showed an increase in the percentage of such pupils were the Apple Year 7 and Yard Year 7 Meta classes. However, it still appeared that pupils of the same class differed regarding their awareness of positive or negative feelings during their strategic action and the tasks, as there was neither a strong majority nor a clear minority of such pupils in any class.

There appeared to be a greater similarity between the three Apple Year 7 classes regarding the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks, as they responded differently following the intervention; the Control class showed a decrease in the percentage of such pupils, the Meta class showed a slight increase in the percentage of such pupils and the Meta+ class maintained the same percentage of such pupils. All three Apple Year 9 classes

### Table 4.34B: Pupils suggesting that they had experienced either positive or negative feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>48</td>
<td>37</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>29</td>
<td>40</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>19 (D)</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>41</td>
<td>54</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>29</td>
<td>28</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>12 (D)</td>
<td>26</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>69</td>
<td>47</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>53</td>
<td>71</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>16 (D)</td>
<td>-24</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

(B1) Following the intervention, there was a decrease in the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks in most classes; the only two classes that showed an increase in the percentage of such pupils were the Apple Year 7 and Yard Year 7 Meta classes. However, it still appeared that pupils of the same class differed regarding their awareness of positive or negative feelings during their strategic action and the tasks, as there was neither a strong majority nor a clear minority of such pupils in any class.

(B2) There appeared to be a greater similarity between the three Apple Year 7 classes regarding the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks, as they responded differently following the intervention; the Control class showed a decrease in the percentage of such pupils, the Meta class showed a slight increase in the percentage of such pupils and the Meta+ class maintained the same percentage of such pupils. All three Apple Year 9 classes
showed a decrease in the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks, although the variety in the extent of this decrease had meant that there appeared to be less similarity between the classes regarding the percentage of such pupils; the Meta class showed a larger decrease (26%) in the percentage of such pupils compared to the Control and Meta+ classes. All three Yard Year 7 classes showed a majority of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks, although each class differed in the response following the intervention; both the Control and the Meta+ classes showed a decrease in the percentage of such pupils, while the Meta class showed a dramatic increase (24%) in the percentage of such pupils.

(B3) Following the intervention, there appeared to be a slightly greater degree of similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks. However, while both Control classes showed a similar decrease in the percentage of such pupils, the response of each Meta and Meta+ class differed; the Apple Year 7 Meta class showed an increase in the percentage of such pupils, whereas the Apple Year 9 Meta class showed a dramatic decrease in the percentage of such pupils, and the Apple Year 7 Meta+ class maintained a similar percentage of such pupils whereas the Apple Year 9 Meta+ class showed a decrease in the percentage of such pupils.

(B4) The Yard Year 7 classes maintained a greater percentage of pupils who acknowledged experiencing either positive or negative feelings during their strategic action and the tasks compared to the Apple Year 7 classes. However, the corresponding Control classes and Meta classes showed a similar response following the intervention; both of the Control classes showed a decrease in the percentage of such pupils, while both of the Meta classes showed an increase in the percentage of such pupils. The major difference between Apple Year 7 and Yard Year 7 concerned the maintenance in the percentage of such pupils shown in the Apple Year 7 Meta+ class compared to the decrease in the percentage of such pupils shown in the Yard Year 7 Meta+ class.
Theme: Pupils' Feelings During their Strategic Action and the Task

Category & Scale: Positive Feelings

Table 4.35B: Pupils suggesting that they had experienced positive feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>22</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>18</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>25</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>11</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>11</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

(B1) There remained a minority of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks, although some classes did show an increase in the percentage of such pupils. It appeared that pupils within most classes were similar regarding their lack of positive feelings during their strategic action and the tasks. The main exception seemed to be the Apple Year 9 Meta+ class that showed an approximately even split between the those pupils who acknowledged experiencing positive feelings, and those who did not.

(B2) There remained a degree of similarity between the Apple Year 7 classes regarding the percentage of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks, as each class showed an increase in the percentage of such pupils. Each of the Apple Year 9 classes maintained a similar percentage of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks, although the small change in the percentage of such pupils in each class, technically, increased
the degree of similarity between the classes; the Control class and the Meta+ class showed a small decrease in the percentage of such pupils, while the Meta class showed a small increase in the percentage of such pupils. While the range in the percentage of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks increased between the Yard Year 7 classes, the percentage of such pupils was so small that there was always going to be a degree of similarity between the three classes. However, it was noticeable that only the Meta+ class showed an increase in the percentage of such pupils.

(B3) Although the Apple Year 9 classes maintained a greater percentage of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks compared to the Apple Year 7 classes, the difference between each Year was reduced considerably. Notably, all three Apple Year 7 classes showed a relatively large increase in the percentage of such pupils, while the Apple Year 9 classes maintained a similar percentage of such pupils.

(B4) Prior to the intervention, there was a degree of similarity between Apple Year 7 and Yard Year 7 regarding the poor percentage of pupils who acknowledged experiencing positive feelings during their strategic action and the tasks. Following the intervention, the percentage of such pupils remained low, but the Apple Year 7 classes showed a greater percentage such pupils compared to the Yard Year 7 classes; both of the Meta+ classes showed an increase in the percentage of such pupils, but the Apple Year 7 Control and Meta classes showed an increase in the percentage of pupils who acknowledged experiencing positive feelings that was not matched in the corresponding Yard Year 7 classes.
Following the intervention there still appeared to be a difference between pupils in Apple Year 7 classes regarding their volitional control. However, whereas the Control class showed a decrease in the percentage of pupils with volitional control, there was a dramatic increase in the percentage of such pupils in the Meta class and the Meta+ class. Indeed, the increase in the percentage of such pupils had meant that there appeared to be a majority of pupils in the Apple Year 7 Meta and Meta+ classes who had volitional control, whereas, previously, such pupils were in a minority. The Apple Year 9 classes all maintained a majority of pupils who appeared to have volitional control, and the majority was strong enough to suggest that there was a similarity between pupils of the same class. All the Yard Year 7 classes showed an increase in the percentage of pupils who suggested that they had some volitional control, although it still appeared that there were possible differences between pupils within each class. Furthermore, the increase in the
percentage of such pupils in the Yard Year 7 Meta and Meta+ classes was large enough to show a majority of pupils with volitional control rather than a minority, but not large enough to suggest an overwhelming similarity between pupils of the same class regarding their volitional control.

(B2) There was a far greater consistency and similarity between the Apple Year 7 classes following the intervention than there had been prior to it. This greater similarity was mainly due to the large increase in the percentage of pupils with volitional control in the Apple Year 7 Meta and Meta+ classes, the largest increase being in the Meta class. The change in the percentage of such pupils following the intervention, in the Apple Year 9 classes, was relatively small and, hence, these three classes maintained a strong similarity. However, it was noticeable that the Apple Year 9 Meta class did show a decrease in the percentage of pupils who suggested that they had some volitional control. In Yard Year 7, the classes showed a very similar percentage of such pupils following the intervention. All three classes showed an increase in the percentage of pupils with some volitional control, although the size of the increase varied between the classes. The largest increase was in the Meta and Meta+ classes, the most dramatic of which was the Meta+ class that had over a quarter (25%) more pupils suggest that they had some volitional control following the intervention. In contrast, the increase in the percentage of such pupils in the Yard Year 7 Control class was small.

(B3) The Apple Year 9 classes continued to have a greater percentage of pupils who had volitional control compared to the Apple Year 7 classes. Indeed, the difference was magnified in the Control classes following the intervention. However, there was a dramatic decrease in the difference between the corresponding Meta classes and the corresponding Meta+ classes. In the Apple Year 7 Meta and Meta+ classes there was a large increase in the percentage of pupils with some volitional control, whereas, in the Apple Year 9 Meta and Meta+ classes, there was a slight decrease in the percentage of such pupils.

(B4) Following the intervention, the corresponding Meta and Meta+ classes in Apple Year 7 and Yard Year 7 showed a large increase in the percentage of pupils who had some volitional control. As such, the relative similarity between these classes was maintained. It was noticeable that the largest increase in the percentage of such pupils in Apple Year 7 occurred in the Meta class, whereas the largest increase in Yard Year 7 occurred in the Meta+ class.
This difference meant that the four classes involving a metacognitive strategy had a final percentage of pupils with some volitional control, that was remarkably similar. The main difference between Apple Year 7 and Yard Year 7 concerned the Control classes as the Apple Year 7 Control class showed a large decrease in the percentage of pupils with some volitional control, whereas the Yard Year 7 Control class showed a slight increase in the percentage of such pupils.

**Theme:** The Wider Purpose of Physical Education  
**Category & Scale:** Mental Skills  
**Table 4.37B:** Pupils suggesting that a purpose of Physical Education is the development of specific mental skills.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>4</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>0</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Apple</td>
<td>7 Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>4</td>
<td>-1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>19</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>18</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Apple</td>
<td>9 Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>1</td>
<td>12</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>5</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yard</td>
<td>7 Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- Meta: Metacognitive Strategy Class
- Meta 3: Metacognitive Strategy, Metacognitive Knowledge of Factual and Strategy Variability and Cognitive Strategy Class

(B1) It was noticeable that, following the intervention, the percentage of pupils who suggested that a purpose of Physical Education was to develop mental skills remained extremely low. Hence, it seemed that there was very little difference between pupils of the same class regarding their awareness of the development of mental skills.

(B2) The percentage of pupils who appreciated that a purpose of Physical Education was to develop mental skills in Apple Year 7 altered very little.
Thus, the relative consistency between classes, in this respect, remained. However, in Apple Year 9 the classes were much more similar following the intervention than they had been prior to it. The large increase (14%) in the percentage of pupils who appreciated that mental skills were being developed in the Apple Year 9 Meta class, was concomitant with a large decrease (18%) in the percentage of such pupils in the Meta+ class. These variations made the Apple Year 9 classes remarkably similar following the intervention with regard to the percentage of pupils who appreciated that mental skills are being developed in Physical Education. In Yard Year 7, the increase in the percentage of such pupils in the Control class was not matched in either the Meta class or the Meta+ class. Therefore, although the percentage of such pupils remained so low that there was still a degree of similarity between these classes, the range in the percentage of such pupils between the classes had, technically, widened.

(B3) It appeared that the Apple Year 9 classes continued to have a greater percentage of pupils who appreciated that a purpose of Physical Education was to develop mental skills compared to the Apple Year 7 classes. Although both Meta classes showed an increase in the percentage of such pupils, the increase was much more dramatic in the Apple Year 9 class than in the Apple Year 7 class. With respect to the Meta+ classes, both Years were similar in that there was a decrease in the percentage of pupils who were aware that mental skills were being developed in Physical Education. Yet, again, the most dramatic change occurred within the Apple Year 9 class rather than the Apple Year 7 class. The large difference between the Control classes that had previously been evident was enlarged further still following the intervention, although both Control Classes showed a decrease in the percentage of pupils who appreciated that a purpose of Physical Education was to develop mental skills.

(B4) In general, the initial percentage of pupils in the Apple Year 7 and the Yard Year 7 classes, who had some awareness of the development of mental skills during Physical Education, was relatively small. Furthermore, following the intervention, the change in the percentage of such pupils in the Apple Year 7 and the Yard Year 7 classes was also small. Thus, there remained a degree of similarity between them. However, there were differences in that the percentage of such pupils decreased in the Apple Year 7 Control class and increased in the Yard Year 7 Control class, while, in contrast, the Apple Year 7 Meta class showed a slight increase in the percentage of such pupils,
whereas the Yard Year 7 Meta class showed a decrease in the percentage of such pupils.

**Theme:** Pupils' Motivational Orientation  
**Category & Scale:** Task (St)  
**Table 4.38B:** Pupils suggesting that they had a strong task-oriented motivation.

(B1) Following the intervention, the percentage of pupils who appeared to have had a strong task-oriented motivation in each Year 7 class, implied that there may have been a difference between pupils of the same class regarding their motivational orientation. However, there was variety in the Year 7 classes concerning whether there was an increase or a decrease in the percentage of such pupils. Although a difference between pupils had been suggested in most of the Year 7 classes prior to the intervention, there were classes, such as the Apple Year 7 Meta class, that showed a decrease in the percentage of such pupils and showed less pupil similarity than there had been suggested previously. In Apple Year 9, the strong majority of pupils who suggested that they had a strong task-oriented motivation in each class was either maintained or enhanced following the intervention. Therefore, there continued to be a
similarity between pupils of the same class regarding their motivational orientation in Apple Year 9.

(B2) Although all three Apple Year 7 classes showed a decrease in the percentage of pupils with a strong task-oriented motivation, the variation in the size of this percentage decrease had meant that there appeared to be a greater difference between the three classes following the intervention. However, the difference in the percentage of such pupils actually decreased between the Meta and Meta+ classes, and it was the large decrease in the percentage of such pupils in the Control class that widened the range between the classes. In Apple Year 9 there was a remarkable similarity between the three classes regarding the percentage of pupils who appeared to have a strong task-oriented motivation. The similarity in the percentage of such pupils seemed to be a result of the Meta and the Meta+ classes showing a slight increase in the percentage of pupils with a strong task-oriented motivation, whereas the Control class showed a clear decrease in the percentage of such pupils. The largest increase in the percentage of such pupils was in the Meta class, even though this class had, initially, the lowest percentage of pupils with a strong task-oriented motivation. The Yard Year 7 classes also became very similar regarding the percentage of pupils who had a strong task-oriented motivation following the intervention. There was a clear increase in the percentage of such pupils in the Meta and the Meta+ classes, whereas there was a slight decrease in the percentage of such pupils in the Control class.

(B3) Prior to the intervention it had been suggested that there was no consistent difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who suggested that they had a strong task-oriented motivation. However, following the intervention, it appeared that the Apple Year 9 classes had a consistently greater percentage of such pupils compared to the Apple Year 7 classes. In Apple Year 7 the Meta and the Meta+ classes showed a relatively large decrease in the percentage of pupils who suggested that they had a strong task-oriented motivation, while, in contrast, the corresponding classes in Apple Year 9 showed an increase in the percentage of such pupils; a relatively large increase in the percentage of such pupils in the Meta class.

(B4) It had been suggested previously that the Apple Year 7 classes had a slightly greater percentage of pupils who suggested that they had a strong task-oriented motivation compared to the Yard Year 7 classes. However, following
the intervention the opposite appeared to be the case. The main difference between Apple Year 7 and Yard Year 7 was the differing response of the corresponding Meta classes and the corresponding Meta+ classes following the intervention. In Apple Year 7 there was a large decrease in the percentage of pupils who had a strong task-oriented motivation in the Meta and the Meta+ classes. Yet, in the Yard Year 7 Meta and Meta+ classes, there was a relatively large increase in the percentage of such pupils. Furthermore, while both Control classes showed a decrease in the percentage of pupils who had a strong task-oriented motivation, the Apple Year 7 Control class showed a far more dramatic decrease in the percentage of such pupils compared to the Yard Year 7 Control class.

Theme: Pupils' Locus of Control
Category & Scale: Intrinsic
Table 4.39B: Pupils suggesting that they had an intrinsic locus of control.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>(D)</td>
<td>67</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>(D)</td>
<td>30</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>37</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>(D)</td>
<td>56</td>
<td>89</td>
<td>66</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>(D)</td>
<td>61</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>-5</td>
<td>14</td>
<td>-8</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>(D)</td>
<td>63</td>
<td>18</td>
<td>52</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>(D)</td>
<td>47</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>16</td>
<td>-39</td>
<td>2</td>
</tr>
</tbody>
</table>

(B1) Although there was either a clear increase or decrease in the percentage of pupils who had an intrinsic locus of control in most classes, these alterations, in general, did not change the pattern of similarity between pupils of the same class. For example, although the Apple Year 7 Control class showed a decrease of thirty-seven percent of pupils who claimed to have an intrinsic
locus of control, the implication was still that there was a difference between pupils of the same class regarding their perceptions of the locus of control. The Apple Year 9 Meta class was the exception, as the decrease in the percentage of such pupils had meant that there seemed to be less pupil similarity following the intervention than there had been prior to it.

(B2) Prior to the intervention it was the Control class that appeared to be irregular in Apple Year 7, as the Meta class and the Meta+ class had a similar percentage of pupils with an intrinsic locus of control. However, following the intervention, both the Control class and the Meta class showed a decrease in the percentage of such pupils, whereas the Meta+ class showed an increase in the percentage of such pupils. Therefore, not only did the range in the percentage of pupils with an intrinsic locus of control between the classes become smaller, but it was the Meta+ class that appeared the most irregular, being the only class with a majority of such pupils. In Apple Year 9 each class appeared to respond slightly differently to the intervention as the Control and the Meta+ classes showed a slight increase in the percentage of pupils who had an intrinsic locus of control, whereas the Meta class showed a clear decrease in the percentage of such pupils. However, the range in the percentage of such pupils between the three classes became smaller and, as such, there was greater similarity between the classes following the intervention than there had been before it. The Yard Year 7 classes also showed much greater consistency and similarity regarding the percentage of pupils who had an intrinsic locus of control following the intervention. There was a decrease in the percentage of such pupils in the Control class, a dramatic increase in the percentage of such pupils in the Meta class and a slight increase in the percentage of such pupils in the Meta+ class.

(B3) Following the intervention it appeared that the Apple Year 9 classes had a much greater percentage of pupils with an intrinsic locus of control compared to the Apple Year 7 classes. Interestingly, the corresponding Meta classes both showed a decrease in the percentage of pupils with an intrinsic locus of control, whereas both Meta+ classes showed a similar increase in the percentage of such pupils. The main difference between Apple Year 7 and Apple Year 9 concerned the Control classes, where there was a very large decrease in the percentage of pupils with an intrinsic locus of control in the Apple Year 7 class, while there was a slight increase in the percentage of such pupils in the Apple Year 9 class.
Although there continued to be a degree of similarity between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who had an intrinsic locus of control, it appeared that, following the intervention, the Yard Year 7 classes had a slightly greater percentage of such pupils compared to the Apple Year 7 classes. Both Control classes showed a decrease in the percentage of pupils with an intrinsic locus of control and both Meta+ classes showed an increase in the percentage of such pupils, but, in each case, the percentage change in Apple Year 7 was over double that in Yard Year 7. The main difference between Apple Year 7 and Yard Year 7 concerned how the Apple Year 7 Meta class showed a slight decrease in the percentage of pupils who suggested that they may have an intrinsic locus of control, whereas the corresponding Yard Year 7 class showed a dramatic increase in the percentage of such pupils.

Theme: Self-Efficacy (perceived competence)
Category & Scale: Positive Mental (St)
Table 4.40B: Pupils suggesting that they strongly perceived themselves to have good mental abilities for Physical Education.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>70</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>19</td>
<td>64</td>
<td>66</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>51</td>
<td>6</td>
<td>-4</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>63</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>68</td>
<td>54</td>
<td>58</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>-5</td>
<td>3</td>
<td>-2</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>74</td>
<td>29</td>
<td>48</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>73</td>
<td>79</td>
<td>31</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post- intervention</td>
<td>(D)</td>
<td>1</td>
<td>-50</td>
<td>17</td>
</tr>
</tbody>
</table>

Legend
<table>
<thead>
<tr>
<th>Metacognitive Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta</td>
</tr>
<tr>
<td>Meta+</td>
</tr>
</tbody>
</table>

Following the intervention, there continued to be either a weak majority or a slight minority of pupils in each class who perceived themselves to have good
mental abilities for Physical Education. Thus, it still appeared that there was a
difference between pupils of the same class regarding their mental self-
efficacy. However, there were alterations in the percentage of such pupils,
where majorities became minorities, as in the Apple Year 7 Control class, and
where minorities became strong majorities, as in the Yard Year 7 Meta class.

(B2) The similarity between the Apple Year 7 classes regarding the percentage of
pupils who perceived themselves to have good mental abilities for Physical
Education, was drastically reduced following the intervention. While the
Control class showed a very large reduction in the percentage of such pupils,
there was only a very slight reduction in the percentage of such pupils in the
Meta class and an actual increase in the percentage of such pupils in the
Meta+ class. Interestingly, the percentage of pupils who perceived themselves
to have good mental abilities for Physical Education was similar in the Apple
Year 7 Meta and Meta+ classes; the lack of similarity between the three
classes was due to the Control class. In Apple Year 9 there remained a strong
similarity between the classes regarding the percentage of pupils who
perceived themselves to have good mental abilities for Physical Education.
Although there still appeared to be a difference between the Yard Year 7
classes regarding the percentage of such pupils, there was an extremely large
increase in the percentage of pupils who perceived themselves to have good
mental abilities for Physical Education in the Meta class.

(B3) The Apple Year 7 Meta and Meta+ classes maintained a greater percentage of
pupils who perceived themselves to have good mental abilities for Physical
Education compared to the corresponding classes in Apple Year 9. However,
both Meta classes showed a very slight decrease in the percentage of such
pupils and both Meta+ classes showed a slight increase in the percentage of
such pupils. The major difference between Apple Year 7 and Apple Year 9
was the dramatic decrease in the percentage of pupils who perceived
themselves to have good mental abilities for Physical Education in the Apple
Year 7 Control class, compared to a slight increase in the percentage of such
pupils in the corresponding Apple Year 9 class.

(B4) There was a clear difference between each corresponding class in Apple Year
7 and Yard Year 7 regarding the percentage of pupils who perceived
themselves to have good mental abilities for Physical Education. Although the
Control classes had shown, prior to the intervention, a very similar percentage
of such pupils, the decrease of over half the pupils who perceived themselves
to have good mental abilities for Physical Education in the Apple Year 7 class, ensured that there was a difference between the Control classes following the intervention. However, it was the Yard Year 7 Meta class that showed the greatest change in the percentage of pupils who perceived themselves to have good mental abilities for Physical Education, showing an incredible increase of fifty percent of such pupils. This was in sharp contrast with the slight decrease in the percentage of such pupils in the corresponding Apple Year 7 Meta class. The difference between the Apple Year 7 and Yard Year 7 Meta+ classes was maintained following the intervention, with the Apple Year 7 Meta+ class showing a slight increase in the percentage of pupils who perceived themselves to have good mental abilities for Physical Education, and the corresponding Yard Year 7 Meta+ class showing a decrease in the percentage of such pupils.

**Theme:** Self-Efficacy (strength)

**Category & Scale:** Positive Strength

**Table 4.41B:** Pupils suggesting that they perceived themselves to have had the necessary abilities to complete the tasks.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>44</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>15</td>
<td>24</td>
<td>41</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>29</td>
<td>6</td>
<td>-20</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td></td>
<td>37</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td></td>
<td>32</td>
<td>18</td>
<td>42</td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>5</td>
<td>14</td>
<td>-18</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td></td>
<td>26</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td></td>
<td>13</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D)</td>
<td>13</td>
<td>-24</td>
<td>9</td>
</tr>
</tbody>
</table>

**Legend**

<table>
<thead>
<tr>
<th>Meta</th>
<th>Metacognitive Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta+</td>
<td>Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class</td>
</tr>
</tbody>
</table>

(B1) Within each class there remained a minority of pupils who strongly perceived that they had the necessary abilities to complete the tasks. In general, this
minority was only slight, which suggested that there may have been a difference between pupils of the same class regarding their perceptions of their abilities. However, whereas some classes, such as the Apple Year 7 Control class, showed greater similarity between pupils of the same class regarding their failure to strongly perceive that they had the necessary abilities to complete the tasks, other classes, such as the Yard Year 7 Meta class, showed a greater difference between pupils of the same class regarding their perceptions of the strength of their self-efficacy.

(B2) In Apple Year 7, the range in the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks, between the three classes, was widened following the intervention. The range was widened as the Control class showed a large decrease in the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks, whereas the Meta+ class showed a large increase in the percentage of such pupils. In Apple Year 9, the range in the percentage of such pupils between the three classes was also widened. Again, the Meta+ class showed a large increase in the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks, while the Control class and the Meta class showed a decrease in the percentage of such pupils. Yard Year 7 followed a similar pattern to Apple Year 7 and Apple Year 9 regarding the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks, as the range in the percentage of such pupils between the three classes widened following the intervention. However, it was noticeable in Yard Year 7 that both the Meta and the Meta+ classes showed an increase in the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks and, thus, they appeared to have a similar percentage of such pupils.

(B3) Following the intervention there continued to be relatively little difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who suggested that they had the necessary abilities to have completed the tasks well. Interestingly, both Meta+ classes showed a large increase in the percentage of such pupils, whereas the Control classes and the Meta classes showed a decrease in the percentage of such pupils. In both Apple Year 7 and Apple Year 9 the Meta+ class initially had the lowest percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks, but following the intervention they had the
The highest percentage of such pupils compared to the other classes in the same Year.

(B4) There remained relatively little difference between Apple Year 7 and Yard Year 7 regarding the percentage of pupils who strongly perceived that they had the necessary abilities to complete the tasks. Both Control classes showed a decrease in the percentage of such pupils and both Meta+ classes showed an increase in the percentage of such pupils, although these alterations in Apple Year 7 were over double the size those alterations in Yard Year 7. Yet, the main difference between Apple Year 7 and Yard Year 7 lay with the Meta classes, as the Apple Year 7 class showed a slight decrease in the percentage of pupils who believed they had the necessary abilities to complete the tasks well, whereas the Yard Year 7 class showed an increase in the percentage of such pupils.

Theme: Self-Efficacy (generality)
Category & Scale: Positive Generality
Table 4.42B: Pupils suggesting that they perceived their abilities to be useful in most aspects of Physical Education.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control %</td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>26 33 21</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>26 32 28 0 1 7</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D) 16 22 23</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>41 29 24</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>25 7 37</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>(D) 13 43</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>26 12 10</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>13 43 23</td>
<td></td>
</tr>
</tbody>
</table>

Legend
- Meta
- Meta+
Although there was a change in the percentage of pupils who perceived that their abilities could generalise to other Physical Education tasks, in all of the classes, there remained a minority of such pupils in each class. Furthermore, the percentage of such pupils in most classes implied that there was a difference between pupils of the same class regarding their beliefs about the generalisation of their abilities.

The strong similarity between the three Apple Year 7 classes was maintained following the intervention regarding the percentage of pupils who perceived that their abilities could generalise to other Physical Education tasks. Indeed, as the Control and the Meta classes maintained a similar percentage of such pupils and the Meta+ class showed a slight increase in the percentage of such pupils, Apple Year 7 actually showed greater similarity between the three classes. However, there was a decrease in the similarity between the three Apple Year 9 classes regarding the percentage of pupils who perceived that their abilities could generalise to other Physical Education tasks; there was a decrease in the percentage of such pupils in the Control and the Meta classes, and an increase in the percentage of such pupils in the Meta+ class. The similarity between the three Yard Year 7 classes also slightly decreased following the intervention regarding the percentage of pupils who perceived that their abilities could generalise to other Physical Education tasks; there was a large decrease in the percentage of such pupils in the Control class and a large increase in the percentage of such pupils in the Meta and the Meta+ classes.

Excluding the Apple Year 9 Meta class, the Apple Year 7 classes and the Apple Year 9 classes showed a very similar percentage of pupils who perceived that their abilities would have been useful in other aspects of Physical Education. However, while both Meta+ classes showed an increase in the percentage of such pupils, the Apple Year 7 Control and Meta classes maintained approximately the same percentage of such pupils, whereas there was a large decrease in the percentage of such pupils in the corresponding Apple Year 9 classes.

There did not appear to be a consistent difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who perceived that their abilities would have been useful in other aspects of Physical Education. Prior to the intervention, there had been a slight but consistent difference in this respect. Following the intervention, both Meta+
classes showed a similar increase in the percentage of pupils who perceived that their abilities could generalise to other Physical Education tasks, but while the Apple Year 7 Control and Meta classes maintained a similar percentage of such pupils, the corresponding Yard Year 7 classes showed a decrease and an increase in the percentage of such pupils respectively.

Theme: General Self-Worth
Category & Scale: Positive Self-Worth
Table 4.43B: Pupils suggesting that they viewed themselves positively.

<table>
<thead>
<tr>
<th>School</th>
<th>Year</th>
<th>Questionnaire</th>
<th>Difference (D)</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>7</td>
<td>Pre-intervention</td>
<td>22</td>
<td>37</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>7</td>
<td>Post-intervention</td>
<td>7</td>
<td>24</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre-intervention</td>
<td>22</td>
<td>32</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Post-intervention</td>
<td>32</td>
<td>25</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>9</td>
<td>Pre- &amp; Post-intervention</td>
<td>-10</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre-intervention</td>
<td>26</td>
<td>12</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Post-intervention</td>
<td>0</td>
<td>36</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Yard</td>
<td>7</td>
<td>Pre- &amp; Post-intervention</td>
<td>25</td>
<td>-24</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

(B1) All of the classes showed either an increase or a decrease in the percentage of pupils who viewed themselves positively, but these pupils remained in the minority. It appeared that most classes consisted of pupils who seemed to differ in their perceptions of themselves, although the Apple Year 7 and Yard Year 7 Control classes suggested a great similarity regarding pupils' lack of a positive self-worth.

(B2) There was less similarity between the Apple Year 7 classes following the intervention as there was a relatively large decrease in the percentage of pupils who viewed themselves positively in the Control and Meta classes, and an
increase in the percentage of such pupils in the Meta+ class. In contrast, the consistency and similarity between the Apple Year 9 classes was increased; the slight increase in the percentage of pupils who viewed themselves positively in the Control and Meta+ classes, combined with the decrease in the percentage of such pupils in the Meta class, made the three classes similar regarding the percentage of pupils who viewed themselves positively. However, far less similarity was evident between the Yard Year 7 classes because, while there was a large increase in the percentage of pupils who viewed themselves positively in the Meta class, there was a large decrease in the percentage of such pupils in the other two classes. Indeed, the Yard Year 7 Control class had no pupils in it, following the intervention, who viewed themselves positively.

(B3) Prior to the intervention, there had been a strong similarity between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who viewed themselves positively. Following the intervention, the similarity was still evident between the corresponding Meta and Meta+ classes as both of the Meta classes showed a similar decrease in the percentage of such pupils and both of the Meta+ classes showed a slight increase in the percentage of such pupils. The main difference between Apple Year 7 and Apple Year 9 lay in the corresponding Control classes, as both classes had the same percentage of pupils who viewed themselves positively prior to the intervention, but, following the intervention, the Apple Year 7 Control class showed a decrease in the percentage of such pupils, whereas the Apple Year 9 Control class showed an increase in the percentage of such pupils.

(B4) There continued to be relatively little difference between the Apple Year 7 classes and the Yard Year 7 classes regarding the percentage of pupils who viewed themselves positively. While both Control classes showed a similarly dramatic decrease in the percentage of such pupils, there was less similarity between the other corresponding classes. The Apple Year 7 Meta class showed a decrease in the percentage of pupils who viewed themselves positively, whereas the corresponding Yard Year 7 class showed an increase in the percentage of such pupils. This pattern reversed with respect to the Meta+ classes; while the Apple Year 7 class showed an increase in the percentage of pupils who viewed themselves positively, the Yard Year 7 class showed a decrease in the percentage of such pupils.
(B1) In general, most of the classes maintained a majority of pupils who indicated that there had been elements of a strong task-oriented motivational climate during the tasks. Nevertheless, each majority was often not large enough to suggest that there was strong similarity between pupils of the same class regarding their perceptions of the motivational climate. Indeed, some classes, such as the Apple Year 7 Control class, showed a reduction in the percentage of pupils who perceived there to have been elements of a strong task-oriented motivational climate and, rather than there being similarity between pupils of the same class, there seemed to be a difference between pupils of the same class regarding their perceptions of the motivational climate. However, other classes, such as the Yard Year 7 Meta class, indicated a greater similarity between pupils of the same class by having a large majority of pupils who noted a strong task-oriented motivational climate during the tasks.

(B2) There appeared to have been far less consistency and similarity between the Apple Year 7 classes following the intervention than there had been prior to it.
However, both the Meta the Meta+ classes showed an increase in the percentage of pupils who noted elements of a strong task-oriented motivational climate during the tasks, and the much larger increase in the Meta+ class ensured that the two classes showed a similar percentage of such pupils. Hence, it was the dramatic decrease in the percentage of such pupils in the Apple Year 7 Control class that appeared to eliminate the overall consistency between the three classes. The range in the percentage of such pupils between the Apple Year 9 classes was smaller, following the intervention, than it had been prior to the intervention. Yet, it was noticeable that the increase in the percentage of such pupils in the Meta+ class, combined with the slight decrease in the percentage of such pupils in the Meta class, made these two classes similar regarding the percentage of pupils who perceived there to have been elements of a strong task-oriented motivational climate. In Apple Year 9, as in Apple Year 7, it was the Control class that appeared to be the most irregular of the three classes. However, in Yard Year 7 there was a larger degree of similarity between the classes regarding the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks; the dramatic increase in the percentage of such pupils in the Meta class prevented even greater consistency between the classes. Whereas the Control class and the Meta+ classes showed a decrease in the percentage of such pupils, the Meta class showed a very large increase in the percentage of such pupils.

(B3) There did not appear to be a consistent difference between the Apple Year 7 classes and the Apple Year 9 classes regarding the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks. Both Meta+ classes showed an increase in the percentage of such pupils, but the increase was much greater in the Apple Year 7 class which, therefore, provided a similarity between the final percentage of such pupils in each class. The Meta classes differed, in that the Apple Year 7 Meta class showed a slight increase in the percentage of pupils who had noted elements of a strong task-oriented motivational climate within the tasks, while the corresponding Apple Year 9 class had shown a slight decrease in the percentage of such pupils. However, the final percentage of such pupils in each class was relatively similar. The Control classes both showed a decrease in the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks, although the decrease in the percentage of such pupils was much larger in Apple Year 7 than it had been in Apple Year 9.
Following the intervention, the overall similarity between the Apple Year 7 classes and the Yard Year 7 classes, regarding the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks, changed very little. Both Meta classes showed an increase in the percentage of such pupils, and the incredible size of the increase in the Yard Year 7 Meta class, in comparison with that in the corresponding Apple Year 7 class, had meant that the final percentage of such pupils in each class was remarkably similar. The Meta+ classes differed in that the Apple Year 7 class showed a dramatic increase in the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks, whereas the Yard Year 7 Meta+ class had shown a decrease in the percentage of such pupils. Yet, again, this difference had meant that the final percentage of such pupils in each class was more similar than it had been prior to the intervention. Notably, while both of the Control classes showed a decrease in the percentage of pupils who had noted elements of a strong task-oriented motivational climate during the tasks, the decrease was much more dramatic in the Apple Year 7 class and, as such, there was a greater difference between the Control classes regarding the percentage of such pupils following the intervention.
4.1.6.2  The Specific Focus

For clarity,

- Only the three Apple Year 7 classes were involved in the specific focus of the Part Two Main Study Comparison Between Pupils' Pre-Intervention and Post-Intervention Metacognitive Ability (Objectives B1 and B2).
- As there were only Apple Year 7 pupils involved, only objectives (B1) and (B2) could be assessed.
- An indication of the relevant general area precedes each section and an indication of the relevant theme precedes the presentation of each table.
- Information regarding each category and category scale is available in Section 4.1.2.2 and Appendix 14
- Objectives (B1) and (B2) are assessed separately directly after the presentation of each table.
- Within each table, the value zero (0) percent signifies that there were no pupils in the relevant class who referred to the specified category and category scale.
- The category 'blank' is always included to show the percentage of pupils who were unable to offer any response to a specific question, as it presents some insight into those pupils who struggled with their awareness of their metacognitive ability.
- As pupils could potentially refer to more than one category or category scale during a single response, or during responses to more than one question relating to the same theme, the total percentage value in each class column may be greater than one hundred percent. Furthermore, as the number of pupils in each class who referred to a specific category and category scale was transformed into a percentage value, the rounding up and rounding down of a percentage may mean that the total percentage value in each class column is not exactly one hundred percent.
There remained a strong similarity between pupils of the same class following the intervention regarding their perceptions of the purpose behind the tasks. There remained a large majority of pupils in each class who simply described the tasks or activities and were unaware of any main purpose. References made to the development of physical skills or mental skills remained sporadic, which further supported the suggested similarity between pupils of the same class. However, differences between pupils of the same class were evident if the category scales were assessed rather than just the category selected. Following the intervention it appeared that the Meta class and the Meta+ class had greater similarity between pupils within each class compared to the Control class. In each of these classes there was a large majority of pupils who provided an activity description in general terms. In contrast, prior to the
intervention, it was only the Control class that suggested any major similarity between pupils of the same class regarding an activity description in general terms.

(B2) There appeared to be some slight differences between the three classes following the intervention regarding pupils' perceptions of the purpose behind the tasks. Both the Meta class and the Meta+ class showed an increase in the percentage of pupils who provided a description of the activities in general terms and a decrease in the percentage of pupils who provided a description in more specific terms. However, the Control class showed a decrease in the percentage of pupils providing an activity description in general terms and maintained the same percentage of pupils who offered an activity description in specific terms. The Control class also appeared irregular following the intervention because there was an increase in the percentage of pupils who acknowledged, in specific terms, that the purpose of the tasks may have been to develop physical skills. Such awareness was not matched in the other two classes where it was more noticeable that there had been an increase in the percentage of pupils who offered poor activity descriptions as their explanation of the purpose behind the tasks. Yet, whereas both the Meta and the Meta+ classes showed a decrease in the percentage of pupils who were either unaware of any task purpose or were unable to offer any opinion, the Control class showed a very slight increase in the percentage of such pupils. However, all three classes did show some similarity in their failure to suggest that the development of mental skills had been an important purpose of the tasks.
The Influences Upon the Task

Table 4.46B: Apple Year 7 pupils' references regarding the influences upon the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
<td>Meta + %</td>
</tr>
<tr>
<td>Intrinsic Physical</td>
<td>G</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>S</td>
<td>52</td>
<td>37</td>
</tr>
<tr>
<td>Extrinsic Physical</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Intrinsic Mental</td>
<td>G</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>S</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Extrinsic Mental</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Stock / Unaware</td>
<td>-</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Nothing</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

(B1) Following the intervention there remained no influence that was overwhelmingly suggested by the pupils of the same class. There had clearly been slight changes in some of the pupils' opinions regarding the influences upon the tasks but no additional similarities or differences between pupils of the same class had been suggested.

(B2) The classes showed great similarity in the decrease of pupils who had suggested that there were intrinsic physical influences upon the tasks, in both general and specific terms. Following the intervention, virtually no pupils in
any class referred to intrinsic physical influences in general terms and there was an approximate twenty percent decrease of those pupils who referred to such influences in specific terms across all three classes. Similarly, all three classes showed an approximately matching decrease in the percentage of pupils who commented upon extrinsic physical influences in specific terms, while the percentage of pupils who had referred to such influences in general terms had remained basically the same. However, differences between the classes were evident with respect to the percentage of pupils who had suggested mental influences. Whereas the Control class and the Meta class had suggested a decrease in the percentage of pupils who had acknowledged some intrinsic mental influences in general terms, the Meta+ class had maintained the same percentage of such pupils. Furthermore, whereas the Control class maintained the percentage of pupils who had explained some intrinsic influences in specific terms, the other two classes had shown an increase in the percentage of such pupils. The same pattern was evident regarding those pupils who had mentioned extrinsic mental influences in specific terms; the Control class had maintained the same percentage of such pupils and the other two classes had shown a clear increase, in the vicinity of twenty percent, of such pupils. All three classes had shown an increase in the percentage of pupils who referred to some extrinsic mental influences in general terms, although the increase in the Meta class and the Meta+ class, of approximately ten percent, was more noticeable than the increase of such pupils in the Control class. Interestingly, following the intervention none of the classes had any pupils who offered a stock response, although all three classes had shown a clear increase in the percentage of pupils who claimed that nothing could influence their performance during the tasks. The increase of over twenty percent of such pupils in the Meta+ class was more dramatic than in the other classes. Finally, while the Meta+ class suggested a decrease in the percentage of pupils who were unable to offer any opinion as to what could influence their performance, the other two classes suggested a very slight increase in the percentage of such pupils.
### Theme:
The Abundancy and Organisation of the Information

### Table 4.47B:
Apple Year 7 pupils' references regarding the abundancy of information.

<table>
<thead>
<tr>
<th>Category</th>
<th>Main Study: Pre-Intervention Questionnaire</th>
<th>Quasi-Experimental Classes</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scale</td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Enough</td>
<td>-</td>
<td>86</td>
<td>93</td>
</tr>
<tr>
<td>Not Enough</td>
<td>-</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Unsure</td>
<td>-</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

### (B1)
Following the intervention there appeared to be strong similarities between pupils of the same class regarding their views on the abundancy of information. There was a very strong majority of pupils who had suggested that there was enough information available to them during the tasks. Interestingly, the difference between pupils of the Meta+ class appeared to have been removed following the intervention.

### (B2)
Prior to the intervention, there seemed to have been strong similarities between the Control class and the Meta class, while the Meta+ class appeared more irregular. However, following the intervention all three classes had a clear majority of pupils who had suggested that enough information had been made available to them. The Meta+ class had shown a decrease of approximately forty percent of pupils who had been either unsure of the abundancy of information or had been unable to offer any opinion, and an increase of approximately forty percent of pupils who claimed that there was enough information made available. Notably, the other two classes also showed small increases in the percentage of pupils who believed there to have been enough information, even though there was far less potential for such increases in these classes. Thus, there were strong similarities between the three classes following the intervention regarding their perceptions of the abundancy of information.
### Theme:
The Abundancy and Organisation of the Information

### Table 4.48B:
Apple Year 7 pupils' references regarding the prioritisation of information.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Study:</td>
<td>Quasi-Experimental Classes</td>
</tr>
<tr>
<td></td>
<td>Main Study:</td>
<td>Quasi-Experimental Classes</td>
</tr>
<tr>
<td></td>
<td>Study:</td>
<td>Study:</td>
</tr>
<tr>
<td></td>
<td>Quasi-Experimental Classes:</td>
<td>Quasi-Experimental Classes:</td>
</tr>
<tr>
<td>Physical Technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>S</td>
<td>41</td>
<td>52</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Activity Principle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Lesson Issues (GLI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Encouragement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unspecified</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Blank</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

### Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Meta +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mnesic Strategy Class</td>
<td></td>
</tr>
<tr>
<td>Mnesic Strategy, Mnesic Knowledge of Person and Strategy Variation and Cognitive Strategy Class</td>
<td></td>
</tr>
</tbody>
</table>

(B1) Following the intervention it still appeared that there had not been any information that pupils of the same class unanimously believed should have been prioritised. As such, it remained evident that there were differences between pupils of the same class with regard to what information they thought should have been prioritised. However, while there was a slight increase in the percentage of pupils who acknowledged mental techniques and activity principles in some classes, these pupils were clearly in the minority and,
therefore, pupils of the same class were similar in their lack of awareness of such factors. Similarly, general lesson issues and encouragement or general hints from the teacher were not prioritised by a large majority of pupils in each class.

(B2) As a whole, all three classes had shown a decrease in the percentage of pupils who claimed that elements of physical technique should have been prioritised, although the changes in the Control class were far less dramatic than in the other two classes. Yet, while the Meta+ class had shown an increase in the percentage of pupils who had referred to physical technique in general terms, the other two classes had shown a decrease of such pupils. Furthermore, the Control class appeared to have an increase in pupils who had suggested elements of physical technique in specific terms, whereas the other two classes had shown a decrease in the percentage of such pupils. Nevertheless, all three classes had shown an increase in the percentage of pupils who acknowledged elements of mental technique that should have been prioritised, although the increase in the Control class concerned pupils who referred to mental techniques in general terms while the main increase in the other two classes concerned those pupils who referred to mental techniques in more specific terms. The overall increase in the percentage of pupils who acknowledged mental techniques was not great in any class and the most notable increase occurred in the Meta+ class, where there appeared to be a thirteen percent increase of such pupils. All three classes were similar in that very few pupils suggested that any activity principles should have been prioritised. However, there was an increase from no such pupils to twelve percent of pupils in the Meta class, an increase that was not matched in either of the other classes. There remained very few pupils in any of the classes who acknowledged general lesson issues as being important enough to prioritise. Furthermore, the percentage of pupils who had prioritised encouragement or general hints from the teacher reduced in the Control and Meta classes so that there was much greater consistency across the three classes as a whole. All three classes showed a slight increase in the percentage of pupils who failed to specify any information that should have been prioritised although the increase was considerably greater in the Meta+ class compared with the other classes. Yet, the Meta+ class also showed a dramatic decrease in the percentage of pupils who were unable to offer any opinion regarding the prioritisation of information, whereas the percentage of such pupils in the other classes remained similar. Thus, it remained that the Meta+ class appeared to have more pupils who lacked a relevant opinion of what information should have
been prioritised compared to the other two classes; the Meta+ class had approximately a half of the class who lacked such a relevant opinion whereas there was only a third of such pupils in the other classes.

Theme: The Demands of the Task
Table 4.49B: Apple Year 7 pupils' references regarding the demands of the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>General Processes</td>
<td>G</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>General Processes</td>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Processes</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>G</td>
<td>11</td>
<td>48</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>S</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Physical Properties</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>G</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>S</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>Physical Processes</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>G</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Properties</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>G</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>S</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Mental Processes</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None Required</td>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

(B1) There remained a degree of consistency between pupils of the same class regarding their perceptions of what demands the tasks had placed on them. In
each class most pupils had continued to believe that the tasks had mostly placed demands on them physically as opposed to mentally. Furthermore, very few pupils acknowledged general processes which implied that when pupils had an awareness of demands they could identify whether the demands were physical or mental. However, rather than having similarity between the pupils of the same class regarding what they believed had been demanded of them, there was similarity in what they believed had not been demanded of them. Very few pupils of the same class claimed that demands had been placed upon their mental properties or, indeed, on any mental processes.

(B2) All three classes showed a degree of similarity regarding their perceptions of what demands the tasks had placed upon them. Very few pupils in any of the classes had suggested general processes which implied, therefore, that when pupils appreciated that they required certain abilities to complete the tasks they were specific whether these abilities were physical or mental. There were clearly more pupils in each class who acknowledged physical demands and the need for physical abilities, as opposed to mental demands and the need for mental abilities. Furthermore, following the intervention there was a notable consistency between the classes regarding the percentage of pupils who acknowledged, in both general and specific terms, the demands placed upon their physical properties. To achieve such consistency the Control class showed a very slight increase in the percentage of pupils who referred to physical properties in general terms, while the other classes had a dramatic decrease of over thirty percent of such pupils. All three classes showed a dramatic increase in the percentage of pupils who referred to physical properties in specific terms, although the increase in the Meta+ class was approximately ten percent greater than in the other classes. Interestingly, there were slight differences between the three classes in their apparent response to the intervention regarding the percentage of pupils who suggested certain physical processes would be required to complete the tasks. The percentage of pupils who referred to physical processes in general terms increased slightly in the Meta+ class but decreased in the other two classes and, while all three classes showed a decrease in the percentage of pupils who referred to physical processes in specific terms, the decrease was notably smaller in the Meta+ class compared with the other two classes. With respect to mental properties, those few pupils in each class who appreciated the need for mental properties to complete the tasks referred to them in general terms. Interestingly, although the percentage of such pupils in each class was small, there was a slight increase of over ten percent of such pupils in the Meta+ class, whereas the
Meta class showed a decrease in the percentage of such pupils and the Control class maintained the same percentage of such pupils. There was a very slight increase in the percentage of pupils in the Meta and the Meta+ classes who referred to mental processes, in either general or specific terms. However, the percentage of pupils who mentioned mental processes was very small in all of the classes. Notably, there were also very few pupils in each class who stated that they were unaware of the demands placed upon them during the tasks. However, following the intervention there was an increase in the Control class of over ten percent of pupils who suggested that no abilities were required to complete the tasks. This increase coincided with a decrease in the percentage of pupils in the Control class who were unable to offer any opinion regarding the demands of the task. The Meta class also showed a slight increase in the percentage of pupils who claimed that the tasks did not place any demands on their abilities but this was concomitant with an increase in the percentage of pupils who were unable to offer any opinion on the demands of the tasks. In the Meta+ class, the picture appeared more positive as there remained no pupils who claimed that they did not require any abilities to complete the tasks, and there was a relatively large decrease in the percentage of pupils who could not suggest any ideas regarding what abilities were demanded of them during the tasks.

Theme: The Pupils' Feelings During the Task

Table 4.50B: Apple Year 7 pupils' references regarding their feelings during the task.
(B1) While there remained differences between pupils of the same class with respect to their feelings during the tasks, there were also some slight similarities in certain instances. For example, there were very few pupils in the Meta class and the Meta+ class who claimed that they had experienced negative feelings during the tasks. However, these were exceptions and, as a whole, each class appeared to consist of pupils who differed in their feelings during the tasks.

(B2) Following the intervention all three classes showed an increase in the percentage of pupils who experienced positive feelings during the tasks. The most notable increase of such pupils occurred in the Meta+ class, where the percentage of such pupils increased by nearly forty percent. In the Control and the Meta+ classes the increase in the percentage of such pupils coincided with a notable decrease in the percentage of pupils who experienced neutral feelings or negative feelings. However, while the Meta class also showed a decrease in those pupils who experienced negative feelings, those pupils who experienced neutral feelings doubled, increasing by over twenty percent. As such, with a further sixteen percent of pupils claiming that they did not have any feelings during the tasks, over a half of the Meta class appeared to have lacked any form of affective metacognitive experience. Interestingly, there was an increase in the percentage of pupils in all three classes who claimed that they did not have any feelings and, in the Meta class and the Meta+ class, this coincided with a decrease in the percentage of pupils who were unable to state whether they had experienced any feelings. However, the slight increase in the percentage of pupils who had not experienced any feelings in the Control class was concomitant with a increase in the percentage of pupils who were unable to offer any indication of what feelings they had.
In general, there were few notable similarities between pupils of the same class with regard to their appreciation of intra-individual variables, although at some time during the lesson, a large percentage of pupils from each class were either unaware of intra-individual variables or unable to offer any response regarding intra-individual variables. As such, there was a degree of similarity
between pupils of the same class in this respect. However, as some of these same pupils must have also suggested that a source of intra-individual difference could be physical properties, physical processes, mental properties or mental processes, it is suggested that there may be some confusion within individual pupils regarding the concept of intra-individual variables. As such, if pupils have potentially inconsistent and, therefore, flawed appreciation of intra-individual variables it was inevitable that there may have been differences between pupils of the same class.

(B2) The three classes were relatively similar regarding the lack of pupils in each who acknowledged physical properties as intra-individual variables. In the Control class and the Meta class there was a large decrease in the percentage of pupils who suggested, in either general or specific terms, that physical processes may be intra-individual variables. There was also a decrease in the percentage of pupils in the Meta+ class who referred to physical processes in general terms, but the decrease was much less dramatic compared with the other classes. Thus, the three classes became much more consistent regarding the percentage of such pupils. Interestingly, the Meta+ class showed a slight increase in the percentage of pupils who mentioned physical processes in specific terms, although this again made the three classes appear much more consistent with each other. There remained very few pupils in any class that considered mental properties or mental processes as intra-individual variables. There was a decrease in the percentage of pupils who referred to mental processes in the Meta+ class, especially noticeable with regard to those pupils who made reference to mental processes in specific terms. In contrast, the Control class approximately maintained the same percentage of pupils who referred to mental processes and the Meta class actually showed a slight increase in the percentage of such pupils. Notably, the Control class showed a large increase in the percentage of pupils who claimed that some general factors were intra-individual variables, but this was not matched by either of the other classes that remained with very few of such pupils. However, all three classes were similar in that they showed an increase in the percentage of pupils who referred to practical factors, in specific terms, as intra-individual variables. As the percentage increase in each class was similar, the Control class continued to have a greater percentage of such pupils compared to the other two classes. Possibly the most noticeable difference between the three classes concerned the percentage of pupils in each class who, at some time during the tasks, appeared to be unaware of any intra-individual differences or were unable to offer any indication of what the sources of intra-individual
differences could be. The Control class maintained a very similar percentage of such pupils following the intervention, while both of the other classes showed a dramatic increase in the percentage of pupils who were unaware of any intra-individual variables, while also showing a notable decrease of over twenty percent of pupils who were unable to offer any suggestions regarding intra-individual variables. Interestingly, these alterations made the three classes more consistent with each other regarding the percentage of pupils who were unaware of any intra-individual variables or were unable to offer a suggestion regarding intra-individual variables.

Theme: Intra-Individual and Inter-Individual Variables
(Wholist/Analytic Cognitive Style Dimension)

Table 4.52B: Apple Year 7 pupils' references regarding the wholist/analytic style dimension.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Wholist - Awareness</td>
<td>-</td>
<td>52</td>
<td>44</td>
</tr>
<tr>
<td>Wholist - No Awareness</td>
<td>-</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>Analytic - Awareness</td>
<td>-</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Analytic - No Awareness</td>
<td>-</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Wholist Analytic - Awareness</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wholist Analytic - No Awareness</td>
<td>-</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Neither - No Awareness</td>
<td>-</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>30</td>
<td>44</td>
</tr>
</tbody>
</table>

Legend

Meta = Metacognitive Strategy Class
Meta + = Metacognitive Strategy, Metacognitive Knowledge of Persons and Strategy Variation and Cognitive Strategy Class

(B1) Following the intervention there continued to be inconsistencies within individual pupils regarding their preferences in the wholist/analytic style dimension. Pupils must have suggested more than one stylistic tendency or were not always aware of their preferences. As such, it was unlikely that there would be any great similarity between pupils of the same class. Clearly, there had been differences between the pupils of the same class following the
intervention and there remained no preference in the wholist/analytic style dimension that was overwhelmingly suggested by pupils of the same class.

(B2) It was evident that more pupils appeared to be aware of their preferences in the wholist/analytic style dimension following the intervention. Furthermore, the increase was most noticeable in the Meta+ class with over a ten percent increase of pupils with some degree of awareness of their stylistic preferences. It appeared that the pupils who had potentially gained some awareness in the Meta+ class tended towards a wholistic preference or a wholist analytic preference in the wholist/analytic style dimension. However, the percentage of pupils who had awareness of their preferences in the wholist/analytic style dimension in the Control and the Meta class remained very similar to the percentage of such pupils prior to the intervention. Yet, following the intervention the percentage of pupils who suggested wholistic processing preferences and had some awareness of those preferences was very similar in each class, being approximately fifty percent of the pupils. A degree of similarity was maintained regarding the percentage of pupils who suggested wholistic processing preferences but lacked awareness, although the noticeable increase in the percentage of such pupils in the Meta class had reduced the consistency across the three classes slightly. With respect to those pupils who suggested an analytic processing preference, the Control class and the Meta class showed an increase in the percentage of such pupils who had awareness of their preference and a decrease in the percentage of pupils who lacked awareness of their preference. However, in contrast, the Meta+ class showed a decrease in the percentage of pupils who were aware of their preference and maintained the same percentage of pupils who lacked awareness of their preference. Interestingly, there appeared to be an increase in the percentage of pupils in each class who suggested that they may have a wholist analytic preference and were happy to process information in either manner. However, the increase in the percentage of such pupils was more noticeable in the Control and the Meta classes, and, with respect to these classes, was often accompanied by a lack of pupil awareness of the preference. All three classes showed a similar trend for there to be fewer pupils who were unable to offer any response at all regarding their preferences in the wholist/analytic style dimension, although all three classes did show an increase in the percentage of pupils who had provided responses that offered no insight into their stylistic preferences.
Theme: Intra-Individual and Inter-Individual Variables (Verbaliser/Imager Cognitive Style Dimension)

Table 4.53B: Apple Year 7 pupils’ references regarding the verbaliser/imager style dimension.

<table>
<thead>
<tr>
<th>Category</th>
<th>Main Study:</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Intervention Questionnaire</td>
<td>Post-Intervention Questionnaire</td>
</tr>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Verbaliser - Awareness</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Verbaliser - No Awareness</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Imager - Awareness</td>
<td>-</td>
<td>78</td>
</tr>
<tr>
<td>Imager - No Awareness</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Verbaliser Imager - Awareness</td>
<td>-</td>
<td>81</td>
</tr>
<tr>
<td>Verbaliser Imager - No Awareness</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Neither - No Awareness</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
</tr>
</tbody>
</table>

(B1) As there had been previously, there was a large percentage of pupils in each class who had suggested a preference for imager representation and a large percentage of pupils who had suggested no strong preference for either verbaliser or imager representation. As such, it still appeared that pupils may have had a lack of stability regarding their preferences in the verbaliser/imager style dimension. However, clearly a majority of pupils in each class remained in the imager half of the verbaliser/imager stylistic continuum, thereby suggesting that pupils of the same class had similar preferences and showed a similar stability regarding those preferences. The lack of pupils in each class who suggested preferences towards verbaliser representation confirmed the relative similarity between pupils of the same class.

(B2) It was evident that there had been an increase in the percentage of pupils in the Meta and the Meta+ classes who appeared to be aware of their preferences in the verbaliser/imager style dimension following the intervention, especially in the Meta class which showed over a ten percent increase of such pupils.
However, their appeared to be a smaller percentage of pupils in the Control class who had such awareness than there had been prior to the intervention. These slight changes had made the three classes much more consistent with respect to pupils' awareness of their preferences in the verbaliser/imager style dimension. The percentage of pupils who acknowledged a verbaliser representation preference was very small in all three classes. Furthermore, while the percentage of pupils who were aware of their verbaliser representation preference in the Control and Meta classes decreased, the percentage of pupils with a verbaliser representation preference not only increased slightly in the Meta+ class, but these pupils also had an awareness of their preference. All three classes were very similar in that those pupils who suggested that they had an imager preference in the verbaliser/imager style dimension also appeared to have an awareness of that preference. However, while there was a decrease in the percentage of such pupils in the Control class there was an increase in the percentage of such pupils in the other classes, an increase that was especially noticeable in the Meta class. Notably, those pupils who implied that they had a verbaliser imager preference and were happy to represent information in either manner also appeared to have an awareness of that preference. Furthermore, the percentage of such pupils in each class remained basically unchanged and, therefore, remained very similar to each other; there was a clear majority of such pupils in each class. All three classes showed a similar trend in that there were few pupils who were unable to offer any response at all regarding their preference in the verbaliser/imager style dimension and there was a decrease in the percentage of such pupils in the Meta and the Meta+ classes. However, the Control class and the Meta class also showed an increase in the percentage of pupils who had provided responses that offered no insight into their preferences in the verbaliser/imager style dimension.
Theme: Inter-Individual Variables

Table 4.54B: Apple Year 7 pupils' references regarding their awareness of inter-individual variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Awareness</td>
<td></td>
<td>59</td>
<td>22</td>
</tr>
<tr>
<td>Unsure</td>
<td></td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Don't Know</td>
<td></td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>4</td>
<td>37</td>
</tr>
</tbody>
</table>

In both the Control class and the Meta+ class there appeared to be differences between pupils of each class. There appeared to be an approximately even balance between those pupils who suggested that they had some awareness of inter-individual variables and those pupils who failed to make such suggestions. However, the Meta class, as it had prior to the intervention, appeared to have greater similarity between the pupils within it as there were more pupils who failed to suggest any awareness of inter-individual variables than there were pupils who suggested that they had some awareness.

As had been the case prior to the intervention, there appeared to be slight differences between the three classes regarding pupils' awareness of possible inter-individual variables. Nevertheless, all three classes showed a similar decrease in the percentage of pupils who had an awareness of inter-individual variables and, as such, continued to have a relatively wide difference in the percentage of such pupils. However, the decrease in the percentage of such pupils in each class had meant that, following the intervention, the pupils who had suggested some awareness of inter-individual variables were in the minority. Notably, while the Meta class showed a decrease in the percentage of pupils who suggested that they had no awareness of any inter-individual variables, the other two classes had shown an increase in the percentage of such pupils. As such, assuming that those pupils who were unable to offer any
response regarding their awareness of inter-individual variables were unsure of their awareness or lacked awareness, following the intervention there was greater uncertainty in the Control class and the Meta class than there had been before the intervention. In contrast, there was less uncertainty in the Meta+ class following the intervention than there had been prior to it.

Theme: Inter-Individual Variables

Table 4.55B: Apple Year 7 pupils' references regarding the types of inter-individual variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Gender</td>
<td>G</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gender</td>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gender</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>G</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>S</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental Factors</td>
<td>G</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Mental Factors</td>
<td>S</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Mental Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Ability</td>
<td>G</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>General Ability</td>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Ability</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Don't Know</td>
<td></td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

(B1) As had been the case prior to the intervention, there were no inter-individual variables that were overwhelmingly suggested by the pupils in any class. Thus, in general, there appeared to be differences between pupils of the same class regarding their perceptions of inter-individual variables. However, it was
noticeable that pupils of the same class were more similar in what they did not perceive to have been inter-individual variables. For example, gender was not viewed by the pupils as being an important inter-individual difference that may influence performance during the tasks.

(B2) There were both similarities and differences between the three classes regarding pupils' perceptions of inter-individual variables. As had been the situation prior to the intervention, gender did not appear to be an issue with any of the classes and no pupils stated that it was a reason for inter-individual difference. All three classes showed a degree of similarity in that very few pupils appeared to suggest in general terms, that physical factors were inter-individual variables. However, it was noticeable that while there was a increase in the percentage of such pupils in the Meta+ class, the other two classes showed a decrease in the percentage of such pupils. However, there was a notable increase in the percentage of pupils who, in specific terms, implied that physical factors were inter-individual variables in the Meta class. Such an increase was not matched in either of the other two classes where the percentage of such pupils remained very similar to that which it had been prior to the intervention. However, these slight alterations had meant that the three classes had a similar percentage of pupils who had acknowledged physical factors, in specific terms, as inter-individual variables. Notably, all three classes showed a decrease in the percentage of pupils who implied, in general terms, that mental factors were inter-individual variables. However, while the percentage of pupils was relatively small, the Meta+ class showed an increase of ten percent of pupils who referred to mental factors, in specific terms, as being inter-individual variables; an increase that was not matched in either of the other classes. General Ability remained a common reason provided by pupils for inter-individual differences, yet, while the Control class and the Meta class maintained approximately forty percent of pupils who referred to general ability, the Meta+ class showed a noticeable decrease of almost twenty percent of such pupils. As such, there was less consistency between the three classes regarding the percentage of pupils who referred to general ability compared with prior to the intervention. All three classes had an increase in the percentage of pupils who implied that there were no inter-individual variables that may lead to varied performances, although the largest increase of such pupils occurred in the Meta and the Meta+ classes. As such, the three classes were much more similar with respect to the percentage of pupils who claimed that there were no important inter-individual variables. Interestingly, the Meta+ class showed an increase in the percentage of pupils who stated that
they were not sure if there were any inter-individual variables, an increase that was not matched in either of the other classes. Yet, both the Meta and the Meta+ showed a decrease in the percentage of pupils who failed to offer an opinion regarding inter-individual variables, the most noticeable decrease being in the Meta+ class. The Control class, however, actually showed a slight increase in the percentage of such pupils.

Theme: Universals of Cognition
Table 4.56B: Apple Year 7 pupils' references regarding the universals of cognition.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Enough - Additional</td>
<td>G</td>
<td>4</td>
</tr>
<tr>
<td>Enough - Additional</td>
<td>S</td>
<td>4</td>
</tr>
<tr>
<td>Enough - Additional</td>
<td>P</td>
<td>11</td>
</tr>
<tr>
<td>Enough - No Ideas</td>
<td>-</td>
<td>56</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>G</td>
<td>0</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>S</td>
<td>11</td>
</tr>
<tr>
<td>Not Enough - Additional</td>
<td>P</td>
<td>0</td>
</tr>
<tr>
<td>Not Enough - No Ideas</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Don't Know</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>11</td>
</tr>
</tbody>
</table>

Compared with prior to the intervention, there seemed to be greater similarity between pupils of the same class regarding their perceptions of the universals of cognition. There was a large majority of pupils in each class who claimed that there had been enough information for them and that they had no ideas for any possible additional information.

There remained a majority of pupils who claimed that there had been enough information for them to complete the tasks successfully. Furthermore, there
were strong similarities between the classes as most pupils also argued that they had no ideas for any additional information. Thus, the three classes also had a similar percentage of pupils who did actually suggest some additional information, either general information or specific information; the percentage of such pupils, both before and after the intervention, was small. Interestingly, there was a reduction in the percentage of pupils in the Meta class who claimed that there was not enough information made available for them but these pupils still had no ideas as to what additional information they required. There was a very slight increase in the percentage of such pupils in the Meta+ class. Interestingly, while there was an increase in the percentage of pupils in the Control class who failed to offer any suggestion regarding the universals of cognition, there was a decrease of over twenty percent of such pupils in the other two classes. As a result, it appeared that there were more pupils in the Meta and the Meta+ classes who had some degree of awareness regarding the universals of cognition compared to the Control class. This was in contrast to the situation prior to the intervention, where the Control class appeared to have more pupils who had some awareness of the universals of cognition compared to the other classes.
General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?

Table 4.57B: Apple Year 7 pupils' references regarding what strategies or strategic thoughts were utilised.

<table>
<thead>
<tr>
<th>Category</th>
<th>Main Study: Quasi-Experimental Classes</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scale</td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>G</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>S</td>
<td>74</td>
<td>56</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>G</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>General Mental Techniques</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Specific Mental Techniques</td>
<td>G</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Specific Mental Techniques</td>
<td>S</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Specific Mental Techniques</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>External Factors</td>
<td>G</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>External Factors</td>
<td>S</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>External Factors</td>
<td>P</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nothing</td>
<td>-</td>
<td>63</td>
<td>59</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>33</td>
<td>52</td>
</tr>
</tbody>
</table>

(B1) A relatively large percentage of pupils in each class had thought about physical factors during the tasks, but focused on specific factors as opposed to general factors. Yet, the percentage of such pupils was not overwhelming and far from suggested that there was similarity between pupils of the same class in this respect. There was greater similarity between pupils of the same regarding what they did not think about during the tasks. Few pupils considered general mental techniques and very few considered specific mental techniques, especially following the intervention. Furthermore, while few pupils actively thought about external factors that were irrelevant to the tasks,
there appeared to be a majority of pupils who suggested that they had not actually thought about anything at all during the tasks, with a large percentage of pupils also unable to offer any opinion regarding their thoughts. As such, the greatest similarity between pupils of the same class appeared to be that, at some time during the tasks, they had not been considering anything that may have been beneficial to the completion of the tasks.

(B2) Following the intervention, all three classes showed a decrease in the percentage of pupils who had considered general physical factors during the tasks. However, while the Control class and the Meta class showed a further decrease in the percentage of pupils who considered specific physical factors, there was a slight increase in the percentage of such pupils in the Meta+ class. The most noticeable decrease in the percentage of pupils who had thought about specific physical factors occurred in the Control class, with the changes in the other two classes being very slight. There was, in general, a very slight change in the percentage of pupils who had considered general mental techniques during the tasks. The Control class maintained the same percentage of pupils who had thought about general mental techniques, there was a decrease of such pupils in the Meta class, while the Meta+ class showed a slight increase in the percentage of such pupils. The percentage of pupils who had considered specific mental techniques was very small in all three classes. Indeed, the Control class and the Meta class showed only a slight decrease in the percentage of such pupils but this had meant that nobody in these classes, following the intervention, had considered specific mental techniques at all. In the Meta+ class there was a small increase in the percentage of pupils who considered specific mental techniques. Again, all three classes were similar in the very few pupils who considered external factors during the tasks, although each class did also show a very slight increase in the percentage of such pupils following the intervention. As such, the Control class maintained a greater percentage of such pupils compared to the other classes. However, there was a difference between the classes regarding the percentage of pupils who had failed to consider anything during the tasks or had implied that they were unable to offer any insight into their thoughts. The Meta+ class showed a slight decrease in the percentage of pupils who suggested that they had not thought about anything during the tasks, and an almost twenty percent decrease in the percentage of pupils who simply offered no insight into their thoughts. However, in the other two classes, there was an approximately ten percent increase of pupils in both categories.
### Why Use the Strategy?

**Table 4.58B:** Apple Year 7 pupils' references regarding why they considered utilising certain strategies or strategic thoughts.

<table>
<thead>
<tr>
<th>Category</th>
<th>Main Study:</th>
<th>Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Intervention Questionnaire</td>
<td>Post-Intervention Questionnaire</td>
</tr>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>CogG</td>
<td>33</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>CogS</td>
<td>26</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>CogP</td>
<td>0</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractC</td>
<td>11</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractS</td>
<td>56</td>
</tr>
<tr>
<td>Conscious Decision</td>
<td>PractP</td>
<td>0</td>
</tr>
<tr>
<td>Unconscious Decision</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>G</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>S</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>P</td>
<td>4</td>
</tr>
<tr>
<td>No Reason</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>48</td>
</tr>
</tbody>
</table>

(B1) As was the situation prior to the intervention, there were no strong similarities between pupils of the same class regarding why they had certain thoughts during a task, although there was some similarity regarding those factors that did not seem to have influenced their thoughts. There was a large percentage of pupils who had made conscious cognitive decisions based on general factors, and a similarly large percentage of pupils who had made conscious cognitive decisions based on specific factors. However, while conscious cognitive decisions were clearly utilised by a majority of pupils, there were no strong similarities between pupils of the same class evident. There had been a decrease in the percentage of pupils who had made conscious practical decisions across all three classes. As such, in the Meta and the Meta+ classes, there was greater similarity between pupils as only very few acknowledged practical factors as a reason for their strategic thoughts during the tasks. There
continued to be similarities between pupils of the same class regarding the implication that their actions and thoughts had not been a reaction to unconscious decisions or encouraged by others. Clearly, a large percentage of pupils in each class had no reason why they had contemplated certain actions or specific cognitive strategies during the tasks, but there appeared to have been a relatively balanced split between those pupils who offered a reason and those who did not.

(B2) There appeared to have been greater similarity between the three classes regarding the percentage of pupils who had made conscious cognitive decisions based on general factors, due to the slight increase of such pupils in the Control class and the Meta+ class. However, more noticeable were the changes in the percentage of pupils who had made conscious cognitive decisions based on specific factors. The percentage of such pupils increased in all three classes, but while the increase of such pupils in the Control class and the Meta class was approximately ten percent, the increase was approximately fifty percent in the Meta+ class. There continued to be similarity between the classes in that those pupils who had made conscious practical decisions had done so based on specific factors as opposed to general factors. However, following the intervention, there was a decrease in the percentage of pupils who had made conscious practical decisions based on specific factors in all three classes. Yet, the decrease was much greater in the Control class, over three times greater, compared to the other two classes. As such, the three classes, in this respect, appeared to be much more consistent with each other following the intervention. The percentage of pupils who made unconscious decisions was very small in all three classes which made it difficult to suggest any patterns. Nevertheless, following the intervention there was a slight increase in the percentage of such pupils in the Meta+ class and a decrease in the percentage of such pupils in the other two classes. There was a decrease in the percentage of pupils who implied, in general terms, that others had encouraged their actions. However, there was an increase in the percentage of pupils who made such implications in more specific terms in both the Control class and the Meta class. As such, the three classes became more consistent with each other regarding the low percentage of pupils who noted the influence of others upon their actions. There was an increase in the percentage of pupils in all three classes who suggested that they had no reasons for taking certain actions during the tasks, but while there was a decrease in the percentage of pupils who were unable to offer any response in the Meta+ class, this was not matched in either of the other classes. However, there
continued to be large percentage of pupils in all three classes who either suggested that there was no reason for their actions or were unable to offer any indication of the reasons behind their actions.

### Theme: When to Use the Strategy

Table 4.59B: Apple Year 7 pupils' references regarding when certain strategies or strategic thoughts would be useful.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>In Context</td>
<td>Gd</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Pr</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Near Transfer</td>
<td>Gd</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Pr</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wider Transfer</td>
<td>Gd</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Pr</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No Context</td>
<td></td>
<td>41</td>
<td>22</td>
</tr>
<tr>
<td>Not Applicable</td>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Don't Know</td>
<td></td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>19</td>
<td>33</td>
</tr>
</tbody>
</table>

(B1) Following the intervention there appeared to have been greater similarity between pupils of the same class regarding their appreciation of when specific cognitive strategies are transferable, or useful, in other tasks or activities. There was a large percentage of pupils who did not suggest any context in which a specific strategy would be useful, who stated that they did not know of any such context, or who were unable to even offer a response regarding the transferability of specific cognitive strategies. Indeed, in the Meta class this referred to every pupil. As such, there was similarity between pupils of
the same class in their apparent lack of awareness of when specific cognitive strategies are transferable, or useful, in certain contexts.

(B2) There appeared to have been relatively strong, general, similarities between the three classes regarding pupils' awareness of when specific cognitive strategies could be utilised. Although the percentages were initially very small, there was still a decrease in the percentage of pupils, in all three classes, who appreciated that the specific cognitive strategies would be useful in the context of the tasks and activity in which they had participated. There was a similar decrease across all three classes regarding the percentage of pupils who noted that the specific cognitive strategies would be useful for closely related activities and, therefore, near transfer. All three classes showed a decrease in the percentage of pupils who suggested good examples of possible wider transfer of the specific cognitive strategies, although the decrease was notably less, almost three times less, in the Meta+ class compared with the other two classes. While the Control class showed a very slight increase in the percentage of pupils who suggested 'OK' wider transfer possibilities, the Meta class showed a decrease in the percentage of such pupils and the Meta+ class maintained the same percentage of such pupils. Notably, although all three classes had an increase in the percentage of pupils who suggested a lack of awareness of any relevant context for the specific cognitive strategies, the increase was over two times larger in the Meta+ class compared with the other classes. Yet, the three classes showed more similarity in the percentage of such pupils following these changes. The Meta+ class also showed a greater increase in the percentage of pupils who stated that they were unaware of any context in which the specific cognitive strategies may be useful compared with the other classes. These larger increases in the Meta+ class coincided with a decrease in the percentage of pupils who were unable to offer any response, while the smaller increases in the Control and the Meta classes were concomitant with a further increase in the percentage of pupils who were unable to offer a response. Interestingly, all three classes indicated a general increase in the percentage of pupils who were unaware of when specific cognitive strategies could be used, either in the tasks or activity in which they had participated or in other activity areas. As such, the three classes were very similar in that a large majority of pupils in each class, indeed, all of the pupils in the Meta class, appeared to lack awareness of when to utilise specific cognitive strategies.
### Theme: Pupils' Monitoring of the Strategy and the Task

Table 4.60B: Apple Year 7 pupils' references regarding their monitoring of their strategic action and the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Change - Want</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Change - Need</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Change - Informed</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change - No Reason</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>No Change - Want</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>No Change - Need</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>No Change - Informed</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>No Change - No Reason</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>No Change - Couldn't</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Don't Know</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td>30</td>
<td>37</td>
</tr>
</tbody>
</table>

*Main Study: Quasi-Experimental Classes*

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
<th>Control %</th>
<th>Meta %</th>
<th>Meta + %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change - Want</td>
<td>-</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Change - Need</td>
<td>-</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Change - Informed</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change - No Reason</td>
<td>-</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>No Change - Want</td>
<td>-</td>
<td>11</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>No Change - Need</td>
<td>-</td>
<td>19</td>
<td>7</td>
<td>14</td>
<td>22</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>No Change - Informed</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>No Change - No Reason</td>
<td>-</td>
<td>11</td>
<td>7</td>
<td>17</td>
<td>11</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>No Change - Couldn't</td>
<td>-</td>
<td>15</td>
<td>4</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Don't Know</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>30</td>
<td>37</td>
<td>48</td>
<td>30</td>
<td>32</td>
<td>17</td>
</tr>
</tbody>
</table>

(B1) There had continued to be a degree of similarity between pupils of the same class in that most pupils either did not change the specific cognitive strategy that they were using or they were, at least, unaware of any change. However, the reasons offered by the pupils in each class regarding why they did or did not change their specific cognitive strategy during the tasks, were clearly varied and, as such, it appeared that there were still differences between pupils of the same class regarding their monitoring of their strategic action and the tasks.

(B2) There remained clear similarities between the three classes in that there were a majority of pupils who did not change the specific cognitive strategy that they were using during the tasks, or were, at least, unaware of any change. Furthermore, there was a relatively large percentage of pupils in each class who either stated that they did not know whether they had changed their
specific cognitive strategy or not, or were simply unable to offer any response. However, the percentage of such pupils had reduced considerably in the Meta+ class, the percentage had over halved. Yet, in the other two classes the percentage of such pupils had changed very little. Nevertheless, the noticeable difference between the classes remained with the pupils' reasons for making their decisions. While the Meta+ suggested a slight increase in the percentage of pupils who selected to change, or not to change, their specific cognitive strategy because that was what they wanted, the other classes showed a decrease of over ten percent of such pupils. The Control class and Meta+ class maintained a similar percentage of pupils who perceived that there was a need, or there was not a need, to change their specific cognitive strategies, whereas the Meta class showed a noticeable increase in the percentage of such pupils. The Meta class also showed a decrease in the percentage of pupils who appeared to rely on being informed about whether they should change their specific cognitive strategies or not and, as such, all three classes had a similar percentage of such pupils following the intervention. While the Control class maintained a similar percentage of pupils who had no reason for either changing or not changing their specific cognitive strategies, the other classes showed an increase of approximately fifteen percent of such pupils. As a final point, it was interesting that there was an increase of ten percent of pupils in the Meta+ class that claimed, for some reason, they could not have changed their specific cognitive strategy. The other classes appeared to show a slight decrease in the percentage of such pupils.
### Theme:

Pupils' Feelings During their Strategic Action and the Task

### Table 4.61B:

Apple Year 7 pupils' references regarding their feelings during their strategic action and the task.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Positive</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Negative</td>
<td>-</td>
<td>44</td>
<td>33</td>
</tr>
<tr>
<td>Physical</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>None</td>
<td>-</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

(Bl) Although there appeared to have been changes in pupils' opinions regarding their feelings about their strategic action during the tasks, it still seemed that there were differences between pupils of the same class in this respect. Interestingly, where there had been a striking similarity between pupils of the same class regarding their lack of positive feelings, the only major similarity between the pupils following the intervention was the lack of neutral feelings that were expressed. However, the pupils within the Control class also showed a degree of similarity in the lack of negative feelings expressed. Nevertheless, the general variety in the form of pupils' affective metacognitive experiences meant that, as a whole, there was little similarity between pupils of the same class regarding their feelings during their strategic action and the tasks.

(B2) There were some strong similarities between the three classes regarding pupils' feelings during their strategic action and the tasks. There was an increase in the percentage of pupils who had experienced positive feelings following the intervention, although the increase was less noticeable in the Meta+ class. All three classes showed a decrease in the percentage of pupils who expressed neutral feelings during their strategic action and the tasks, and a decrease in the percentage of pupils who expressed negative feelings during...
their strategic action and the tasks. However, the decrease in the percentage of such pupils was less dramatic in the Meta+ class compared with the other two classes. Yet, it was the Control class that appeared slightly irregular with respect to the percentage of pupils who were more concerned with physical experiences rather than feelings; although all three classes showed an increase in the percentage of such pupils, the increase was larger in the Control class. All three classes showed a similar increase in the percentage of pupils who claimed that they had no feelings during their strategic action and the tasks and, as such, the classes maintained the slight differences that they had shown prior to the intervention in this respect. That is, there were more pupils in the Meta+ class who claimed to have not experienced any feelings compared with the other two classes. However, while the Meta+ class showed a decrease in the percentage of pupils who were unable to offer any response regarding their feelings during their strategic action and the tasks, the other two classes showed a slight increase in the percentage of such pupils. It was noticeable that there was a decrease in percentage of pupils who had experienced negative feelings and an increase in the percentage of pupils who had experienced positive feelings in all three classes. However, while the Control class appeared to show a relatively large decrease in the percentage of pupils who actually had some form of affective metacognitive experience, be it positive or negative, the Meta class and the Meta+ class showed an increase and a stability in the percentage of such pupils respectively.
General Area: Interactional Variables

Theme: Pupils' Volitional Control

Table 4.62B: Apple Year 7 pupils' references regarding their volitional control.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Volitional</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>No Volitional</td>
<td>56</td>
<td>52</td>
</tr>
<tr>
<td>Don't Know</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Blank</td>
<td>30</td>
<td>70</td>
</tr>
</tbody>
</table>

(B1) There still appeared to have been inconsistencies within an individual pupil regarding their perceptions of their volitional control. While a relatively large percentage of pupils in each class suggested that they had some degree of volitional control, a percentage of these same pupils must have also stated that they had no volitional control, stated that they were unaware of whether they had volitional control, or were unable to offer any idea of what volitional control they had. With such inconsistencies within a large percentage of individual pupils it seemed apparent that there were going to be few similarities between pupils of the same class, as a whole.

(B2) Prior to the intervention, there had been a much larger percentage of pupils in the Control class who claimed to have some degree of volitional control compared with the other two classes. However, following the intervention the Control class showed a large decrease in the percentage of such pupils, whereas the other classes showed a large increase in the percentage of such pupils. As such, following the intervention there was greater similarity between the classes regarding the percentage of pupils who claimed to have some volitional control. The Control class showed an increase in the percentage of pupils who, at some time, were unable to offer any suggestion regarding what volitional control they had. Yet, in the other classes there was...
a decrease in the percentage of such pupils, a large decrease with respect to the Meta+ class. The Control class did indicate a decrease in the percentage of pupils who had suggested that at times they lacked volitional control, whereas the other classes indicated an increase in the percentage of such pupils. However, all three classes remained similar in that over half of each class claimed that, at some point during the tasks, they had no volitional control. There was an increase in the Control class and the Meta+ class regarding the percentage of pupils who stated that they were unaware of their volitional control. In contrast, the Meta class showed a ten percent decrease of such pupils. Thus, although there were small similarities and small differences between the three classes, all three classes were bonded in that a large percentage of pupils in each had shown an inconsistency in their perceptions of their volitional control.
Theme: The Wider Purpose of Physical Education

Table 4.63B: Apple Year 7 pupils' references regarding their perceptions of the purpose of Physical Education.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Main Study: Quasi-Experimental Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Intervention Questionnaire</td>
</tr>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Health &amp; Fitness</td>
<td>Men</td>
<td>0</td>
</tr>
<tr>
<td>Health &amp; Fitness</td>
<td>Gen</td>
<td>30</td>
</tr>
<tr>
<td>Health &amp; Fitness</td>
<td>Phys</td>
<td>70</td>
</tr>
<tr>
<td>Physical Skills</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>Mental Skills</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Social</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>Satisfy Others</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Experience</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Future</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>No Purpose</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>7</td>
</tr>
</tbody>
</table>

(B1) In each class there remained a large percentage of pupils who suggested that a main purpose of Physical Education was to develop pupils' health and fitness. As such, there was a degree of similarity between pupils of the same class in this respect. Furthermore, in the Meta and the Meta+ classes almost every pupils' view of Physical Education was based on the development of the physical aspects of health and fitness, as opposed to the mental aspects. In addition, pupils of the same class were similar in their perceptions that the purpose of Physical Education was to improve physical factors rather than mental factors, such as understanding the principles behind Physical Education activities. There were further similarities between pupils of the same class as very few pupils suggested social factors, enjoyment, satisfying others, experience or development for the future were reasons for participation.
in Physical Education. Furthermore, very few pupils in any class suggested that Physical Education had no purpose and, therefore, pupils of the same class were similar in that they appreciated Physical Education had a purpose even if they were not necessarily aware of it.

(B2) Health and Fitness remained a strong focus for pupils in all three classes regarding the purpose of Physical Education. However, while the Meta class maintained a similar percentage of pupils who referred to general health and fitness, the other classes showed a decrease in the percentage of such pupils, a dramatic decrease of over fifty percent in the Meta+ class. These alterations following the intervention had meant that the three classes became more consistent with each other in respect of the percentage of pupils who referred to general health and fitness. Both the Control class and the Meta class showed a decrease in the percentage of pupils who suggested that physical health and fitness was a main purpose of Physical Education, although the decrease in the Meta class was much less than in the Control class. In contrast, the Meta+ class indicated that there had been an increase in the percentage of such pupils. As such, while the Meta and the Meta+ classes showed a clear majority of pupils who claimed that physical health and fitness was a key concern of Physical Education, the Control class had a minority of such pupils. All three classes showed that less pupils referred to the development of physical skills as a purpose of Physical Education than there had been prior to the intervention. However, while the Meta class showed a slight increase in the percentage of pupils who had mentioned the development of mental skills, there was a slight decrease in the percentage of such pupils in the other two classes. All three classes were very similar in the lack of pupils who considered social factors, enjoyment, satisfying others, experience or development for the future as reasons for Physical Education. However, all three classes also showed an increase in the percentage of pupils who were either unaware of the purpose of Physical Education or unable to offer any opinion regarding the purpose of Physical Education.
Theme: Pupils' Motivational Orientation
Table 4.64B: Apple Year 7 pupils' references regarding their motivational orientation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Quasi-Experimental Classes</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
<td>Meta + %</td>
</tr>
<tr>
<td>Task</td>
<td>St</td>
<td>78</td>
<td>89</td>
<td>69</td>
</tr>
<tr>
<td>Task</td>
<td>Wk</td>
<td>74</td>
<td>78</td>
<td>48</td>
</tr>
<tr>
<td>Ego</td>
<td>St</td>
<td>37</td>
<td>44</td>
<td>38</td>
</tr>
<tr>
<td>Ego</td>
<td>Wk</td>
<td>56</td>
<td>63</td>
<td>28</td>
</tr>
<tr>
<td>Social</td>
<td>St</td>
<td>7</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Social</td>
<td>Wk</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td>-</td>
<td>67</td>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>33</td>
<td>67</td>
<td>76</td>
</tr>
</tbody>
</table>

(B1) There appeared to be similarities between pupils of the same class regarding the suggestion that, at times, they had task-oriented motivation. There was a more specific similarity between pupils of the Meta class and between the pupils of the Meta+ class in the respect that a large majority of pupils indicated a weak task-oriented motivation. Pupils of the same class were also similar in that they generally did not suggest a social motivational orientation. However, a large percentage of pupils in each class also implied that they had an ego-oriented motivation during the tasks or, indeed, failed to show any tendencies towards either motivational orientation. Thus, there was a degree of individual inconsistency with regard to pupils' motivational orientation. Therefore, as had been the case prior to the intervention, there were three notable similarities between the pupils of the same class, firstly, most of the pupils suggested that they had a task-oriented motivation, secondly, most pupils failed to show a tendency towards a social motivational orientation, and thirdly, most pupils implied that they had inconsistent perceptions of their motivational orientation.
All three classes showed a decrease in the percentage of pupils who suggested that they had a strong task-oriented motivation. However, the decrease in the Control class was greater than the decrease in either of the other classes and had meant that the Control class, following the intervention, had a minority of pupils who indicated having a strong task-oriented motivation. Furthermore, the Control class also showed a large decrease in the percentage of pupils who appeared to have a weak task-oriented motivation, whereas the Meta class maintained a very similar percentage of such pupils and the Meta+ class showed a large increase in the percentage of such pupils. Although each class appeared to respond differently to the intervention, it was noticeable that all three classes had more pupils indicating a weak task-oriented motivation than a strong task-oriented motivation; in contrast to the situation prior to the intervention. Notably, while the Meta+ class had shown an increase in the percentage of pupils who had suggested an ego-oriented motivation, both a strong and weak orientation, the other two classes had suggested a decrease in the percentage of such pupils. These alterations had reduced the similarity between the classes regarding the percentage of pupils who had suggested a strong ego-oriented motivation, but improved the similarity between the classes regarding the percentage of pupils who had suggested a weak ego-oriented motivation. All three classes had a low percentage of pupils who implied that they had a social-oriented motivation. However, whereas the Meta class showed a slight increase in the percentage of such pupils, there was a decrease in the percentage of such pupils in the other two classes. Interestingly, the Meta class also appeared slightly irregular by maintaining a similar percentage of pupils who did not suggest a tendency to any motivational orientation and a similar percentage of pupils who simply were unable to provide a response; the Control class showed a clear decrease and an increase in the percentage of such pupils respectively, and the Meta+ class showed an increase and a decrease in the percentage of such pupils respectively.
Theme: Pupils' Locus of Control

Table 4.65B: Apple Year 7 pupils' references regarding their perceptions of the locus of control.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
<td>Meta + %</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>67</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Unaware</td>
<td>19</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Blank</td>
<td>30</td>
<td>63</td>
<td>55</td>
</tr>
</tbody>
</table>

Legend:

- Meta: Metacognitive Strategy Class
- Meta+: Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class

(B1) Following the intervention it appeared that, in all three classes, those pupils who had suggested that they had an intrinsic locus of control were either in a weak majority or a slight minority. As such, there appeared to be slight differences between pupils of the same class regarding their locus of control. However, a notable similarity between pupils of the same class concerned their suggestions that they did not have an extrinsic locus of control. Furthermore, it appeared that following the intervention there was a relatively large percentage of pupils in the Control class and the Meta class who, at some time, had indicated that they were unaware of the locus of control or unable to offer any opinion whatsoever.

(B2) Although all three class showed a notable percentage of pupils who implied that they had an intrinsic locus of control, there had been a decrease in the percentage of such pupils in the Control class and the Meta class, the most noticeable decrease occurring in the Control class. In contrast, the Meta+ class showed an increase in the percentage of such pupils providing a majority. All three classes were very similar with regard to the very small percentage of pupils who suggested having an extrinsic locus of control, although there had been a slight increase in the percentage of such pupils in each class. There was a more dramatic increase in the percentage of pupils who were unaware of the locus of control across all three classes. Although the largest increase in the percentage of such pupils occurred in the Meta+ class, there remained a
degree of similarity between the three classes regarding the percentage of such pupils. Furthermore, while the Control class and the Meta class only showed a comparatively small increase in the percentage of pupils who were unaware of the locus of control, they showed an increase in the percentage of pupils who were unable to offer any response. In contrast, the increase in the percentage of pupils in the Meta+ class who were unaware of their locus of control was concomitant with a decrease in the percentage of pupils who failed to offer any response.

Theme: Self-Efficacy (perceived competence)

Table 4.66B: Apple Year 7 pupils' references regarding their self-efficacy.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Positive Physical</td>
<td>St</td>
<td>52</td>
<td>56</td>
</tr>
<tr>
<td>Positive Physical</td>
<td>Wk</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Positive Mental</td>
<td>St</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Positive Mental</td>
<td>Wk</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Positive General</td>
<td>St</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>Positive General</td>
<td>Wk</td>
<td>11</td>
<td>33</td>
</tr>
<tr>
<td>Negative Physical</td>
<td>St</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Negative Physical</td>
<td>Wk</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Negative Mental</td>
<td>St</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>Negative Mental</td>
<td>Wk</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Negative General</td>
<td>St</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>Negative General</td>
<td>Wk</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td></td>
<td>41</td>
<td>15</td>
</tr>
<tr>
<td>Blank</td>
<td></td>
<td>41</td>
<td>59</td>
</tr>
</tbody>
</table>

(B1) In general, there were no strong similarities between pupils of the same class regarding their self-efficacy as no ability was overwhelmingly suggested by pupils of the same class. There was, however, some similarity between pupils
of the same class regarding the strength of their convictions. Most pupils had clear perceptions about their abilities, if pupils suggested a strength or weakness they appeared definite about it. Nevertheless, it was interesting that a large percentage of pupils in each class, at times, were either unaware of any of their strengths and weaknesses, or were unable to offer any indication of their self-efficacy. The only other notable similarity between pupils of the same class concerned their perceptions that they did not have poor mental abilities.

(B2) All three classes appeared to consist of pupils who were only aware of their abilities if they were extremely efficient or extremely inefficient. Most pupils, when they showed some awareness of their abilities, suggested that they were very poor weaknesses or very good strengths; the category scales were strong and not weak. While the Meta+ class showed an increase in the percentage of pupils who perceived themselves as having strong positive physical abilities, the other two classes showed a decrease in the percentage of such pupils. Exactly the same pattern was observable with respect to the percentage of pupils who referred to their strong positive mental abilities. However, while the decrease in the percentage of such pupils was only small in the Meta class, it was dramatic in the Control class, with a drop of over fifty percent of such pupils. Thus, the Meta and the Meta+ classes had a similar sized majority of pupils who had a strong positive perception of their mental abilities, whereas the Control class had a clear minority of such pupils. Interestingly, the Control class maintained the same percentage of pupils who perceived themselves as having strong positive general abilities, while there was a large increase in the percentage of such pupils in the Meta class and a noticeable decrease in the percentage of such pupils in the Meta+ class. Yet, the pattern varied with respect to those pupils who viewed themselves as having weak positive general abilities. There was an increase in the percentage of such pupils in the Meta+ class but a decrease in the percentage of such pupils in the other classes. Very few pupils perceived themselves as having negative physical or negative mental abilities and it was noticeable that, in general, there was still a slight decrease in the percentage of such pupils in all three classes. Furthermore, there was a strong stability in all three classes regarding the percentage of pupils who perceived themselves as having negative general abilities. However, in the Control class there was an increase in the percentage of pupils who were unable to provide any sort of response regarding their self-efficacy, although there was a decrease in the percentage of pupils who stated that they were unaware of their abilities. In contrast, the other two classes
showed a decrease in the percentage of pupils who were unable to offer any response and an increase in the percentage of pupils who appeared to lack awareness of their abilities. Therefore, there seemed to be both similarities and differences between the three classes regarding their self-efficacy.

Theme: Self-Efficacy (strength)
Table 4.67B: Apple Year 7 pupils' references regarding the strength of their self-efficacy.

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Study</td>
<td>Quasi-Experimental Classes</td>
</tr>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Positive Strength</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>Negative Strength</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>-</td>
<td>19</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>26</td>
</tr>
</tbody>
</table>

(B1) There appeared to be some differences between pupils of the same class regarding the strength of their perceptions that they had the necessary abilities to complete the tasks. Very few pupils of the same class claimed that their abilities were not good enough to complete the tasks although there was a relatively large percentage of pupils in each class who suggested that they may lack awareness of the strength of their abilities.

(B2) Following the intervention the Meta+ class showed an increase of twenty percent of pupils who perceived their abilities to have been good enough to complete the tasks successfully. In contrast, the Control class showed a considerable decrease in the percentage of such pupils and the Meta class showed only a slight decrease in the percentage of such pupils. However, all three classes maintained a stability with regard to the percentage of pupils who suggested that their abilities would not have been good enough for the completion of the tasks and, as such, the percentage of such pupils remained low in all of the classes. Yet, while there were some similarities between the
classes, there was a noticeable difference between them regarding the percentage of pupils who provided responses that were not applicable, who suggested a lack of awareness concerning the strength of their abilities and who were unable to offer any response. In combination, these pupils appeared to lack understanding and awareness of the strength of their abilities and, whereas there was a clear increase in the percentage of such pupils in the Control class and the Meta class, there was a decrease in the percentage of such pupils in the Meta+ class.

Theme: Self-Efficacy (generality)
Table 4.68B: Apple Year 7 pupils' references regarding the generality of their self-efficacy.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td>Positive Generality</td>
<td>-</td>
<td>26</td>
<td>33</td>
</tr>
<tr>
<td>Negative Generality</td>
<td>-</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>-</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Aware</td>
<td>-</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>33</td>
<td>52</td>
</tr>
</tbody>
</table>

(B1) There appeared to be few strong similarities between pupils of the same class regarding pupils' perceptions of the generality of their abilities; there seemed to be a clear split between those pupils who indicated some awareness of the generality of their abilities and those pupils who lacked such awareness. However, the pupils in the Control class appeared to show some similarity in that, if they appeared to have some awareness of the generality of their abilities, they viewed themselves positively.

(B2) All three class indicated a remarkable stability regarding the percentage of pupils who perceived their abilities to have generality. However, there was an increase in the percentage of pupils in the Meta+ class who indicated that their
abilities would generalise across tasks which was not matched in the other two classes. Furthermore, the classes also showed a decrease in the percentage of pupils who viewed their abilities to lack generality. However, these alterations had meant that, in all three classes, there were more pupils who provided responses that were not applicable, who lacked awareness of the generality or who were unable to offer any response, than there were pupils who showed a clear awareness of their abilities and their potential to be useful during other tasks and activities. This situation had been evident prior to the intervention in the Meta class and the Meta+ class, but not in the Control class.

Theme: General Self-Worth

Table 4.69B: Apple Year 7 pupils' references regarding their general self-worth.

<table>
<thead>
<tr>
<th>Category</th>
<th>Main Study: Pre-Intervention Questionnaire</th>
<th>Quasi-Experimental Classes Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control %</td>
<td>Meta %</td>
<td>Meta + %</td>
</tr>
<tr>
<td>Positive</td>
<td>22</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Negative but Aware</td>
<td>26</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Negative Aware</td>
<td>30</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unaware</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Blank</td>
<td>19</td>
<td>19</td>
<td>38</td>
</tr>
</tbody>
</table>

(B1) The relatively large and relatively similar percentage of pupils who either viewed themselves positively or viewed themselves negatively within the Meta and the Meta+ classes implied that there were no strong similarities between pupils of these classes. However, most pupils did not overtly state that they had no views regarding their self-worth. In addition, pupils in each class had shown that, if they had a negative self-worth they also had an awareness of their weaknesses. As such, there appeared to be, at least, some similarity between pupils of the same class. In the Control class, following the intervention, there was strong similarity between pupils regarding their lack of
positive self-worth and their lack of weak negative self-worth. Yet, in general, there appeared to be differences between pupils of the same class regarding their general self-worth.

(B2) Following the intervention, there appeared to be less consistency between the classes regarding the percentage of pupils who viewed themselves positively; there had been a dramatic decrease in the percentage of such pupils in the Control class and a slight decrease in the percentage of such pupils in the Meta class. However, in contrast, the Meta+ class had shown an increase in the percentage of such pupils. Interestingly, the Meta+ class had also shown a clear increase in the percentage of pupils who had suggested a strong negative view of themselves while appreciating their weaknesses, and an increase in the percentage of pupils who had only a weak negative view of themselves while appreciating what their weaknesses were. In contrast, the other classes showed a stability in the percentage of pupils who had a strongly negative view of themselves and an awareness of their weaknesses, and a decrease in the percentage of pupils who only had a weak negative view of themselves and had an awareness of their weaknesses. All three classes had very few, if any, pupils who had a negative view of themselves or who overtly claimed not to have any views of themselves. However, while there was a large decrease in the percentage of pupils who were unable to offer any response regarding their general self-worth in the Meta+ class, there was a large increase in the percentage of such pupils in the other two classes. This appeared to be in sharp contrast with the situation prior to the intervention, where it was the Meta+ class that had the greatest percentage of pupils who offered no response or insight into their general self-worth.
Theme: Motivational Climate

Table 4.70B: Apple Year 7 pupils' references regarding their perceptions of the motivational climate during the lesson.

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale</th>
<th>Pre-Intervention Questionnaire</th>
<th>Post-Intervention Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>St.</td>
<td>Control %</td>
<td>Meta %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>Task</td>
<td>Wk.</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>Ego</td>
<td>St.</td>
<td>78</td>
<td>52</td>
</tr>
<tr>
<td>Ego</td>
<td>Wk.</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Blank</td>
<td>-</td>
<td>22</td>
<td>52</td>
</tr>
</tbody>
</table>

(B1) There were clearly slight inconsistencies within individual pupils' perceptions of the motivational climate throughout the intervention, as there had been prior to it. As such, there was inevitably going to be a degree of difference between pupils of the same class. However, most pupils in the Control class, at some point, were unable to offer any opinion regarding the motivational climate. The pupils within the Meta class showed signs of similarity with a large percentage of pupils acknowledging, at some time, a strong task-oriented motivational climate. The pupils in the Meta+ class showed a similar pattern, although the pupils within this class were also similar in that most of them claimed that the climate had, at some stage, been strongly ego-oriented. The major similarity between pupils of the same class, in all of the classes, was that the motivational climate was very rarely viewed as neutral.

(B2) There were some similarities between the three classes regarding pupils' perceptions of the motivational climate. Indeed, all three classes showed that very few pupils claimed the motivational climate to be neutral or overtly suggest that they were unaware of the motivational climate. Yet, following the intervention, there were still slight differences between the classes. It was still
noticeable that, while the Control class showed a stable percentage of pupils who viewed the motivational climate to be neutral, there was a decrease in the percentage of such pupils in the other classes. Furthermore, while the Control class also maintained a stable percentage of pupils who overtly claimed that they were unaware of the motivational climate, there was a very slight increase in the percentage of such pupils in the other two classes. Nevertheless, there were more major differences between the classes regarding pupils' perceptions of the motivational climate. There was an increase in the percentage of pupils in both the Meta and Meta+ classes who viewed the motivational climate as having been strongly task-oriented. The increase in the Meta+ class had been dramatic and, as such, the Meta class and the Meta+ class showed greater similarity following the intervention than prior to it. In contrast, there had been a dramatic decrease in the percentage of such pupils in the Control class. There had been a similarly sharp decrease in the Control class regarding the percentage of pupils who viewed the motivational climate to be weakly task-oriented. There was a slight decrease in the percentage of such pupils in the Meta class also. However, in contrast, there was a clear increase in the percentage of such pupils in the Meta+ class; the percentage of such pupils actually doubled. Interestingly, the Control class had a decrease in the percentage of pupils who suggested that there had been a strong ego-oriented motivational climate, whereas the other two classes had shown a large increase in the percentage of such pupils. The Meta+ class had also shown a slight increase in the percentage of pupils who claimed that there had been a weak ego-oriented motivational climate, an increase that was not matched in either of the other classes. Therefore, in general, it appeared that the motivational climate was perceived differently by individual pupils and, indeed, by individual classes. The motivational climate was not perceived as being constant. Furthermore, the decrease in the percentage of pupils in the Meta+ class who failed to offer a response regarding the motivational climate, further supported the assumption that there had been an increase in pupils' awareness of the motivational climate in the Meta+ class. In contrast, the Control class showed a dramatic increase in the percentage of such pupils with almost the whole class, at some point, being unable to offer any view regarding the motivational climate. The Meta class showed only a slight increase in the percentage of such pupils.
4.1.7 The Content Knowledge Statistical Analysis

The content knowledge statistical analysis forms part of the comparison between the pre- and post-intervention data (part two of the main study). Both the pre- and post-intervention questionnaires included fifteen content knowledge questions that were based upon the lesson activity content that was involved in the observed and the intervention lessons respectively. However, the total points available varied between the pre- and post-intervention questionnaires, between different Years of the same school and between different schools, as the activity and content of the lesson dictated the degree of information that could be considered. It was emphasised during the completion of the questionnaires that the last fifteen questions (the content knowledge questions) should only be considered after attempting to answer all of the earlier questions; the author had prioritised obtaining data directly related to pupils' metacognitive knowledge of task, person and strategy variables. It appeared that some pupils never reached the content knowledge questions while others perceived the instructions to mean that the content knowledge questions were not as important as the other questions. As a consequence, some pupils' content knowledge questions were left blank. Purely for the statistical analysis, it was deemed necessary to remove any questionnaire that did not indicate that the pupil had attempted to answer the content knowledge questions; thus preventing the data from being excessively skewed because of poor administrative procedures on the part of the author. The table of content knowledge scores for each school and Year are available in Appendix 16. Each table includes the zero (0) scores of those pupils who failed to even attempt the content knowledge questions to show how many of the questionnaires were removed for the statistical analysis; these are clearly indicated. From the data tables it could be observed that the content knowledge scores of each class did not follow a normal distribution. As such, 'distribution-free' or non-parametric statistical procedures were required and the measure of central tendency required for the statistical analysis was the median (Cohen & Holliday, 1979). Thus, to compare the three samples (the Control class and two quasi-experimental classes) with a general hypothesis that the intervention setting variables within each class had no effect on the performance of the pupils, the Kruskal-Wallis statistical approach was deemed appropriate (Noether, 1991; Ott, 1988). All statistical data was computed through MINITAB\textsuperscript{10} and all of the data established through the utilisation of MINITAB has been presented (Tables 4.02 to 4.06).

\textsuperscript{10} MINITAB is a registered trademark.
Ideally, any statistical analysis involved in educational research should acknowledge the multiple levels of influence placed upon pupils; for example, pupils learn in classes, classes are taught within schools, and schools may be administered within local authorities or school boards (Woodhouse, Rasbash, Goldstein & Yang, 1995). Therefore, in statistical terms it would have been necessary to utilise a Multilevel Modelling approach, whereby it would be acknowledged that there are variations at numerous levels. A typical multilevel model for the educational system would assign pupils to level one, classes to level two, schools to level three and authorities or boards to level four (Woodhouse, Rasbash, Goldstein & Yang, 1995). Units at level one would be recognised as being grouped, or nested, within units at a higher level. However, as the statistical analysis only played a minor role in the main study and because the purpose of the statistical analysis was to identify possible patterns and interactions between pupils’ metacognitive ability and their content knowledge following treatments to develop metacognitive ability, such extensive analysis was not viewed as appropriate. Nevertheless, it was acknowledged that to search for statistical significance as strong evidence that the main study intervention setting variables were influential in the non-parametric Kruskal-Wallis statistical analysis would have been naïve. Moreover, the P-values in some of the pre-intervention data, such as in School 5 (MSt) 'Apple' Year 7, suggested that the classes were far from similar with regard to their pre-intervention content knowledge scores, which would mean that it would be impossible to even suggest whether any difference between the classes following the intervention was due to the intervention setting variables. Therefore, the statistical analysis focused upon the descriptive statistical data (i.e. medians and rank values).
Table 4.02  Kruskal-Wallis Statistical Analysis Regarding School 5 (MSt) 'Apple' Year 7 Pupils' Content Knowledge Scores

<table>
<thead>
<tr>
<th>Classes</th>
<th>Pre-Intervention or Post-Intervention</th>
<th>Numbers</th>
<th>Median</th>
<th>Av. Rank</th>
<th>Z-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Pre-intervention</td>
<td>10</td>
<td>12</td>
<td>28.1</td>
<td>1.39</td>
</tr>
<tr>
<td>Meta</td>
<td>Pre-intervention</td>
<td>17</td>
<td>7</td>
<td>25.1</td>
<td>0.85</td>
</tr>
<tr>
<td>Meta+</td>
<td>Pre-intervention</td>
<td>18</td>
<td>3</td>
<td>18.1</td>
<td>-2.03</td>
</tr>
<tr>
<td>Overall</td>
<td>Pre-intervention</td>
<td>45</td>
<td>-</td>
<td>23</td>
<td>-</td>
</tr>
<tr>
<td>Control</td>
<td>Post-intervention</td>
<td>10</td>
<td>1</td>
<td>12.6</td>
<td>-2.85</td>
</tr>
<tr>
<td>Meta</td>
<td>Post-intervention</td>
<td>17</td>
<td>8</td>
<td>23.7</td>
<td>0.29</td>
</tr>
<tr>
<td>Meta+</td>
<td>Post-intervention</td>
<td>18</td>
<td>9</td>
<td>28.1</td>
<td>2.13</td>
</tr>
<tr>
<td>Overall</td>
<td>Post-intervention</td>
<td>45</td>
<td>-</td>
<td>23</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Stat</td>
<td>4.47</td>
<td>9.18</td>
</tr>
<tr>
<td>d.f.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P-value</td>
<td>0.108</td>
<td>0.01</td>
</tr>
</tbody>
</table>

In school 5 (MSt) 'Apple' Year 7 it appeared that while the Control class showed a decrease in the median content knowledge score, both the Meta and Meta+ classes showed an increase in the median content knowledge score. Indeed, both the median content knowledge score and the average rank value for the Control class were initially the highest compared to the Meta and Meta+ classes, but following the intervention they were the lowest. Interestingly, it was the Meta+ class that showed the most notable increase in the median content knowledge score and average rank value following the intervention.
Table 4.03  Kruskal-Wallis Statistical Analysis Regarding School 6 (MSt) 'Yard' Year 7 Pupils' Content Knowledge Scores

<table>
<thead>
<tr>
<th>Classes</th>
<th>Pre-Intervention or Post-Intervention</th>
<th>Numbers</th>
<th>Median</th>
<th>Av. Rank</th>
<th>Z-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Pre-intervention</td>
<td>11</td>
<td>6</td>
<td>15.2</td>
<td>0.67</td>
</tr>
<tr>
<td>Meta</td>
<td>Pre-intervention</td>
<td>9</td>
<td>3</td>
<td>8.6</td>
<td>-2.49</td>
</tr>
<tr>
<td>Meta+</td>
<td>Pre-intervention</td>
<td>7</td>
<td>10</td>
<td>19</td>
<td>1.94</td>
</tr>
<tr>
<td>Overall</td>
<td>Pre-intervention</td>
<td>27</td>
<td>-</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>Control</td>
<td>Post-intervention</td>
<td>11</td>
<td>6</td>
<td>12.5</td>
<td>-0.81</td>
</tr>
<tr>
<td>Meta</td>
<td>Post-intervention</td>
<td>9</td>
<td>6</td>
<td>13.8</td>
<td>-0.08</td>
</tr>
<tr>
<td>Meta+</td>
<td>Post-intervention</td>
<td>7</td>
<td>5</td>
<td>16.6</td>
<td>1</td>
</tr>
<tr>
<td>Overall</td>
<td>Post-intervention</td>
<td>27</td>
<td>-</td>
<td>14</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Stat.</td>
<td>7.36</td>
<td>1.15</td>
</tr>
<tr>
<td>d.f.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P-value</td>
<td>0.026</td>
<td>0.565</td>
</tr>
</tbody>
</table>

In school 6 (MSt) 'Yard' Year 7 it appeared that while the Control class maintained the same median content knowledge score, the Meta class showed an increase in the score and the Meta+ class showed a decrease in the score. The Meta+ class showed the highest median content knowledge score initially but the lowest median content knowledge score following the intervention. Only the Meta class showed an increase in both the median content knowledge score and the average rank value, although notably, the decrease in the average rank value in the Control class and the Meta+ class were very similar. Although the analysis remains descriptive it was noticeable that the P-values for school 6 (MSt) 'Yard' Year 7 suggested that the classes were more similar following the intervention than they were prior to it.
Table 4.04  Kruskal-Wallis Statistical Analysis Regarding School 3 (MStQ) Year 7 Pupils' Content Knowledge Scores

<table>
<thead>
<tr>
<th>Classes</th>
<th>Pre-Intervention or Post-Intervention</th>
<th>Numbers</th>
<th>Median</th>
<th>Av. Rank</th>
<th>Z-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Pre-intervention</td>
<td>21</td>
<td>11</td>
<td>31</td>
<td>1.54</td>
</tr>
<tr>
<td>Meta</td>
<td>Pre-intervention</td>
<td>10</td>
<td>10</td>
<td>26.5</td>
<td>-0.1</td>
</tr>
<tr>
<td>Meta+</td>
<td>Pre-intervention</td>
<td>22</td>
<td>10</td>
<td>23.4</td>
<td>-1.44</td>
</tr>
<tr>
<td>Overall</td>
<td>Pre-intervention</td>
<td>53</td>
<td>-</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td>Control</td>
<td>Post-intervention</td>
<td>21</td>
<td>11</td>
<td>29.6</td>
<td>0.98</td>
</tr>
<tr>
<td>Meta</td>
<td>Post-intervention</td>
<td>10</td>
<td>8.5</td>
<td>17.5</td>
<td>-2.15</td>
</tr>
<tr>
<td>Meta+</td>
<td>Post-intervention</td>
<td>22</td>
<td>12</td>
<td>28.8</td>
<td>0.73</td>
</tr>
<tr>
<td>Overall</td>
<td>Post-intervention</td>
<td>53</td>
<td>-</td>
<td>27</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Stat.</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>d.f.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P-Value</td>
<td>0.257</td>
<td>0.056</td>
</tr>
</tbody>
</table>

In school 3 (MStQ) Year 7 it appeared that while the Control class maintained the same median content knowledge score, the Meta class showed a decrease in the score and the Meta+ class showed an increase in the score. Only the Meta+ class showed an increase in both the median content knowledge score and the average rank value. Interestingly, the Meta intervention setting appeared to interfere with school 3 (MStQ) Year 7 pupils' content knowledge.
Table 4.05  Kruskal-Wallis Statistical Analysis Regarding School 5 (MSt) 'Apple'
Year 9 Pupils' Content Knowledge Scores

<table>
<thead>
<tr>
<th>Classes</th>
<th>Pre-Intervention or Post-Intervention</th>
<th>Numbers</th>
<th>Median</th>
<th>Av. Rank</th>
<th>Z-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Pre-intervention</td>
<td>16</td>
<td>14.5</td>
<td>24.6</td>
<td>1.04</td>
</tr>
<tr>
<td>Meta</td>
<td>Pre-intervention</td>
<td>19</td>
<td>12</td>
<td>22.1</td>
<td>0.06</td>
</tr>
<tr>
<td>Meta+</td>
<td>Pre-intervention</td>
<td>8</td>
<td>11.5</td>
<td>16.5</td>
<td>-1.37</td>
</tr>
<tr>
<td>Overall</td>
<td>Pre-intervention</td>
<td>43</td>
<td>-</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>Post-intervention</td>
<td>16</td>
<td>11.5</td>
<td>16.4</td>
<td>-2.24</td>
</tr>
<tr>
<td>Meta</td>
<td>Post-intervention</td>
<td>19</td>
<td>16</td>
<td>28.6</td>
<td>3.08</td>
</tr>
<tr>
<td>Meta+</td>
<td>Post-intervention</td>
<td>8</td>
<td>11</td>
<td>17.4</td>
<td>-1.15</td>
</tr>
<tr>
<td>Overall</td>
<td>Post-intervention</td>
<td>43</td>
<td>-</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Stat.</td>
<td>2.23</td>
<td>9.58</td>
</tr>
<tr>
<td>d.f.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P-value</td>
<td>0.328</td>
<td>0.008</td>
</tr>
</tbody>
</table>

In school 5 (MSt) 'Apple' Year 9 it appeared that both the Control class and the Meta+ class showed a decrease in the median content knowledge score while the Meta class showed an increase in the score. Only the Meta class showed an increase in both the median content knowledge score and the average rank value. Interestingly, the decrease in the Meta+ class regarding the median content knowledge score was only very slight and clearly less evident than the decrease in the Control class. Furthermore, while the Control also showed a decrease in the average rank value, the Meta+ class showed an increase in this value.
In school 3 (MSiQ) Year 9 it appeared that while the Control class maintained the same median content knowledge score, the Meta class showed an increase in the score and the Meta+ class showed a decrease in the score. Only the Meta class showed an increase in both the median content knowledge score and the average rank value. Both the Control class and the Meta+ class showed a similar decrease in the average rank value. As such, while it may have seemed that the Meta+ could have interfered with pupils' content knowledge there seemed to be very little difference between the response of the Control class and Meta+ class following the intervention.

To summarise, with such basic forms of statistics it was impossible to categorically state whether any changes in pupils' content knowledge were due to the intervention setting variables or other variables, such as covert school variables, overt school variables or personal variables. However, the purpose of the statistical analysis was simply to suggest patterns between metacognitive ability and content knowledge. With this in mind, it was suggested from the median content knowledge scores and the average rank values in each class that, regardless of age or school variables, the
Meta intervention setting, the Meta+ intervention setting or both intervention settings seemed to increase pupils' content knowledge while the Control setting maintained or decreased pupils' content knowledge. However, occasionally, either the Meta or Meta+ intervention setting did appear to have been more of a hindrance to pupils' content knowledge compared to the Control setting, although from assessing both median content knowledge scores and average rank values any differences were very slight.
Chapter Five

Discussion
5.1 Discussion

5.1.1 Introduction

The discussion will be sectioned by each content analysis General Area heading. Throughout the discussion, the pre-intervention data (part one of the main study) which are relevant to objectives (A1) to (A5) will precede the comparison between pre- and post-intervention data (part two of the main study) which are relevant to objectives (B1) to (B4). The interaction between pupils' metacognitive ability and their content knowledge following the intervention (objective C) is discussed separately, although some of the variables involved in the interaction, such as age variables, may be referred to earlier in the discussion. The content analysis overall focus upon Apple and Yard and the content analysis specific focus upon Apple Year 7, in part one and part two of the main study, are integrated.

For the purpose of the discussion, pupils' metacognitive ability and the development of metacognitive ability will be considered in relation to known literature, stage one (the preliminary study), three (the pilot study) and four (the main study) of the research programme and additional ethnographic data (Appendix 13). The discussion acknowledges that there are numerous interacting and influential variables upon pupils' metacognitive ability and the development of pupils' metacognitive ability in the Physical Education context, but, where possible, the discussion will highlight an important variable. However, it is important to highlight the scarcity of research in Physical Education regarding metacognitive ability and, especially the development of metacognitive ability, and it is this lack of research that makes comparisons and any discussion more difficult.

---

11 The author emphasises that contextual variables may have influenced pupils' metacognitive ability and the development of pupils' metacognitive ability. For example, there was the possibility that age variables, covert school variables (the school itself and the school ethos, the physical education department and the physical education department ethos), overt school variables (the teacher, the class, the lesson development) and pupil variables could have had an impact on the efficiency of pupils' metacognitive ability and the effectiveness of the intervention setting variables in aiding the development of pupils' metacognitive ability.
5.1.2 **Discussion of Results**

General Area: Metacognitive Knowledge of Task Variables

**Theme:** The Desired Outcomes and Purpose of the Task

**Pre-Intervention Data:**

Lee & Solmon (1992) stated that in the complex Physical Education environment, pupils' perceptions of task will be a critical variable. From both the overall focus upon Apple and Yard, Year 7 and 9, and the specific focus upon Apple Year 7, it appeared that most pupils lacked an awareness of task purpose and they failed to appreciate that the teachers' aims were to develop the physical and mental skills required for the tasks. It was evident from the specific focus that pupils could describe the tasks but could not explain the purpose behind doing them. As such, it appeared that most pupils from each class, Year and school showed a poor metacognitive knowledge of task purpose. Research has suggested that pupils often lacked knowledge regarding the purpose behind tasks (Nisbet & Shucksmith, 1986; Weinstein, 1994) and the pre-intervention data undoubtedly reinforces this view. Baird (1992: p41) also noted, during a study of grade 7-11 pupils, that "many students seemed to have little idea of the answers to such questions as 'Why were you doing the topic?'", and Weinstein (1994: p258) noted that the problem with lacking awareness of the purpose behind a task was that, "It is impossible to know if you have reached a goal if you are not clear about the nature of the goal." It appeared that most pupils failed to consider the purpose of the tasks even though each teacher had overtly referred to a specific purpose and felt that they had structured the tasks to focus on this purpose.

Although many pupils did not seem to have metacognitive knowledge of task purpose or utilise any metacognitive strategies to develop awareness, to monitor or to evaluate that metacognitive knowledge, the Apple Year 9 classes appeared to have a greater percentage of pupils who appreciated that the purpose behind the tasks was to develop specific physical skills and specific mental skills compared to any other classes. It is possible that age variables, covert school variables and overt school variables may have been influencing pupils' metacognitive knowledge of task purpose. Interestingly, with respect to overt school variables, Clive (the Apple Year 9 teacher) did spend more time than any other teacher during the explanation phase of the lesson. The emphasis placed upon explaining what was going to happen during the lesson may have enabled a greater percentage of pupils to grasp an awareness of the purpose behind the tasks compared to classes taught by other teachers.
Comparison of Pre-Intervention and Post-Intervention Data:

It was evident from both the overall focus upon Apple and Yard and the specific focus upon Apple Year 7 that, following the intervention, most pupils still lacked an awareness of the purpose behind the tasks, failing to appreciate that the teachers' aims were to develop the physical and mental skills required for the tasks. It appeared from the specific focus upon Apple Year 7 that pupils continued to describe the tasks but could not explain the purpose behind doing them. It seemed that most pupils from each class, Year and school continued to have poor metacognitive knowledge of task purpose.

Furthermore, it was clear from the overall focus upon both schools that, following the intervention, there had been a decrease in the percentage of pupils who appreciated that the development of specific physical skills and specific mental skills were important aims of the tasks. The pre-intervention data suggests that only the Apple Year 9 classes appeared to have any pupils who acknowledged the purpose behind the tasks but the comparison of pre- and post- intervention data indicates that the percentage of such pupils in Apple Year 9 had decreased. Thus, it would appear that the intervention made no positive impression upon pupils' appreciation that the development of specific physical skills and specific mental skills were important aims of the tasks.

It could be argued that the Meta and Meta+ intervention settings were actually a hindrance to pupils as the only increase in the percentage of pupils who acknowledged the purpose of the tasks occurred under a Control setting. From the specific focus upon Apple Year 7 it appeared that the Meta and the Meta+ classes had shown a decrease in the percentage of pupils who were either unaware of any task purpose or were unable to offer any opinion. Furthermore, as there did not appear to be any consistent difference between classes of the same Year and school or between each Year and school following the intervention, the similarity between overt school variables, such as the teacher and the lesson events, during the intervention seemed more influential upon pupils' metacognitive knowledge of task purpose compared to intervention setting variables. Indeed, the intervention was standardised as much as possible with the author teaching every intervention lesson and with the development of a strong teaching framework for every intervention lesson to follow. Yet, within the standardised intervention it would appear that, unlike previous classroom research (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994), a self-questioning metacognitive strategy had not enhanced pupils' awareness of the purpose behind the tasks. It may have been that the intervention was too short,
as Nisbet & Shucksmith (1986) noted that in secondary schools pupils will be beginning to establish habits that may be difficult to change; the failure to independently assess a task purpose may be one of those habits.

A Summary of the Desired Outcomes and Purpose of the Task:

Most pupils appeared to show a poor metacognitive knowledge of task purpose both prior to, and following, the intervention. It would seem that pupils did not independently consider what the purpose of a task was and, therefore, any pupils' awareness of the task purpose seemed to be strongly influenced by overt school variables, such as the teacher's explanations.

Theme: The Influences Upon the Task

Pre-Intervention Data:

It appeared from the both the overall focus upon Apple and Yard and the specific focus upon Apple Year 7 that, while there was some degree of pupil awareness of the possible intrinsic and extrinsic physical influences during the tasks, pupils' awareness of the possible mental influences, both intrinsic and extrinsic, was comparatively low. As Physical Education, by name and nature, highlights physical activity it was not surprising that pupils appreciated more physical influences than mental influences.

However, it was evident from the overall focus upon both schools that it was still common for many pupils to lack even awareness of both intrinsic and extrinsic physical influences. As it is assumed that both intrinsic and extrinsic physical variables are going to be influential during Physical Education learning, it is crucial that pupils appreciate what these influences may be and how they could affect their performance. Although a majority of pupils in most classes acknowledged some of the possible specific intrinsic physical influences upon the tasks there were as few as seventeen percent of such pupils in any one class. Furthermore, there were as few as eleven percent of pupils in a single class who appeared to have any awareness of possible specific extrinsic physical influences upon the tasks. However, this supports the work of previous researchers who suggested that pupils' awareness of external variables may develop later than more internal variables, and that pupils do not always appear to consider external variables as being able to affect performance (Miller & Weiss, 1982: cited in Reynolds & Shirey, 1988; Shirey & Reynolds, 1987). While it can be appreciated that pupils have developed thoughts upon their personal physical ability and physical properties over a long period of time and these will,
therefore, be more prominent in their mind compared to extrinsic physical influences, it is still difficult to appreciate that pupils struggle to acknowledge such specific extrinsic physical influences upon the tasks as the facilities, the equipment or even other people. For example, the Yard Year 9 observed Volleyball lesson was very congested because the class were in a small hall and the pupils’ lack of control during the ‘dig’ recapitulation and practice meant that they were often running around, interfering with other pupils, whilst retrieving balls. However, no pupil mentioned congestion as an influence upon the tasks.

There was a minority of pupils who appeared to appreciate some of the specific intrinsic or extrinsic mental influences during the tasks, and especially the specific intrinsic mental influences. The suggestion that awareness of external variables may develop later than more internal variables (Miller & Weiss, 1982; cited in Reynolds & Shirey, 1988; Shirey & Reynolds, 1987) was not necessarily supported by the pre-intervention results with regard to mental influences. Nevertheless, from the specific focus upon Apple Year 7 it seemed that when mental influences were referred to in general rather than specific terms, there was a greater percentage of pupils who appreciated some of the intrinsic mental influences compared to those who appreciated some of the extrinsic mental influences. Pupils were able to make general comments such as "have to concentrate..." and "how confident I was." However, Lee, Landin & Carter (1992) noted how pupils during tennis instruction could offer very general thoughts regarding learning tennis or hitting a ball, but these thoughts lacked insight and were unrelated to the quality of practice. Furthermore, in the consideration of patterns of misunderstanding Perkins & Simmons (1988) noted that pupils frequently provided 'stock responses' that offered no insight or understanding of the tasks or influences upon those tasks.

As only a minority of pupils in most classes seemed to have an awareness of both extrinsic physical and mental task influences, it could be suggested that there was a general lack of pupil awareness of how the presentation and organisation of tasks could influence them (Eylon & Linn, 1988; Edwards & Mercer, 1987: cited in Claydon, Desforges, Mills & Rawson, 1994). For teachers to make assumptions that they can structure a practice or a game that will inevitably 'force' pupils to learn specific skills or gameplay strategies may, therefore, appear naïve. Unfortunately, these assumptions are common in numerous teaching approaches such as 'Teaching Games for Understanding' (Thorpe, Bunker & Almond, 1986). The main study pre-intervention data have suggested that pupils can struggle to gain an in-depth appreciation of extrinsic physical and extrinsic mental influences upon a task and, as such, are likely to struggle to make in-depth connections or associations between task
parameters and what they are supposed to be learning. While some pupils in Year 7 and Year 9 may have had views on themselves, the suggestion that pupils define learning as something being provided for them by the teacher (Quicke & Winter, 1994) is perhaps supported by the present research. Therefore, it is unlikely that pupils will develop awareness of extrinsic physical and mental influences unless a teacher teaches them about learning (Norman, 1980). It seems evident from the pre-intervention data that pupils were not considering external variables, they failed to monitor the tasks and failed to evaluate them.

Interestingly, it was Apple Year 9 and Apple Year 7 that had the greater percentage of pupils who acknowledged the possibility of specific intrinsic and specific extrinsic physical influences upon the tasks respectively. Furthermore, while most pupils lacked any awareness of intrinsic or extrinsic mental influences upon the tasks, there was a slightly greater percentage of pupils with an awareness of these mental influences in the Apple Year 9 classes compared to any other classes. Thus, it appeared that most pupils had poor metacognitive knowledge of task influences and there appeared, in general, to be age variables, covert school variables, overt school variables and pupil variables interacting to influence pupils' metacognitive knowledge of task influences. With respect to covert school variables, part of the Apple Physical Education Department ethos was to reduce the power imbalance between the teacher and pupils (Woods, 1990), and all of the staff in the department readily allowed pupils to collect equipment and organise teams or games without overt teacher supervision; the Yard Physical Education Department was the reverse ensuring that pupils were always supervised in any task or action. It is, therefore, possible that Apple pupils had a greater opportunity to develop an understanding of the influences upon tasks compared to Yard pupils.

Comparison of Pre-Intervention and Post-Intervention Data:

From the overall focus upon both schools, there appeared to be, in most classes, a decrease in, or a maintenance of, the percentage of pupils who were aware of specific intrinsic and extrinsic physical influences. Furthermore, it was evident from the specific focus upon Apple Year 7 that, following the intervention, the percentage of pupils who were aware of some physical influences upon the tasks, be they intrinsic or extrinsic, or in general or specific terms, had decreased. As such, the intervention setting variables did not appear to influence pupils' appreciation of the specific intrinsic and extrinsic physical influences evident during the tasks.
In the pre-intervention data it was the Apple Year 9 classes and the Apple Year 7 classes that had the greater percentage of pupils who acknowledged the possibility of specific intrinsic and specific extrinsic physical influences upon the tasks compared to the other classes. However, following the intervention, there was a slightly greater similarity between most classes regarding the percentage of such pupils and, especially a greater similarity between classes of the same Year and school. Therefore, it was implied that overt school variables, such as the teacher and the lesson events, were more influential than the intervention setting variables regarding pupils' awareness of physical influences upon the tasks. The standardised lesson for all the classes in the intervention encouraged pupils to take responsibility for their own learning. Therefore, assuming that pupils may often consider physical factors prior to considering mental factors in Physical Education, it is possible that the standardised intervention lesson would initially encourage an awareness of physical influences more than mental influences.

Even after the intervention there still appeared to be a majority of pupils in each class who failed to appreciate any specific intrinsic mental influences. However, there was an increase in the percentage of pupils who appeared to be aware of some of the specific intrinsic mental influences in the Apple Year 7 Meta and Meta+ classes, and the Apple Year 9 Meta+ class. It has been noted that during cognitive tasks such as mathematics, where, in general, there are more intrinsic than extrinsic mental influences, pupils have completed tasks more easily when a metacognitive strategy has been hinted at (Schoenfeld, 1987). Furthermore, it has been claimed that from utilising a metacognitive strategy pupils may be encouraged to retrieve cues from the task situation (Flavell, 1979). The comparison between the pre- and post-intervention data support previous research that implied a metacognitive strategy could increase pupils' awareness of specific intrinsic mental influences upon a task, although that increase was only evident in Apple Meta and Meta+ classes and not in Yard. Notably, the Apple Physical Education Department involved overt theoretical work during lessons more often than in Yard; pupils would complete charts and worksheets during Health-Related Exercise, pupils would have to plan, video and evaluate routines in Dance, and there was a Unit of Work in Year 7 and Year 8 called Problem Solving whereby physical challenges had to be analysed and overcome. It may be possible that Apple pupils were, therefore, more likely to be receptive to the presentation of a self-questioning metacognitive strategy compared to Yard pupils (pupils in the Yard Year 7 Meta class were astonished that they had been asked to read in a Physical Education lesson) and they would be more likely to utilise the metacognitive strategy to develop their awareness of intrinsic mental influences.
The Apple Year 9 Meta class showed a similar decrease as the Control class regarding the percentage of pupils who showed some awareness of the specific intrinsic mental influences upon the tasks. As such, it was possible that age variables, covert school variables and overt school variables influenced the effectiveness of the Meta and Meta+ intervention settings. For example, with respect to overt school variables, the Apple Year 9 Meta lesson was on a Friday and, therefore, was ten minutes shorter than any of the other intervention lessons. The author felt pressured and rushed throughout the whole lesson and pupils had less time for the covert verbalisation phase involved in the teacher modelling processes. As research has suggested that the inequity in practice time and the opportunity to practise may facilitate or constrain the strategies used for learning situations and may influence the mental effort required by pupils to utilise a strategy (Langley, 1995; Weed, Ryan & Day, 1990), it is possible that the intervention lesson length influenced the development of pupils' metacognitive ability.

Following the intervention, most classes showed a slight increase in the percentage of pupils who seemed to be aware of some of the specific extrinsic mental influences upon the tasks, although there still remained a large percentage of pupils in each class without such awareness. Furthermore, apart from in Apple Year 7, the Meta classes and the Meta+ classes showed no notably greater increase in the percentage of pupils who noted some specific extrinsic mental influences than was evident in the Control classes. Thus, overt school variables, such as the standardised lesson, may have proved more influential than the intervention setting variables regarding pupils' appreciation of extrinsic mental influences upon the tasks.

The relatively large increase in the Apple Year 7 Meta (25%) and Meta+ (17%) classes regarding the percentage of pupils who noted some specific extrinsic mental influences during the tasks compared to the Control class (0%) suggested that the intervention setting variables could have been influential depending upon the interaction of, possibly, age variables, covert school variables and overt school variables. Researchers have suggested that the utilisation of a metacognitive strategy can improve cognitive awareness of tasks and the influences upon them (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994) and, depending upon other interacting variables, the comparison between the pre- and post-intervention data implies some support for these findings.

In the specific focus upon Apple Year 7 all three classes showed a clear increase in the percentage of pupils who claimed that nothing could influence their performance during the tasks. Yet, the increase of twenty-one percent of such pupils in the Meta+
class was more dramatic than in the Control (7%) or the Meta (9%) classes. Furthermore, the Meta+ class suggested a decrease in the percentage of pupils who were unable to offer any opinion as to what could influence their performance, that was not matched in the Control or the Meta classes. Thus, in Apple Year 7 it appeared that the Meta+ intervention setting may have increased pupils' confidence in their ability and enhanced pupils' awareness that there were influences upon the tasks. Remembering that the intervention was undertaken in a single lesson it can be appreciated that pupils would not suddenly show incredible awareness of every influence upon the tasks, but the combination of metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies involved in the Meta+ intervention setting seemingly directed more Year 7 pupils' attention to the fact that influences were present during the tasks. It is suggested that pupils' own specific cognitive strategies may not be efficient (Alexander & Judy, 1988; Peterson, 1988) and assuming that age may influence the development of metacognitive ability (Nisbet & Shucksmith, 1986) it is possible that Year 7 pupils would have less efficient specific cognitive strategies than Year 9 pupils and, therefore, required additional guidance in the development of such cognitive strategies as well as the metacognitive strategy.

A Summary of the Influences Upon the Task:

It would seem that many pupils lacked an adequate appreciation of the physical or mental influences upon the tasks, both from an intrinsic and extrinsic perspective. It has been suggested that pupils can struggle to show an insight into the influences upon tasks in Physical Education (Lee, Landin & Carter, 1992). However, where there was an awareness, an appreciation of the physical influences upon the tasks appeared to develop prior to an appreciation of the mental influences, and the pupils' perspective would tend towards being intrinsic prior to being extrinsic. It appears that there was an interaction between such variables as age variables, covert school variables and overt school variables with regard to pupils' awareness of the influences upon the tasks; for example, with respect to covert school variables, Apple's attempts to break down the power imbalances between the teachers and the pupils involved the pupils having a greater opportunity to experience organising tasks, which may have developed their appreciation of the influences upon those tasks. It would seem that, while the intervention setting variables did not have a large effect upon pupils' awareness of task influences, they did appear to form part of the influential interaction of variables, especially with regard to pupils' appreciation of the mental influences upon the tasks. Thus, to a degree, the present study supports previous researchers who have suggested that the development of metacognitive ability may improve pupils'
awareness of tasks and the influences upon them (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994).

Theme: The Abundancy and Organisation of the Information

Pre-Intervention Data:

Even with a general lack of awareness regarding the purpose behind doing the tasks and the influences upon the tasks, most pupils still suggested that there had been enough information made available during the tasks. In the main study (MSI) pupils were probably given enough information and, therefore, they did not necessarily lack metacognitive knowledge of task information abundancy. It seemed more likely that pupils lacked an appreciation of their own understanding, or more specifically, showed poor metacomprehension (Flavell, 1979). Researchers have noted that during tennis instruction pupils can often state that they understand but when they were asked a follow-up question: 'What did the teacher say?', they are unable to provide a complete answer, providing general, very vague or, indeed, no details (Lee, Landin & Carter, 1992). Thus, the pre-intervention data supports previous research that suggests pupils can show poor metacomprehension during Physical Education tasks.

Interestingly, the Year 9 classes from both Apple and Yard appeared to have a greater percentage of pupils who believed that there had been an adequate abundancy of information compared to the Year 7 classes. It may be that there were age variables influencing pupils' metacognitive knowledge of information abundancy. Therefore, the pre-intervention data supports the suggestion from other researchers that pupils' metacognitive ability can develop with age (Nisbet & Shucksmith, 1986).

It was evident from the overall focus that, although most pupils appreciated the adequate amount of information that was available, only pupils in the Apple Year 9 classes actually appreciated that they should have prioritised some specific activity principles, such as the pacing principles in Health-Related Exercise. Furthermore, it appeared from the specific focus upon Apple Year 7 classes that most pupils failed to appreciate the need to prioritise the activity principles and the mental techniques involved in the tasks, and that only approximately fifty percent of the pupils seemed to appreciate even the specific physical techniques involved in the tasks. Thus, there may have been age variables and overt school variables such as the teacher, the lesson events or the activity area that influenced pupils' ability to efficiently prioritise task information. The possible influence of age variables upon aspects of pupils' metacognitive ability again supports work by other researchers in the field (Nisbet &
Shucksmith, 1986). With respect to possible influences of overt school variables, it was noticeable that the focus on pacing in the Health-Related Exercise lesson was continually emphasised by Clive (the Apple Year 9 teacher) with words of encouragement such as "Pace yourself" and "Pace it!", whereas there was less reinforcement evident in the Yard Year 9 Volleyball lesson and there was greater interference and clouding of the lesson focus from additional tasks occurring throughout the game rather than simply the 'serves' and 'digs'.

From the specific focus upon the Apple Year 7 classes, the relatively large percentage of pupils in each class who failed to specify what information they should have prioritised (up to 22%), who failed to offer any response (up to 41%) or who even prioritised words of encouragement from the teacher (up to 15%), suggest how pupils can lack efficient metacognitive knowledge of task information organisation and prioritisation. Just as pupils' lack of appreciation of the purpose behind the tasks can inhibit learning, an inability to appreciate what information needs to be prioritised can also lead to inefficient learning. Pupils' lack of metacognitive knowledge of task information organisation and prioritisation again emphasises how teachers cannot assume that pupils will make correct connections or associations between a task and the most important information to learn from that task. During the main study the author noted how the teachers stated the important information quite clearly, yet pupils still appeared to consider superficial elements of the tasks, such as the music in Health-Related Exercise or the general words of encouragement offered by the teacher such as "Keep going!" This superficial outlook upon tasks by pupils has also been supported by other researchers (Eylon & Linn, 1988; Edwards & Mercer, 1987: cited in Claydon, Desforges, Mills & Rawson, 1994) and indicates how pupils' learning can be misdirected. Furthermore, the data from the preliminary study (Pre) also supported this assumption; for example, a Year 7 pupil claimed that the information to be prioritised in a hockey lesson was, "to improve your passing skills and erm...your tackling skills" even though the lesson only really contained reference to passing and control. Similarly, a Year 9 pupil suggested that the information to be prioritised in the game of non-stop Cricket was to, "Err...make sure that the other person that's going in next has got a bat and organise the team in what order and so you have no arguing." If pupils are making superficial associations between the presentation of information or class management in an attempt to gain an insight into the information that needs to be prioritised, it cannot be assumed that structuring practice and game situations will inevitably lead pupils to the purpose of the lesson. It appeared that pupils either lacked the metacognitive ability to prioritise information or they were distracted away from the information prioritised by the teacher because of other factors.
Comparison Between Pre-Intervention and Post-Intervention Data:

It appeared from the overall focus upon Apple and Yard that most pupils continued to suggest that enough information had been made available to them during the tasks. As had been evident in the pre-intervention results, most pupils appeared to suggest that they had enough information although virtually all of the pupils in each class failed to prioritise the specific activity principles involved in the tasks. Once again it seems that pupils showed poor metacomprehension (Flavell, 1979).

While there had been a slight decrease in the percentage of pupils (less than 7%) in all of the Control classes who perceived there to have been enough information, there had been a slight increase in the percentage of such pupils (up to 11%) in all of the Meta classes. Furthermore, from the specific focus upon Apple Year 7 there was a decrease in the percentage of pupils who implied that they lacked awareness with regard to the abundancy of information in both the Meta and the Meta+ classes, while the Control class maintained the same percentage of such pupils. Thus, it would seem from the comparison between pre- and post-intervention data that a metacognitive strategy may aid the development of some pupils' metacognitive knowledge of task information abundancy (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994).

Although there had been a dramatic increase in the percentage of pupils who had suggested that there was an adequate abundancy of information in the Apple Year 7 Meta+ class, this increase had led to a greater similarity between the three Apple Year 7 classes regarding the percentage of such pupils. Indeed, as it had appeared in the pre-intervention data, the similarity between the classes of the same Year and school, and the greater percentage of pupils who appreciated the abundancy of information in Year 9 classes compared to Year 7 classes, implies that both age variables and overt school variables, such as teacher and lesson events, interacted to influence pupils' metacognitive knowledge of task information abundancy rather than the Meta+ intervention setting variables.

Interestingly, while most pupils appreciated the adequate amount of information that had been made available, very few pupils appreciated that some specific activity principles should have been prioritised with five of the nine classes being without any such pupils. There was even a decrease in the percentage of such pupils in the Apple Year 9 classes which had, prior to the intervention, been the only classes that seemed to have any pupils who acknowledged the specific activity principles involved in their tasks. Thus, with greater similarity between all of the classes regarding pupils' lack of
metacognitive knowledge of task information organisation and prioritisation, following the intervention, it appeared as though the Meta and Meta+ intervention settings were less influential than the overt school variables such as the teacher and the lesson events. Interestingly, as most pupils were unfamiliar with the teacher modelling processes, especially the teacher commentary and the overt verbalisation that are integral to the modelling processes, pupils may have become confused with the focus of the tasks. Just as a teacher requires practice time with a new teaching approach (Mawer, 1995; Siedentop, 1991), it is possible that pupils may also require time to adjust to new approaches; the novelty of the teaching approach, especially in the Apple Year 9 Health-Related Exercise intervention lessons which also involved music, could have overshadowed the specific activity principles involved in the tasks.

From the overall focus upon Apple and Yard it appeared that the only increase in the percentage of pupils who appreciated some specific activity principles of the tasks occurred in the Apple Year 7 Meta class and the Yard Year 7 Meta+ class. Furthermore, the smallest decrease in the percentage of such pupils in Apple Year 9 occurred in the Meta+ class. Thus, it may be possible that the Meta and Meta+ intervention setting variables strongly interact with overt school variables, such as the teacher and the lesson events to influence some pupils' metacognitive knowledge of task information organisation which would suggest the varied response of the intervention classes to the intervention. For example, during the Apple Year 9 Meta+ intervention lesson the author realised that he had met one of the pupils whilst teaching at another school, and this appeared to 'break the ice' with the pupils as a whole; the pupils were friendly towards the author and were very willing to try each activity and utilise the self-questioning metacognitive strategy card. In contrast to the other Apple Year 9 intervention lessons, the pupils did not become over-excited with the activities and the music although they still appeared to thoroughly enjoy the lesson. Hence, less pupils from the Apple Year 9 Meta+ class compared to those from the Apple Year 9 Control and Meta classes may have lost sight of the activity principles involved in the tasks due to the novelty of the lesson.

From the specific focus upon Apple Year 7, all three classes had also shown an increase in the percentage of pupils who acknowledged aspects of mental technique that should have been prioritised, and a decrease in the percentage of pupils who acknowledged some specific physical techniques that should have been prioritised. As it has been argued by the author that the very nature of the study has a cognitive bias, although the intervention settings did not seem to influence the efficiency of pupils' metacognitive knowledge of task information organisation and prioritisation, the fact that less pupils focused just on aspects of physical technique and more pupils focused
on aspects of mental technique does support the assumption that the overt school variables, such as the teacher and the lesson events, influence pupils' metacognitive ability.

From the specific focus upon Apple Year 7, although all three classes had also shown an increase in the percentage of pupils (up to 13%) who acknowledged aspects of mental technique that should have been prioritised, the increase in the Control class concerned pupils who referred to mental techniques in general terms, whereas the main increase in the Meta and the Meta+ classes concerned those pupils who referred to mental techniques in more specific terms. Thus, it would appear as though the metacognitive strategy had drawn pupils' attention towards specific mental techniques regarding a task. This seems to support previous suggestions that pupils may have a production deficiency (Flavell, 1976) whereby they have the necessary abilities but do not utilise them efficiently due to a lack of awareness, monitoring and evaluation of the situation; the metacognitive strategy can help rectify this problem (Nisbet & Shucksmith, 1986).

A Summary of the Abundancy and Organisation of the Information:

While it would seem that pupils had a degree of awareness with regard to the abundancy of information, they appeared to have very poor metacomprehension both prior to, and following, the intervention. Thus, some support has been offered for both classroom and Physical Education research that suggests pupils can often overestimate their understanding of tasks (Flavell, 1979; Lee, Landin & Carter, 1992). Pupils struggled to organise and prioritise information; they often developed a superficial or misdirected view upon what information was important. There were some signs that the intervention variables were influential in developing pupils' metacognitive knowledge of information abundancy and organisation, although they only formed part of a larger interaction of variables that included age, and covert and overt school variables; for example, it was implied that the Year 9 pupils may have had a greater awareness of how to organise and prioritise information compared to Year 7 pupils (Nisbet & Shucksmith, 1986).

Theme: The Demands of the Task

Pre-Intervention Data:

It was evident from both the overall focus upon Apple and Yard and the specific focus upon Apple Year 7 that there was only a relatively small percentage of pupils
who considered the physical demands of the tasks, and that there appeared to be a lack of pupil awareness regarding the mental demands of the tasks. Thus, in general, pupils seemed to lack metacognitive knowledge of the task demands, which supports the work of other researchers in the field; Stevens (1997) suggested that less than fifty percent of her Year 10 Physical Education class were able to identify the demands of a tennis task or the abilities that they would need to complete the task.

It may be that the greater percentage of pupils, in general, who considered the physical demands of the task compared to those pupils who considered the mental demands of the tasks could be due to Physical Education, by name and nature, emphasising the physical demands placed upon pupils more than the mental demands. However, from the pre-intervention data it appeared that even when pupils acknowledge the physical demands placed upon them, there is uncertainty on whether the demands are directed towards their physical properties or their physical processes. While the Apple Year 9 classes showed the lowest percentage of pupils (less than 10%) who commented upon specific physical processes compared to the other classes, these classes showed the highest percentage of pupils (up to 37%) who commented upon specific physical properties. The implication here is that the Apple Year 9 classes included more pupils who were able to offer some insight into how the tasks placed demands upon their physical properties. This suggested that these pupils had some awareness of the interaction between each category of metacognitive knowledge (Brown, Campione & Day, 1981; Nisbet & Shucksmith, 1986), indicating some metacognitive knowledge of the task demands combined with some metacognitive knowledge of person intra-individual variables, such as their own physical and mental strengths and weaknesses. It would appear that pupils initially appreciate what physical processes are required to complete a task and, as more metacognitive knowledge of person intra-individual variables is developed, there is a greater appreciation that physical processes are related to physical properties.

A similar situation may be evident regarding pupils' awareness of the mental demands placed upon them during the tasks, whereby pupils are more likely to appreciate the mental processes required for a task until more efficient metacognitive knowledge of person intra-individual variables enables them to make associations between these mental processes and their own mental properties. Whereas most pupils did not appreciate the demands placed upon their mental properties, and similarly most pupils in the Year 7 classes and the Yard Year 9 classes failed to comment upon specific mental processes, there was a small percentage of pupils (up to 21%) in the Apple Year 9 classes that appreciated the need for certain mental processes during the tasks,
such as "the need to be possative and listen to what is said" (sic) or "you need to be able to push your self to the max." (sic).

Thus, Apple Year 9 classes had a seemingly deeper awareness of the physical and mental demands placed upon them from the tasks compared to any other classes. However, there were not consistent covert school variable influences upon pupils' awareness of task demands as Apple Year 7 and Yard Year 7 showed a degree of similarity regarding the percentage of such pupils, and age variables did not appear too influential because Yard Year 7 classes showed a greater percentage of pupils with some awareness of the demands placed upon them compared to Yard Year 9 classes. Therefore, it would seem that overt school variables, such as teacher and the lesson events, may have influenced pupils' metacognitive knowledge of task demands. Notably, the Apple Year 9 Health-Related lessons appeared to be of a simplistic design, that is, there were relatively few obvious distractions from the focus of the study; the pupils did an exercise and checked their pulse rate, they did a second exercise and checked their pulse rate. In contrast, the Yard Year 9 Volleyball lesson had a greater number of distractions from the 'serve' and 'dig' focus; the pupils were of a relatively low standard and, therefore, during the game the ball frequently followed a high parabolic path allowing pupils to hit the ball from above their head decreasing the number of times that a 'dig' was necessary or utilised. Thus, the physical and mental demands of the lesson may have become confused or clouded by other events in the lesson. This suggestion would also explain the similarity in the percentage of pupils between the Year 7 classes (Swimming and Athletics), and the greater percentage of pupils in Yard Year 7 compared to Yard Year 9, who showed some awareness of the physical and mental demands of the tasks; both Year 7 lessons followed the repetitive process of presenting the pupils with a point of technique which they would all then practise, and, thus, there were relatively few distractions away from the demands of the tasks.

From the specific focus upon Apple Year 7 it could be observed that pupils' awareness of demands placed upon their physical and mental properties was often in general terms ("You need good control over your body..."; "good judgement. If you judge wrong then the hole thing could go wrong" sic) as opposed to specific terms ("Flexible, fast, strong legs"). The overall focus upon both schools also emphasised how both Year 7 and Year 9 pupils seem to lack depth in their awareness of how the tasks place demands on their specific physical and mental properties. However, authors have suggested that pupils in Physical Education will often consider general factors rather than more insightful, specific factors (Lee, Landin & Carter, 1992; Stevens, 1997) and the pre-intervention data would seem to support such work.
Comparison Between Pre-Intervention and Post-Intervention Data

It was evident from the overall focus upon Apple and Yard that, following the intervention, there was still a minority of pupils in most classes who appreciated the demands that had been placed on their physical properties. However, the Apple Year 7 Meta+ class showed an increase in the percentage of pupils who acknowledged the demands placed upon their physical properties that was approximately ten percent greater than in the other classes. Furthermore, the Apple Year 9 Meta class and the Yard Year 7 Meta class both showed an increase in the percentage of pupils (up to 11%) who appreciated the demands placed upon their physical properties, whereas the Control and the Meta+ classes of the same Year and school showed a decrease in the percentage of such pupils (up to 16%). Hence, it would appear that the Meta or the Meta+ intervention setting may enhance pupils' awareness on their physical properties, regardless of age or covert school variables. It would seem, therefore, that the pre-intervention data offers some support for previous research that implied that a metacognitive strategy may aid the development of pupils' awareness of some task demands (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994) and that some Year 7 pupils may require guidance in the development of cognitive strategies (Nisbet & Shucksmith, 1986).

However, as the most dramatic increase in the percentage of pupils (up to 34%) who appreciated the demands placed upon their physical properties occurred in each of the Apple Year 7 classes compared to any other classes, there also appears to be strong overt school variables, such as the lesson events, that could influence pupils' awareness of the demands placed upon their physical properties. For example, it may be that the author inadvertently emphasised the need for strong legs during the breaststroke leg kick.

From the overall focus upon Apple and Yard it appeared that Apple Year 7 and Apple Year 9 had a greater percentage of pupils who showed some awareness of their physical properties compared to those who referred to physical processes, while in Yard Year 7 this was not the case; there was a dramatic increase in the percentage of pupils (up to 28%) in all of the Yard Year 7 classes who appreciated some of the demands placed upon physical processes by the tasks. Thus, it may be that covert school and overt school variables were influential in the development of pupils' awareness of the demands placed upon physical processes by the tasks. For example, Yard was a fairly regimented school compared to Apple, where pupils expected to do what they were told; respect and interest were demanded by teachers and they did not have to be earned. It is possible that this encouraged pupils to focus upon pleasing the
teachers and coming up with the right answers to questions, regardless of whether they understood the tasks or the information (Marton, 1988; MacLure & French, 1980). The intervention lesson tried to encourage all pupils to consider their actions, and assuming that awareness of the demands upon physical processes will precede awareness of the demands upon physical properties, the Yard Year 7 pupils may have taken the first steps towards controlling their own learning due to the nature of the intervention lesson approach.

It seemed from the specific focus upon Apple Year 7 that there remained more pupils in each class who acknowledged physical demands and the need for physical abilities, as opposed to mental demands and the need for mental abilities. Indeed, it was evident from the overall focus that in most classes, there remained no pupils, whatsoever, who appreciated the demands placed upon their specific mental properties. The Apple Year 9 Meta+ class was the only class to show any increase in the percentage of such pupils. However, there was also a notable increase of over ten percent of pupils who acknowledged their mental properties in general terms within the Apple Year 7 Meta+ class, and, thus, it would appear that the Meta+ intervention setting was beneficial to pupils' awareness of their mental properties and the demands placed upon them. It was suggested that a metacognitive strategy may help pupils to complete academic problems (Schoenfeld, 1987) and enhance motor skill acquisition (Ainsworth & Fox, 1989; Singer, 1988, 1995) assuming pupils possess the abilities and are simply struggling to utilise them efficiently (Flavell, 1987; Nisbet & Shucksmith, 1986). However, it would seem that the inclusion of specific cognitive strategies in the intervention setting variables of the Meta+ class enabled pupils to direct attention to the mental properties they required to meet the demands of the task.

Very few pupils, at all, appreciated the demands placed upon their specific mental processes either before or after the intervention. However, from the overall focus upon Apple and Yard it appeared that there was a slight increase in the percentage of such pupils in the Apple Year 7 and the Apple Year 9 Meta+ classes. From the specific focus it was also evident that the Apple Year 7 Meta+ also showed an increase in the percentage of pupils who referred to demands placed upon mental processes, in general terms such as "all you have to do is concentrate". Again, it would suggest that the inclusion of specific cognitive strategies in the intervention setting variables appeared to help pupils to focus on the mental demands of the task. However, there was also a very slight increase in the percentage of pupils who referred to mental processes in specific terms, such as "rythem, you need to keep the routine" (sic), in the Apple Year 7 Meta class, and a smaller decrease in the percentage of such pupils (10%) in the Apple Year 9 Meta class compared to the
decrease in the percentage of such pupils (19%) in the Apple Year 9 Control class. Therefore, as implied in previous classroom subject research, it appears that the metacognitive strategy may help pupils to appreciate the mental processes required to satisfy the demands of the tasks (King, 1991; Schoenfeld, 1987).

A Summary of the Demands of the Task:

Both prior to, and following, the intervention it would seem that many pupils failed to appreciate the demands placed upon them during the tasks, especially the demands placed upon their mental properties and processes in comparison to their physical properties and processes. Thus, the present study offers some support for previous research that suggests pupils often fail to identify the demands of Physical Education tasks (Lee, Landin & Carter, 1992; Stevens, 1997). The intervention setting variables did appear to influence pupils' awareness of both the physical and the mental demands placed upon them, although covert and overt school variables tended to interact with these setting variables and prove influential; for example, with respect to overt school variables it seemed that the Yard pupils' focus during lessons was oriented towards pleasing the teacher or avoiding being reprimanded and, therefore, they may have had less awareness of the demands placed upon them by the actual tasks compared to Apple pupils. Nevertheless, the present study does offer a degree of support for research that has suggested pupils may increase their awareness of task demands if they are guided in the development of their metacognitive ability (Borkowski & Varnhagen, 1984; King, 1991; Paris & Oka, 1986; Seifert & Wheeler, 1994).

Theme: The Pupils' Feelings During the Task

Pre-Intervention Data:

Although most classes appeared to have a majority of pupils who had experienced positive or negative feelings during the tasks, the percentage of such pupils was not particularly high in many of the classes. It was suggested from the specific focus upon Apple Year 7 that only approximately fifty percent of the pupils implied that they had not experienced any positive or negative feelings during the tasks and, therefore, had a lack of definite affective metacognitive experiences. The pre-intervention data have suggested that pupils may have showed poor metacomprehension during the tasks, and that 'triggering' in the form of either cognitive or affective metacognitive experiences may not have occurred (Nisbet & Shucksmith, 1986). That is, pupils have stated that they had enough information but showed poor awareness of the tasks, thereby implying that they did not experience a cognitive metacognitive experience,
such as that questioning their comprehension, or an affective metacognitive experience, such as feelings of dislike because they were becoming confused. As metacognitive experiences are more likely to occur in situations that create cognitive conflict and make pupils reconsider their thoughts on the situation (Marton, 1988), the fact that the observed lessons did not include tasks that were designed to create such cognitive conflict, it was not surprising that metacognitive experiences were scarce.

Nevertheless, even if metacognitive experiences occur there is no guarantee that they will prove beneficial to the pupils because without any metacognitive knowledge of task variables it is unlikely that pupils will be able to transform these metacognitive experiences into an effective strategic action (Flavell, 1987; Nisbet & Shucksmith, 1986). Thus, it may be that pupils did have additional metacognitive experiences to those noted in the pre-intervention data but did not acknowledge them as they were unaware of how to utilise them effectively; they lacked efficient metacognitive knowledge of task variables.

Interestingly, there was a minority of pupils (a maximum of 41%) in all classes who experienced positive feelings during the tasks. It is implied from research that there is a relationship between pupils having efficient metacognitive ability and pupils having positive orientation towards tasks (Flavell, 1987; Schutz, 1994; Weinert, 1987; Weinstein, 1994). Therefore, the fact that a large percentage of pupils in all classes appeared to lack efficient metacognitive knowledge of task variables, it is perhaps not surprising that few pupils would have positive metacognitive experiences during the tasks.

Comparison Between Pre-Intervention and Post-Intervention Data:

Although most classes continued to have a majority of pupils who had experienced positive or negative feelings, there was still a percentage of pupils (often greater than 30%) in most classes who seemingly did not have any affective metacognitive experiences during the tasks. Within the Meta and Meta+ intervention settings, there was an attempt to make the self-questioning metacognitive strategy conscious and, therefore, to encourage pupils' metacognitive experiences (Flavell, 1979). However, although this had not been notably effective, the Yard Year 7 Meta class showed an increase in the percentage of pupils (21%) who acknowledged their positive or negative metacognitive experiences, and the Apple Year 9 Meta+ class also showed an increase in the percentage of such pupils (16%). Thus, it would appear that the effectiveness of the intervention setting variables may depend upon interacting age,
covert school variables and overt school variables. For example, the Apple Year 9
Meta+ class did not become over-excited during the intervention lesson which was in
contrast to the Control and Meta classes, and, therefore, the Meta+ pupils may have
appreciated more of their metacognitive experiences rather than, as in the Control and
Meta class, possibly having metacognitive experiences overshadowed by too high
arousal levels.

From the specific focus upon Apple Year 7 it appeared that, following the
intervention, all three classes showed an increase in the percentage of pupils (up to
38%) who experienced positive feelings during the tasks suggesting the strong
influence of overt school variables, such as the teacher and lesson events, upon pupils' feelings
during a task. From previous research into the effects of the motivational climate in both classroom subjects and Physical Education, this was always a possibility as the intervention aimed to create a positive environment (Ames, 1992; Seifrez, Duda & Chi, 1992). Yet, the most notable increase in the percentage of pupils who experienced positive feelings during the tasks occurred in the Meta+ class, where there appeared to be nearly a forty percent increase of such pupils. Thus, from the specific focus upon Apple Year 7, the Meta+ intervention setting appeared to encourage not only more affective metacognitive experiences, as a whole, compared to the Control setting but also more positive metacognitive experiences.

The overall focus upon Apple and Yard emphasised how, regardless of age variables,
covert school variables and overt school variables, the Meta+ intervention setting
appeared to influence pupils' positive affective metacognitive experiences as all three Meta+ classes showed a large increase in the percentage of pupils (up to 38%) who claimed to have experienced positive feelings during the tasks. It was implied that as pupils develop more efficient metacognitive ability, motivation and self-efficacy may increase, not only in academic subjects (McCombs, 1988; McKeachie, 1990; Zimmerman & Risemberg, 1994) but also in Physical Education (Lee, Landin & Carter, 1992). Thus, it is likely that if pupils are encouraged to consciously utilise a metacognitive strategy and efficient specific cognitive strategies their affective metacognitive experiences would be positive in nature.

A Summary of the Pupils' Feelings During the Task:

Although a majority of pupils appeared to experience either positive or negative feelings during the tasks, it would seem 'triggering' in the form of either cognitive or affective metacognitive experiences may not have occurred for many pupils. Thus, support is offered for previous research that suggests pupils can either fail to have
metacognitive experiences or they can be unaware of how to utilise them for effective strategic action and, therefore, ignore them (Flavell, 1987; Nisbet & Shucksmith, 1986). Clearly, there would be even fewer pupils from each class who experienced positive feelings during the tasks, which is not surprising considering their poor metacognitive knowledge of task variables, and, therefore, their lack of control over the learning situation (Flavell, 1987; Schutz, 1994; Weinert, 1987; Weinstein, 1994). However, there were indications that when pupils were guided in the development of a metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies (Meta+) they were more likely to experience positive feelings during the tasks, even though other variables such as the teacher or the motivational climate also proved influential.

General Area: Metacognitive Knowledge of Person Variables

Theme: Intra-Individual Variables

Pre-Intervention Data:

The author suggested that an ideal appreciation of intra-individual variables lay with pupils' physical and mental properties, rather than their physical and mental processes. To recapitulate a previous example with reference to physical properties and processes, two pupils commented upon their difficulty with holding a discus and while one pupil suggested that this was due to the physical property that "my hands are small" the other pupil stated "I found it difficult to hold the discus" without any explanation why this physical process was difficult. In other words if pupils referred to properties as opposed to processes they seemed to have a deeper insight into intra-individual variables. Unfortunately, the percentage of pupils who acknowledged either physical properties or mental properties was scarce in most classes, and from the specific focus upon Apple Year 7 it appeared that many pupils, at some time, implied that they were unaware of any intra-individual variables.

Pupils' poor awareness of their physical and mental abilities has already been highlighted in the lack of pupils (a maximum of 38% in any one class) who acknowledged that the tasks had placed demands on physical properties or mental properties; which would have involved having some awareness of their own physical and mental properties. Thus, the pre-intervention data strongly supports the interaction and association between pupils' metacognitive knowledge of person intra-individual variables and their metacognitive knowledge of task variables (Brown, Campione & day, 1981; Nisbet & Shucksmith, 1986). That is, without awareness of
their strengths and weaknesses, personal preferences and personal goals (Flavell & Wellman, 1977; Schmeck, 1988; Weinstein, 1994), pupils will lack awareness of how to approach a learning task and what information they need to prioritise. As Weinstein (1988) claimed, awareness of intra-individual variables is critical for pupils to develop an awareness of the kinds of physical and mental resources that they will need during the tasks.

The percentage of pupils who showed some awareness of specific physical properties was poor in most classes from both Apple and Yard. In general, there were more pupils who did not acknowledge specific physical properties as intra-individual variables, than there were who did. However, there was clearly a greater percentage of pupils who appreciated specific physical properties in the Apple Year 9 classes compared to any other classes, thus implying that overt school variables may have been influential in enhancing pupils' metacognitive knowledge of person intra-individual variables. Notably, the Apple Year 9 observed lesson was Health-Related Exercise and involved a circuit of twelve exercises, each different and requiring the use of a variety of muscles. Thus, it may be that the activity area and the tasks involved in the lesson, by their very nature, enlightened pupils about their physical properties; their specific physical strengths and weaknesses.

Appreciation of specific mental properties as intra-individual variables was even more scarce amongst pupils, with only the Apple Year 9 classes having any pupils who had any such appreciation. The lack of pupil appreciation of their mental properties in Physical Education is worrying, especially, as it is acknowledged that the quality of pupils' thoughts are related to the quality of their practice (Lee, Landin & Carter, 1992) and that pupils "...play an active role in their motor skill learning through their cognitive processes" (Lee & Solmon, 1992: p67). Importantly, the Apple Year 9 observed lesson had asked pupils to consider the rate of their exercise, to check their pulse rate and to record the results on a chart and, therefore, it is possible that these tasks would seem more theoretically or mentally oriented compared to tasks from the other lessons that concentrated upon Swimming technique, Athletics technique and Volleyball skills in a game. Hence, pupils may be more likely to appreciate their mental properties and be aware of what their mental strengths and weaknesses are.

It was evident from the specific focus upon Apple Year 7 that there was a clear tendency for pupils to view physical processes as being the major intra-individual variables; physical properties, mental properties and mental processes were rarely acknowledged as intra-individual variables. The physical, rather than mental, focus may have been expected considering the name and nature of Physical Education, and
as the Apple Year 7 observed lesson had focused upon improving pupils' swimming turns, then pupils could have been made aware of their physical processes such as "I couldn't spring off the wall very well."

The Apple Year 9 classes seemed more aware of their physical and mental properties compared to any other classes. Interestingly, the Apple Physical Education Department suggested that they wanted to 'prepare' pupils for the 'real world' and, therefore, the Schemes of work were varied and included activities such as Problem Solving, and an options programme was available for Year 9 pupils which even included juggling! In contrast, Yard was very regimented with only 'regular' sports offered such as Football and Cricket, and no option programmes apart from in G.C.S.E. Physical Education. Thus, it may be that Apple Year 9 pupils had been given a greater opportunity to appreciate their physical and mental strengths and weaknesses and to learn about themselves in Physical Education.

Comparison Between Pre-Intervention and Post-Intervention Data:

From both the overall focus and the specific focus it was clearly evident that most pupils remained unaware of the strengths and weaknesses of their own physical properties. Furthermore, the Meta and the Meta+ classes showed a similar response, following the intervention, as the Control classes of the same Year and school implying that the intervention setting variables had little influence on pupils' metacognitive knowledge of person intra-individual variables. It would seem that the intervention was too short in duration to develop pupils' awareness of their physical properties and overcome their greater focus upon physical processes. Otherwise, it may be that the metacognitive strategy is more task-focused than person-focused, naturally encouraging pupils to consider task variables rather than person variables even though there is a strong association between them.

However, whereas there was a notable decrease in the percentage of pupils who appreciated specific physical properties as intra-individual variables in Apple Year 9 and Yard Year 7, there was a slight increase in the percentage of such pupils in Apple Year 7. Therefore, while Year 9 maintained a greater percentage of such pupils compared to Year 7, there was less difference between each Year regarding the percentage of such pupils following the intervention. It appeared that overt school variables, such as the teacher and the lesson events, could partly overcome any influence of age variables upon pupils' awareness of their physical properties, and could prove to be more influential than the intervention setting variables. It would seem that the standardised lesson structure involving the teacher modelling processes,
or, indeed, the author being the teacher during the intervention, stabilised pupils' awareness of their physical properties even if it did not always enhance such awareness. Haller, Child and Walberg (1988) suggested that teacher differences will have little effect upon pupils' metacognitive ability but the pre-intervention data does not necessarily support this suggestion.

From the overall focus upon both schools it appeared that very few pupils acknowledged any specific mental properties as intra-individual variables and most pupils appeared to lack metacognitive knowledge of such person intra-individual variables. There did not appear to have been any difference between each class of the same Year and school regarding the response to the intervention. Furthermore, the specific focus upon Apple Year 7 also indicated that very few pupils considered mental processes as intra-individual variables and the Meta and Meta+ intervention settings did not appear to influence pupils' awareness of their mental processes more than the Control setting. Nevertheless, it was possible that due to the physical nature of Physical Education, pupils' awareness of their physical properties and physical processes was more likely to be enhanced prior to pupils' awareness of their mental properties and mental processes. Hence, as the intervention in the main study had only seemingly began to influence physical processes it was unlikely that mental properties and mental processes would have been influenced.

It was evident from the specific focus upon Apple Year 7 that, in general, there was a decrease in the percentage of pupils who acknowledged, in either general or specific terms, physical processes as intra-individual variables. However, the Meta+ class showed a much less dramatic decrease in the percentage of pupils who referred to physical processes in general terms compared to the Control and the Meta classes. Furthermore, the Meta+ class actually showed a slight increase in the percentage of pupils who referred to physical processes in specific terms. Although the Meta and Meta+ intervention settings did not appear influential in encouraging pupils to consider their physical properties, the Meta+ intervention setting appeared to encourage pupils to consider their physical processes more than the Control setting did. It has been implied that Year 7 pupils may be more likely to require additional specific cognitive strategies compared to Year 9 pupils (Nisbet & Shucksmith, 1986), and it may be that the Meta+ intervention setting in Apple Year 7 aided greater awareness of pupils' physical processes compared to the Control setting and the Meta intervention setting. The specific cognitive strategies possibly helped pupils consider the physical processes involved in the tasks. For example, the analogy of a flic flac for a back crawl start may have enhanced pupils' awareness of the need for a good push off the wall. Furthermore, it was noticeable from the pre-intervention data
concerning pupils' metacognitive knowledge of task demands that awareness of processes appeared to emerge prior to an awareness of properties. Assuming pupils will appreciate physical processes prior to physical properties the Meta+ intervention setting, even in the brief duration of the main intervention study, may have proved beneficial in the development of pupils' metacognitive knowledge of physical person intra-individual variables.

A Summary of Intra-Individual Variables:

Many pupils appeared to lack awareness of their physical and mental properties, although if and when some awareness was evident, it could be argued that pupils' awareness of their physical properties may appear to develop prior to their awareness of their mental properties. It appeared that the intervention setting variables may have had a very slight influence upon pupils' metacognitive knowledge of person intra-individual variables, but they did not seem to overcome the influence of age variables or overt school variables; for example, with the former it would seem that older pupils had a greater opportunity to consider intra-individual variables compared to younger pupils (Nisbet & Shucksmith, 1986).

Theme: Intra-Individual and Inter-Individual Variables (Wholist/Analytic Cognitive Style Dimension)

Pre-Intervention Data:

It was evident from the overall focus upon both schools that there was a majority of pupils in each class who appeared to have some awareness of their preferences in the wholist/analytic style dimension. However, pupils' responses regarding their awareness varied considerably in depth and understanding. As in the preliminary study (Pre), some pupils would suggest that they had preferences but they struggled to explain why they had these preferences; a common response was "because it's easier." Yet, other pupils in the main study would acknowledge pupils' preferences quite directly; "because some like demonstration and others like description."

Apart from the Apple Year 9 classes, there was still a relatively large percentage of pupils (up to 40%) from all classes who did not seem to have any awareness of their processing preferences. As it is suggested that once pupils have become aware of their cognitive preferences they have taken the first step in taking charge of their learning (Pennell, 1985), it is important that pupils must have some metacognitive knowledge
of their cognitive style tendencies in order to be versatile in their approach to tasks (Nisbet & Shucksmith, 1986; Pask, 1988; Riding & Mathias, 1991).

The Apple Year 9 classes had a greater percentage of pupils (a maximum of 93% in a single class) who were aware of their preferences in the wholist/analytic style dimension compared to any other classes, and Apple had a greater percentage of pupils overall who had this awareness compared to Yard. Thus, there was a potential interaction between age variables, covert school variables and overt school variables that appeared to influence pupils' awareness of their preferences in the wholist/analytic style dimension. Once again, the variety and the choice involved in the Apple Physical Education Schemes of Work compared to the Yard Physical Education Schemes of Work may have provided Apple Year 9 pupils with a much greater opportunity to comprehend what their preferences are in the wholist/analytic cognitive style dimension. Research has suggested that wholists and analytics will have preferences for certain subjects and tasks (Riding & Pearson, 1994; Riding & read, 1996) and this may be due to a match between their processing cognitive style preferences, the natural style tendency determined by the activity area (Zakrajsek, Johnson & Walker, 1984) and, therefore, how the activity area is taught (Dunn, 1990). Thus, if Apple Year 9 pupils have experienced a greater range of activity areas and, presumably, a greater range of wholist and analytic tasks and teaching, they are more likely to show some awareness of their processing style preferences.

However, while the pre-intervention data suggests that pupils can be aware of their processing cognitive style preferences, there was a minority of pupils in each class who suggested that they had a wholist analytic preference in the wholist/analytic style dimension and showed some form of awareness of that preference. Thus, it would seem that most pupils are not happy to process information either as a wholist or as an analytic; most pupils have a preference in one direction or the other in the wholist/analytic style dimension (Riding & Cheema, 1991).

It appeared from the specific focus upon Apple Year 7 that pupils were often inconsistent in their indicated preferences, thereby supporting previous research that suggests cognitive style stability is questionable (Brodzinsky, 1982; Freeman & Whitson, 1992; Geiger & Pinto, 1991). However, this apparent inconsistency in pupils' preferences does not support research that has suggested Physical Education pupils tend towards a wholist processing cognitive style (Zakrajsek, Johnson & Walker, 1984). A wholist analytic processing cognitive style was not common in any class, although as previous research suggests, only the most successful pupils appear to have such a 'versatile' processing cognitive style (Pask, 1976, 1988). As was the
case in the preliminary study (Pre), the lack of style stability noted in the main study suggests that potentially the interacting variables from learning style, such as sociological, environmental, physiological and emotional variables, may have proved influential in how pupils approached a task (Dunn & Dunn, 1978; Dunn, Griggs, Olson, Beasley & Gorman, 1995).

Nevertheless, the Apple Year 9 classes had a greater percentage of pupils who suggested having a wholist analytic stylistic preference and some form of awareness of that preference compared to the other classes. As such, there would appear to have been some interaction between age variables and overt school variables influencing pupils' tendencies to process information as a wholist analytic. Authors have suggested that pupils should experience tasks and teaching that both match and mismatch their preferred processing cognitive style preferences to encourage them to become more versatile in their learning, and, therefore, to show some ability to adapt to the characteristics of both processing cognitive style preferences (McCarthy, 1990; Pask, 1988). Hence, once again, the variety and the choice involved in the Apple Physical Education Schemes of Work compared to the Yard Physical Education Schemes of Work may have provided Apple Year 9 pupils with a much greater opportunity to develop the characteristics of a wholist analytic.

Comparison Between Pre-Intervention and Post-Intervention Data:

From the overall focus upon both schools there remained a majority of pupils who were aware of their preferences in the wholist/analytic style dimension. However, apart from the Apple Year 9 classes there was still a relatively large percentage of pupils who did not seem to have any awareness of their processing preferences and, unfortunately, if pupils are to become flexible in their approach to learning they must understand the influences and effects of their cognitive style preferences (Nisbet & Shucksmith, 1986; Pask, 1988; Riding & Mathias, 1991).

Nevertheless, while there was an increase in the percentage of pupils who had some awareness of their preferences in the wholist/analytic style dimension in all of the Year 7 classes, it was the Meta classes and the Meta+ classes that appeared to show the greatest increase in the percentage of such pupils. Furthermore, in Apple Year 9, whereas the Control class showed a decrease in the percentage of pupils who were aware of their processing preferences, the Meta and the Meta+ classes showed an increase in the percentage of such pupils. Thus, it appeared that the Meta and the Meta+ intervention settings appeared to help more pupils to develop an awareness of their preferences in the wholist/analytic style dimension, regardless of age variables,
covert school variables or overt school variables, compared to the Control setting. Therefore, the comparison between pre- and post- intervention data would seem to offer support to research that pupils can be encouraged to develop an awareness of their processing cognitive style preferences (McCarthy, 1990; Pask, 1988).

Nevertheless, following the intervention, there appeared to be very few pupils who suggested that they had a wholist analytic preference and had some form of awareness of that preference. Such a 'versatile' processing cognitive style may help pupils adopt the characteristics of whatever processing cognitive style was the most appropriate to the situation (Pask, 1976, 1988; Riding & Mathias, 1991). However, there was an increase in the percentage of such pupils in all the Apple Year 7 classes and Apple Year 9 classes, although there was a decrease in the percentage of such pupils in Yard classes. Therefore, it would appear that both covert and overt school variables proved more influential in pupils having control towards a wholist analytic stylistic preference and having some form of awareness of that preference, compared to the intervention setting variables. Thus, emphasis is placed once more upon the variety of activities, tasks and teaching that Apple pupils would have experienced compared to Yard pupils; the positive benefits for pupils of experiencing a match and mismatch to their cognitive styles in helping them to develop greater control over their processing cognitive style preferences.

From the overall focus upon Apple and Yard, the large and increased difference between the Year 9 classes over the Year 7 classes regarding the percentage of pupils who suggested that they had a wholist analytic preference and had some form of awareness of that preference, following the intervention, strongly implied that age variables were also very influential in pupils' processing cognitive style preferences in interaction with overt school variables. Thus, the comparison between pre- and post-intervention offers support for research that has implied age may alter pupils' processing cognitive style preferences (Geiger & Pinto, 1991) possibly due to greater experience with a variety of task and situational characteristics (Brodzinsky, 1982).

Nevertheless, as there was a slightly greater increase in the percentage of pupils who suggested that they had a wholist analytic preference in the Apple Year 9 Meta and the Meta+ classes compared to the Apple Year 9 Control class, there may also have been intervention setting variables interacting to influence some pupils' control over their processing tendencies and their awareness of those preferences. The possibility that pupils could gain control over a wholist analytic processing cognitive style once an awareness of their preferences has developed has been noted by other researchers.
in the field (McCarthy, 1990; Nisbet & Shucksmith, 1986; Pask, 1988; Pennell, 1985).

A Summary of Intra-Individual and Inter-Individual Variables
(Wholist/Analytic Cognitive Style Dimension):

It would seem that the Apple Year 9 pupils showed a greater awareness of their processing cognitive style compared to any other classes. Thus, it appears that age variables and covert and overt school variables proved influential in the development of pupils' appreciation of their processing cognitive style; it may be that pupils who have had a greater opportunity to experience a variety of tasks and a variety of learning situations are more aware of their preferences in the wholist/analytic cognitive style dimension. Thus, the present study offers some support for literature that suggests pupils should experience a variety of learning situations, that both match and mismatch their processing cognitive style, in order to develop their awareness of their processing cognitive style preferences (McCarthy, 1990; Pask, 1988). While such variables continued to interact and prove influential following the intervention, the intervention setting variables appeared to help pupils to develop an awareness of their processing cognitive style. Therefore, a degree of support is offered for research that suggests pupils can be guided in their appreciation of processing cognitive styles (McCarthy, 1990). In addition, the intervention setting variables may have had a slight influence upon pupils developing a wholist analytic processing cognitive style; thus, the present study also supports research that implies processing cognitive style tendencies can be overcome (McCarthy, 1990; Nisbet & Shucksmith, 1996).

Theme: Intra-Individual and Inter-Individual Variables
(Verbaliser/Imager Cognitive Style Dimension)

Pre-Intervention Data:

In general, there was much greater pupil awareness of their preferences in the verbaliser/imager style dimension and, as indicated in the specific focus upon Apple Year 7, slightly more stability in pupils' indicated preferences. The Apple Year 9 classes appeared to have a greater percentage of pupils (up to 38% greater) with an awareness of their preferences in the verbaliser/imager style dimension compared to any other classes. It was evident from the specific focus upon Apple Year 7 that most pupils suggested having a preference within the imager half of the verbaliser/imager stylistic continuum. This latter preference by pupils in Physical Education may be due to the nature of Physical Education as a subject area (Westman, 1993). Subject areas
and cognitive style have been researched (Riding & Pearson, 1994; Riding & Read, 1996) although the focus has been more on the wholist/analytic cognitive style dimensions rather than the verbaliser/imager cognitive style dimension, whereas in Physical Education, Zakrajsek, Johnson & Walker (1984) implied that a high percentage of Dance and Physical Education Majors had a wholist cognitive style. It could be argued that the practical nature of Physical Education cannot always be described effectively and, therefore, may require pupils to utilise an imager representational cognitive style. Another explanation is that the common teaching approach of offering demonstrations and visual cues had become more 'normal' to pupils in Physical Education lessons. Indeed, in all of the observed lessons demonstration played a key role, especially during the Swimming lessons in Apple Year 7, where not only did the teacher demonstrate from the side of the pool several times but she also asked two pupils to demonstrate later in the lesson while the other pupils watched from the side of the pool.

Each class of each Year and school had a majority of pupils who suggested that they had a verbaliser imager stylistic preference and had some form of awareness of that preference. However, the Apple Year 9 classes again had a greater percentage of such pupils compared to any of the other classes and Apple, in general, had a greater percentage of such pupils compared to Yard. It would seem that both age variables and covert school variables, such as those noted with regard to pupils' processing cognitive style preferences, were evident with regard to pupils' representational cognitive style preferences; that is, the greater opportunity that Apple Year 9 pupils would have had to experience a range of tasks and teaching, and, therefore, the greater chance for them to experience a match and mismatch to their representational cognitive style preferences may have enabled them to develop greater control over their representational cognitive style preferences (McCarthy, 1990; Pask, 1988).

Comparison Between Pre-Intervention and Post-Intervention Data:

Most pupils appeared to show some awareness of their preferences in the verbaliser/imager style dimension. It was likely that pupils showed greater awareness of their representational cognitive style preferences than their processing cognitive style preferences as the complex nature of the wholist/analytic cognitive style continuum made it difficult to explain and present it clearly during the author's intervention lessons.

It was evident from the specific focus upon Apple Year 7 that all three classes showed a similar trend in that there were few pupils who were unable to offer any response at
all regarding their preference in the verbaliser/imager style dimension. However, while the Control class from each Year and school showed a decrease in the percentage of pupils who were aware of their representational cognitive style preferences, the Meta classes showed an increase in the percentage of such pupils. Furthermore, the Year 7 Meta+ classes from each school also showed an increase in the percentage of such pupils, and from the specific focus upon Apple Year 7 it appeared that only the Meta+ class did not show an increase in the percentage of pupils who provided responses that offered no insight into their preferences in the verbaliser/imager style dimension. Thus, there appeared to be intervention setting variables, regardless of age variables, covert school variables and overt school variables, that positively influenced pupils' awareness of their preferences in the verbaliser/imager style dimension. It would seem, therefore, that there is support for research that implies pupils' awareness of representational cognitive style can be developed through intervention (McCarthy, 1990; Nisbet & Shucksmith, 1986; Pask, 1988).

However, as there remained a greater percentage of such pupils in Year 9 compared to Year 7 and in Apple classes compared to Yard classes, the influence of age variables, covert and overt school variables upon pupils' awareness of their representational cognitive style preferences was still evident. Once again, the comparison between pre- and post- intervention offers support for research that has implied age may alter pupils' cognitive style preferences (Geiger & Pinto, 1991) possibly due to greater experience with a variety of task and situational characteristics (Brodzinsky, 1982).

It was also evident from the overall focus upon Apple and Yard that, following the intervention, there was a strong majority of pupils who appeared to have a verbaliser imager stylistic preference and some form of awareness of that preference. While there was, in general, a decrease in the percentage of such pupils in the Control class from each Year and school, there appeared to have been an increase in the percentage of such pupils in both Year 7 Meta classes and the Apple Year 9 and Yard Year 7 Meta+ classes. Furthermore, the Apple Year 7 Meta+ class and the Apple Year 9 Meta class showed a smaller decrease in the percentage of such pupils compared to the respective Control classes. Therefore, it appeared that the Meta and the Meta+ intervention settings, interacting with age, covert and overt school variables, were more beneficial to the development of pupils' control of a verbaliser imager stylistic preference and their awareness of that preference, than the Control setting. Thus, the pre- and post- intervention data offers support for the assumption that by developing
metacognitive ability, pupils may show greater control over their representational cognitive style preferences (McCarthy, 1990; Pask, 1988).

However, age (Geiger & Pinto, 1991) and situational influences (Brodzinsky, 1982) still remained evident because, while the Meta intervention settings in Year 7 appeared to be more beneficial than the Meta+ settings regarding the development of pupils' control of a verbaliser imager stylistic preference and their awareness of that preference, the opposite appeared to be the case in Year 9. Also, Yard showed a much greater increase in the percentage of pupils who had control of a verbaliser imager stylistic preference and had some awareness of that preference, in both the Meta and the Meta+ intervention settings, compared to in Apple. However, the similarity shown between all of the Meta and Meta+ intervention settings, regardless of age variables, covert school variables and overt school variables, did suggest that these intervention settings encouraged a balance, potentially helping pupils who had a production deficiency (Flavell, 1976) to utilise their abilities better, and helping those pupils who utilised inefficient specific cognitive strategies (Alexander & Judy, 1988; Peterson, 1988) to adapt them.

A Summary of Intra-Individual and Inter-Individual Variables (Verbaliser/Imager Cognitive Style Dimension):

Most pupils were aware that they had a preference on the verbaliser/imager cognitive style dimension and, in general, this preference lay on the imager side of such a dimension. The Apple Year 9 classes had a greater percentage of pupils who were aware of their representational cognitive style compared to the other classes, and the Apple Year 9 pupils were more likely to show a verbaliser imager representational cognitive style compared to any other pupils. Age variables and covert and overt school variables proved influential upon pupils' representational cognitive style, although, following the intervention, it seemed that the intervention setting variables also formed part of the interacting and influential variables. The present study offers some support for research that suggests an activity area may influence pupils' cognitive style tendencies (Westman, 1993; Zakrjsek, Johnson & Walker, 1984), although as pupils develop more efficient metacognitive ability they may gain greater control over their representational cognitive style preferences (McCarthy, 1990; Pask, 1988).
Pre-Intervention Data:

Although there were differences between all classes with regard to the percentage of pupils who were aware of inter-individual variables, it was evident that, in general, many pupils (up to 78% in a single class) lacked such awareness. In addition, it was inevitable that a large percentage of pupils would also lack efficient awareness of the important inter-individual variables, such as physical factors and mental factors.

It could be argued that through having efficient metacognitive knowledge of person inter-individual variables, pupils would be able to appreciate what the teacher would like to see, to acknowledge fully the extrinsic physical and mental task influences and, therefore, be able to match appropriate strategic action in that situation. For example, pupils' awareness that a teacher values outcome rather than technique development during Volleyball may encourage those pupils to focus upon getting the ball up in the air regardless of the 'dig' technique, and pupils' awareness that their partners in Health-Related Exercise have a good level of cardio-vascular fitness may suggest to them that they must concentrate upon their own pace and not their partner's pace. Hence, efficient metacognitive knowledge of person inter-individual variables may enhance an efficient interaction between pupils' metacognitive knowledge of task, person and strategy variables, thus encouraging a fuller understanding of a learning situation (Brown, Campione & Day, 1981; Nisbet & Shucksmith, 1986).

Pupils with inefficient views on inter-individual variables may find that their learning could be hampered. If pupils consider that a teacher simply wants them "...to come up with the right answers to the questions" (Marton, 1988: p79) then they may adapt their cognitive strategies to achieve these ends (MacLure & French, 1980). However, by having this awareness of inter-individual variables, such as the type of people the teachers are and what they frequently do or like to see, pupils may be able to 'play the game' in a learning situation. For example, Nisbet & Shucksmith (1986) suggested that pupils could have efficient metacognitive ability but not take advantage of it during tasks, especially if pupils perceive that tasks are best rewarded by using the least sophisticated strategies geared to following instructions and getting finished in good time. It may be that task-avoidance participation patterns (Griffin, 1984, 1985) and coping strategies (Portman, 1995) utilised by pupils could be encouraged through the development of metacognitive knowledge of person inter-individual variables. During the observed Apple Year 9 Health-Related Exercise lesson many pupils were aware that the teacher was wandering around the gymnasium timing and verbally
motivating pupils, and it was common for pupils to simply stand still until the teacher came near them and then to burst into action and be complimented for the determination that they were showing in the task. Thus, it may be that these pupils did have a degree of metacognitive knowledge of person inter-individual variables but utilised it negatively; they utilised their knowledge of the teacher to be seen to do well on the tasks rather than developing an awareness of pacing which was an important purpose of the lesson. The suggestion is that, while learning can be enhanced through the development of metacognitive ability (Brown, Campione & Day, 1981; Nisbet & Shucksmith, 1986), if tasks or lessons do not encourage positive use of this metacognitive ability, or they do not ask pupils to justify their actions (Flavell, 1987) then 'short-cuts' in understanding may occur.

Importantly, pupils' perceptions or appreciation of inter-individual variables have been suggested to influence their perceptions of the motivational climate (Seifrez, Duda & Chi, 1992). For example, if pupils perceive that a teacher wants competition it is less likely that pupils will help each other, and if pupils perceive that the teacher has favourites, or that they are disliked in a class, it is unlikely that they will perceive the motivational climate as positive and task-oriented. However, if teachers are attempting to encourage pupils to learn and understand rather than simply answering teachers' questions correctly, and they are attempting to develop a strong task-oriented motivational climate then pupils' awareness of inter-individual variables would be of benefit.

It was evident from the specific focus upon Apple Year 7 in the pre-intervention data that general ability was the most popularly stated inter-individual variable. Few pupils acknowledged specific physical factors and specific mental factors as inter-individual variables, and it was clear from the overall focus upon both schools that those pupils who suggested either specific physical factors or specific mental factors as inter-individual variables were in the minority. Thus, it could be stated that pupils appeared to lack metacognitive knowledge of person inter-individual variables.

Nevertheless, the Year 7 classes had either an equivalent or a slightly greater percentage of pupils commenting upon such specific physical factors compared to the Year 9 classes from the same school. However, the situation was reversed with regard to such specific mental factors with the Year 9 classes showing a slightly greater percentage of pupils commenting upon specific mental factors compared to the Year 7 classes. Furthermore, while it appeared that Yard classes showed a slightly greater percentage of pupils who commented upon specific physical factors compared to Apple classes of the same Year, the Apple classes showed a slightly greater
percentage of pupils who commented upon specific mental factors compared to the Yard classes of the same Year. As such, a combination of age variables and covert school variables may have influenced the development and direction of pupils' awareness regarding inter-individual variables. Interestingly, it may be that mental inter-individual variables require a greater time to understand and appreciate compared to physical inter-individual variables; that is Year 9 pupils, presumably knowing their classes and teachers longer than Year 7 pupils, were able to comment upon mental inter-individual variables, whereas the Year 7 pupils could only comment upon the more obvious physical variables. Furthermore, the Yard Physical Education classes separated tutor classes, whereas in Apple the Physical Education classes and the tutor classes were the same (i.e. the same pupils stayed together); thus implying that Apple Physical Education pupils would have had a greater opportunity to understand and appreciate mental inter-individual variables compared to Yard Physical Education pupils.

Comparison Between Pre-Intervention and Post-Intervention Data:

It seemed from the overall focus upon both schools and the specific focus upon Apple Year 7 that, following the intervention, a large percentage of pupils continued to lack any awareness that inter-individual variables were evident during the tasks. Assuming that time spent with a class is a strong influence upon pupils' awareness of inter-individual variables this was inevitable considering the intervention lesson closely followed the observed lesson and pre-intervention questionnaire.

The Apple Year 9 classes continued to have a greater percentage of pupils who showed some awareness of inter-individual variables compared to any other classes and, the similarity between the three Apple Year 9 classes regarding the percentage of such pupils was also increased following the intervention, due to a large increase of such pupils (27%) in the Control class. Thus, it appeared that a combination of age variables and covert and overt school variables were more influential regarding pupils' awareness of inter-individual variables compared to intervention setting variables. However, in Yard Year 7 there was an increase in the percentage of pupils with some awareness of inter-individual variables in both the Meta and the Meta+ classes, while there was a decrease in the percentage of such pupils in the Control class. Although the size of the increase differed between the classes, both appeared to have approximately fifty percent of such pupils. As such, while accepting that combined age variables and covert and overt school variables remain interacting like the situation in the pre-intervention data, the intervention setting variables seemed to help some pupils to develop a greater awareness of inter-individual variables.
With respect to the type of inter-individual variables that were referred to by the pupils, it was evident from the specific focus upon Apple Year 7 that the 'stock response' (Perkins and Simmons, 1988) of general ability remained common in all classes. A very small percentage of pupils (a maximum of 20%) appeared to acknowledge specific physical factors as inter-individual variables. Furthermore, the Year 9 Meta and Meta+ intervention settings did not appear to have been influential in the development of pupils' appreciation of specific physical factors implying that the intervention setting variables had little influence upon pupils' appreciation of specific physical factors as inter-individual variables. However, in Year 7, as a whole, the Meta and Meta+ intervention settings seemed to have been influential in increasing the percentage of pupils who noted specific physical factors as inter-individual variables; both Year 7 Meta classes and the Yard Year 7 Meta+ class showed an increase in the percentage of such pupils. However, there remained a degree of similarity between the classes in Apple Year 7, and Yard Year 7 maintained a greater percentage of such pupils compared to Apple Year 7, which further supported the assumed influence of covert and overt variables, such as class groupings, upon pupils' acknowledgement of specific physical factors. Nevertheless, following the intervention, there was a greater difference (up to 40% difference) between the Meta and Meta+ classes compared to the Control class in Yard, which, therefore, implied that in Yard the intervention settings proved influential in enhancing pupils' appreciation of specific physical factors as being inter-individual variables. A physical focus, as opposed to a mental focus, upon inter-individual variables was often maintained in Yard and so it would seem that the metacognitive strategy simply focused more pupils' attention towards the more obvious physical inter-individual variables and did not help pupils to overcome their poor appreciation of mental inter-individual variables. Thus, while the intervention setting variables may have proved beneficial to pupils' appreciation of inter-individual variables they did not appear to compensate for the age or time that seemed to be required to develop such appreciation.

It was evident from the overall focus upon Apple and Yard that, in general, an extremely small percentage of pupils acknowledged any specific mental factors as inter-individual variables. Year 9 maintained a greater percentage of such pupils compared to Year 7, implying that age and time were possibly more influential than any intervention setting variables in encouraging pupils to consider specific mental factors.

However, both Apple Meta+ classes had shown an increase in the percentage of pupils who acknowledged specific mental factors as inter-individual variables that
was not matched in the Control class. Thus, it would seem that in Apple the Meta+ intervention setting enhanced pupils' appreciation of specific mental factors as inter-individual variables. It may be that the specific cognitive strategies from the intervention setting helped more of these pupils to build upon previously latent awareness of mental factors as inter-individual variables because it offered insight into some of the mental requirements of the tasks; for example, the analogy of bike gears for exertion rates, and the need to exercise in gear 3 to 4, may have enabled more pupils to understand the amount of effort that they would need to exert in exercise (Harris, 1996), and, therefore, these pupils may think that the Health-Related tasks would only suit "the out going ones because they feel they can do it."

Interestingly, as the Apple Year 7 Meta class remained with no pupils who acknowledged specific mental factors as inter-individual variables, the Apple Year 9 Meta class showed a decrease in the percentage of such pupils, and the Yard Control class showed an increase in the percentage of such pupils (9%) that was not matched in either the Meta or Meta+ classes, it would seem that the Meta intervention setting was of no benefit to the development of pupils' appreciation of specific mental factors as being inter-individual variables. Thus, it appears that to develop an awareness of mental inter-individual variables pupils may need to develop awareness of relevant specific cognitive strategies to help them appreciate the mental factors that are important in the tasks.

A Summary of Inter-Individual Variables:

Many pupils lacked an awareness of inter-individual variables, even important inter-individual variables such as physical or mental factors. Thus, support was offered for research that suggests pupils can lack even basic metacognitive knowledge of person variables (Flavell, 1987). A combination of age and covert and overt school variables seemed to influence the development and direction of pupils' awareness of inter-individual variables; for example, it may be that mental inter-individual variables need a longer time to comprehend compared to physical inter-individual variables. The intervention setting variables did not show any great influence upon pupils' appreciation of inter-individual variables, although there were indications that they could become another important part of the influential variables' interaction.
Pre-Intervention Data:

A majority of pupils from all classes (up to 100%) suggested that enough information had been made available to them personally in preparation of and during the tasks. Most pupils implied that they understood the tasks and what they were required to do. Unfortunately, from the pre-intervention data it was evident that pupils struggled to appreciate what was involved in the tasks and, therefore, they appeared to have poor metacomprehension (Flavell, 1979) and were under the 'illusion of knowing' (Glenberg, Wilkinson & Epstein, 1982). Unfortunately, if pupils are unaware of what they do not know because they have poor metacomprehension, then relevant corrective cognitive strategies will not be prompted (Brown, 1980). "Students must be aware of their problems in understanding, or gaps in knowledge, before they can do something about it" (Weinstein, 1994: p268).

The difference between all classes was relatively small, although it seemed that the Apple Year 9 classes had a greater percentage of pupils who implied that enough information had been made available to them personally in preparation of and during the tasks compared to any other classes. There did not appear to be important age variables or covert school variables influencing pupils' awareness of their understanding and, thus, overt school variables or pupil variables would seem to have been more influential. For example, Clive (the Apple Year 9 teacher) was the only teacher who brought the pupils together for a concluding comment at the end of the lesson, which may have enabled a greater percentage of pupils to compare their understanding gained during the tasks with the recapitulation of information from the teacher.

It was evident from the specific focus upon Apple Year 7 that most pupils believed that there was no need for any additional information to aid their learning and, indeed, from the overall focus upon both schools it appeared that there was a low percentage of pupils in each class who had perceived a need for some specific additional information. Once again, this situation was perhaps inevitable considering pupils' poor appreciation of what was involved in the tasks and their poor metacomprehension; if pupils perceive themselves as having understanding they will not appreciate that they require any additional information (Campione, 1987).

As it is suggested that monitoring can provide the 'triggering mechanism' that may signal that there is a failure in comprehension (Brown, 1980), the present pupils were
undoubtedly failing to monitor their awareness and their learning. Flavell (1979) noted that young pupils do relatively little monitoring of their own comprehension and Kirby & Teasdale (1987: cited in Kirby, 1988) suggested that, although pupils are capable of cognitive monitoring they often do not in standard situations. Unfortunately, it has already been noted in the pre-intervention data that pupils' learning is often misdirected due to their superficial outlook upon the presentation and organisation of tasks, and, therefore, it was not surprising that there was inefficient monitoring of comprehension. Furthermore, at no point during any lesson did a teacher ask the pupils to consider what they were doing or offer guidance in how to assess or monitor their learning; they were more often just told what to do. Thus, as pupils were unlikely to independently and efficiently monitor their learning and, because effective cognitive monitoring was not encouraged by the teachers during the pre-intervention lessons, then pupils could continue to assume that they understood the tasks, assume that they had enough information and, therefore, decline any suggestion of additional information.

Nevertheless, Yard classes appeared to have a slightly greater percentage of pupils who desired some specific additional information compared to the Apple classes which implied that there may have been some covert or overt school variables proving influential. The Yard Year 7 and the Yard Year 9 classes were taught by the same teacher (Elizabeth); Elizabeth taught in a very authoritarian manner, she expected pupils to listen and do as they were told, and she would often shout at pupils to ensure her control over the lesson. Pupils were, in general, not given an explanation for a technique and were given little chance to experiment with techniques. In contrast, pupils in Apple were given both detailed explanations of why actions occur, such as the 'screw-kick' in breaststroke, and were given time to experiment, such as with the tumble turn. Hence, Yard pupils may have desired greater explanations for even basic techniques as they knew what to do but not necessarily why they should do it. As one pupil stated with regard to the discus throw; "I would like to know why you have to throw the discus up."

Comparison Between Pre-Intervention and Post-Intervention Data:

There was a large majority of pupils (up to 95%) who implied that they understood what was involved in the tasks and were able to complete them. The percentage of such pupils in all of the classes, across both Years and schools, appeared to be very similar following the intervention, although Year 9 maintained a slightly greater percentage of such pupils compared to Year 7. As such, age variables were influential in pupils' suggestions that they had enough information to fully understand the tasks.
Other researchers have implied that age is an important variable in the development of any aspect of metacognitive ability as metacognitive ability can be continuously developing (Nisbet & Shucksmith, 1986). Thus, it may be that Year 9 pupils have developed more efficient metacognitive knowledge and metacognitive strategies, and may have a greater repertoire of specific cognitive strategies, compared to Year 7 pupils.

However, in both Year 7 Meta classes the increase in the percentage of such pupils was greater than in the Control or Meta+ classes. Furthermore, from the specific focus upon Apple Year 7 it seemed that, whereas there was an increase in the percentage of pupils in the Control class who failed to offer any suggestion regarding their understanding, there was a decrease of over twenty percent of such pupils in the Meta and the Meta+ classes. As such, compared to the Control setting, the Meta and the Meta+ intervention settings in Apple Year 7 may have encouraged some degree of pupil awareness regarding the universals of cognition, especially as the situation prior to the intervention showed the Control class with a greater percentage of pupils who had some awareness of the universals of cognition compared to the Meta and the Meta+ classes. It was not surprising that the intervention setting variables may have enhanced Year 7 pupils' awareness of the universals of cognition, especially as there were also signs that these intervention settings positively influenced some Year 7 pupils' awareness of task information abundancy and their awareness of the specific activity principles involved in the tasks. It would seem that the intervention setting variables guided the development of a metacognitive strategy and relevant specific cognitive strategies for Year 7 pupils.

Notably, this increased awareness may have shown itself with more pupils stating that they did not have enough information even though they had no idea of what information was required, as it appeared in the Apple Year 7 Meta+ class. It has been suggested that efficient metacognitive knowledge and metacognitive strategies may develop pupils' metacomprehension (Flavell, 1979) and, therefore, reduce a problem referred to as the 'illusion of knowing' (Glenberg, Wilkinson & Epstein, 1982). The action of considering the amount of information available to them and checking the level of understanding is important, as Ranson & Martin (1996) suggested, pupils must acknowledge that their knowledge is open to refutation or modification if they are to learn efficiently.

Unfortunately, the intervention setting variables did not seem to help most pupils to acknowledge their possible problems in metacomprehension. Indeed, most pupils still considered themselves to have had enough information which, considering the
percentage of pupils who indicated relatively poor metacognitive ability, implied metacomprehension was still a major problem. It was evident from both the overall focus upon Apple and Yard that there continued to be very few pupils who wanted some specific additional information. There remained a similarity between the classes of the same Year and school regarding the percentage of such pupils, and there remained a greater percentage of pupils who wanted some additional information in Yard classes compared to any of the Apple classes. As such, it appeared that the influence of the Meta and the Meta+ intervention settings was limited; perhaps due to the brief nature of the intervention.

A Summary of the Universals of Cognition:

It would seem that most pupils had poor metacomprehension; they failed to monitor their understanding and, therefore, lacked any awareness of the additional information they required to enhance their understanding. Thus, the present study offers support for literature that suggests pupils can be under the 'illusion of knowing' (Glenberg, Wilkinson & Epstein, 1982). Overt school variables, such as a teacher's concluding comment, appeared to be important influential variables upon pupils' appreciation of the universals of cognition. While the influence of the intervention setting variables was not dramatic, the intervention setting variables did appear to form part of the influential variables' interaction; for example, it would seem that the Meta and Meta+ intervention setting variables were beneficial in developing some Year 7 pupils' appreciation of the universals of cognition. Thus, the present study also offers a degree of support for research that implies interventions may guide some pupils, if not all, in their appreciation of their comprehension and the universals of cognition (Flavell, 1979; King, 1991).

General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?

Pre-Intervention Data:

It was evident from the overall focus upon both schools that a greater percentage of pupils considered specific physical factors during the tasks, such as "not to throw hard to control the chest-pass" "sitting closer to the wall", than those who considered either general mental techniques, such as "Concentrated on the activity" and "to keep focused on the ball", or specific mental techniques, such as "I thought about keeping a steady rate..." and "I thought about my pacing". It would seem understandable that
pupils would consider specific physical factors throughout the tasks as the pupils were involved in physical activity. Furthermore, as it was evident that many pupils lacked metacognitive knowledge of task and person variables and, seemingly, failed to monitor their awareness, it was not surprising that pupils struggled in their appreciation of what cognitive strategy or strategic action to consider. If pupils fail to appreciate the purpose behind a task, the influences upon a task, their own strengths and weaknesses, their cognitive style preferences, and whether they understand or not, they are unlikely to efficiently select and utilise a specific cognitive strategy (Flavell, 1987; Weinstein, 1994).

Although more pupils considered specific physical factors during the tasks compared to either general mental techniques or specific mental techniques, there was never a majority of such pupils (a maximum of 50%) in any one class in Yard, and although there was a majority of such pupils in most Apple classes it was far from a strong majority (a maximum of 79%). Furthermore, it appeared from the specific focus upon Apple Year 7 that while a majority of pupils did consider specific physical factors during the tasks there was an equally large percentage of pupils who implied, at times, that they were not thinking of anything in particular. Thus, once again, the pupils' awareness of the purpose behind the tasks and their awareness of even the most basic physical requirements of the tasks seemed poor.

The Apple Year 9 classes had a greater percentage of pupils (up to 79%) who considered specific physical factors compared to any other classes. Furthermore, Year 9, in general, had a greater percentage of such pupils compared to Year 7 and Apple had a greater percentage of such pupils compared to Yard. Thus, it would seem that both age variables and covert and overt school variables may have been influential in pupils' consideration of physical factors during the tasks. With regard to overt school variables such as the lesson events, the author has already noted that the Yard lessons were much more oriented towards performance compared to the Apple lessons. It is possible that the greater focus upon learning as opposed to performing in Apple may have enhanced pupils' consideration of physical factors such as physical technique, rather than considering the outcome of their attempt. Indeed, performance-oriented and outcome thoughts were common with Yard pupils, such as "I'm not going to do well" (sic) and "Throwing it far."

There was a clear minority of pupils in each class who considered general mental techniques during the lesson. It would seem that pupils were unaware, or they took for granted, even the most basic of mental requirements such as concentration. However, the Apple Year 9 classes had a greater percentage of pupils (a maximum of
45%) who considered general mental factors compared to any other classes. Furthermore, there appeared to be a greater, or an equivalent, percentage of such pupils in the Year 9 classes compared to the Year 7 classes of the same school, and there appeared to be a greater, or an equivalent, percentage of such pupils in Apple classes compared to classes of the same Year in Yard. Thus, once more, age variables and covert and overt school variables may have proved influential in pupils' strategic actions. For example, Elizabeth (the Yard Year 7 and Year 9 teacher) was much more authoritarian than either Caroline (the Apple Year 7 teacher) or Clive (the Apple Year 9 teacher); she directed lessons step by step as much as possible and especially with the Yard Year 7 pupils because discus throwing was treated as a 'dangerous' activity. Elizabeth put more emphasis upon pupils following instructions and safety procedures than she did on pupils' attempts, and, therefore, it would seem that these Yard Year 7 pupils may have simply followed instructions, almost like robots, to avoid being reprimanded. Interestingly, many of those pupils who did actually suggest that they had utilised general mental techniques emphasised the strict lesson organisation influence; for example, pupils' stated, "I thought I should relax and follow instructions" and "Not to look at my classmates, to concentrate really hard about what I am doing."

Nevertheless, it was evident from the overall focus upon Apple and Yard, Years 7 and 9, that very few pupils (a maximum of 21% in any one class) utilised some specific mental techniques during the tasks; indeed, no pupils at all utilised specific mental techniques in Yard. There was even a similar percentage of pupils between the Apple Year 7 classes who considered factors completely external and irrelevant to the tasks, such as "what I was doing that night", as there was of pupils who considered specific mental techniques. Research has suggested that successful learners have a range of cognitive strategies from which they are able to select appropriately and to adapt flexibly to meet the needs of a specific situation (Nisbet & Shucksmith, 1986), and, therefore, the fact that the present pupils struggled to thoughtfully select any cognitive strategy suggested that learning could be hindered (Gitomer, 1984; cited in Alexander & Judy, 1988). It has long been recognised that "people rely on cognitive strategies to promote learning, remembering and problem solving" (Paris, 1988: p299) and that pupils must engage in some form of strategy to build connections between new ideas, and to relate new ideas to prior knowledge (Mayer, 1988; Weinstein & Mayer, 1986). It did not appear from the pre-intervention data that pupils utilised any cognitive strategies, or at least they were not aware of their utilisation. It was possible that pupils were 'forced' into using a cognitive strategy during the lesson which they were not conscious of (Derry & Murphy, 1986; Rigney, 1978, 1980) and, as such, the pupils would have been utilising 'blind tactics'. For example, in Yard Year 7, pupils
were directed by the teacher with a rhythmical counting as they performed their discus throw; rhythmical counting may be an example of a general wholist-verbaliser cognitive strategy (Luke & Hardy, 1996) but the pupils were kept 'blind' to its use because the teacher did not explain that it was being used or why it was being used. It has been argued that 'forcing' cognitive strategies and tactics is the most conventional situation in most schools (Derry & Murphy, 1986; Schmeck, 1988b) and it is acknowledged in such teaching approaches as 'Teaching Games for Understanding' (Almond, 1996). Unfortunately, Wittrock (1988) suggested that 'model learners' should have awareness of their cognitive strategies and tactics if they are to employ them appropriately to task and context.

The Apple Year 9 classes had a greater percentage of pupils (a maximum of 21%) who considered specific mental techniques compared to any other classes. Furthermore, there appeared to be a greater, or an equivalent, percentage of such pupils in the Year 9 classes compared to the Year 7 classes of the same school, and there appeared to be a greater percentage of such pupils in Apple classes compared to classes of the same Year in Yard. Thus, again, age variables and covert and overt school variables may have proved influential in pupils' strategic actions. Focusing upon age variables, it has been implied that Year 9 pupils will have had a greater opportunity to develop a repertoire of cognitive strategies compared to Year 7 pupils (Nisbet & Shucksmith, 1986) and, therefore, they are more likely to acknowledge considering specific mental techniques during the tasks. However, research has also suggested that pupils' own specific cognitive strategies may not be efficient (Alexander & Judy, 1988; Peterson, 1988) which is also supported in the pre-intervention data by the large percentage of pupils (up to 86%), even in Apple Year 9, who did not acknowledge the use of specific mental techniques during the tasks.

Interestingly, the Apple Year 7 pupils were presented with a cognitive tactic to aid with their tumble turn; the analogy with a forward roll. However, very few pupils seemed to acknowledge this tactic, "I thought about doing a half roll", or any other specific mental technique (a maximum of 7% in any one class). Research has suggested that such imposed specific cognitive strategies, or more specifically, tactics, have been found to contribute to achieving in various Physical Education tasks with children (Gallagher & Thomas, 1984: cited in Singer & Chen, 1994) but it would not seem that this is supported in the pre-intervention data. However, authors have suggested that if tactics are isolated from the origins of those tactics then learning may be inefficient (Schmeck, 1988); pupils not only need to know what the strategy or tactic is, but also why it should be learned, how to use it, when and where to use it and how to evaluate its use (Paris, 1988; Winograd & Hare, 1988).
Unfortunately, this information was not provided in the Apple Year 7 lessons and, therefore, the pre-intervention may not appear to support research that suggests externally imposed strategies can be beneficial to pupils' learning in a Physical Education context because Caroline's (the Apple Year 7 teacher) presentation of the specific cognitive strategies was inefficient.

Comparison Between Pre-Intervention and Post-Intervention Data:

It was evident from both the overall focus upon Apple and Yard that, following the intervention, a relatively large percentage of pupils from each class had still not considered specific physical factors, general mental techniques and specific mental techniques during the tasks. However, this was partly to be expected as there had been relatively little change in pupils' metacognitive knowledge of task and person variables following the intervention which implies that pupils would fail to show efficient strategic action (Flavell, 1987; Weinstein, 1994).

There had been a very large decrease in the percentage of pupils (up to 64%) who had considered some specific physical factors in all of the Apple Year 9 classes. The Apple Year 7 Control class had also shown a large decrease in the percentage of such pupils (41%), whereas the Meta and the Meta+ classes altered only slightly, having shown a slight decrease (4%) and slight increase (7%) in the percentage of such pupils respectively. All three Yard Year 7 classes showed an increase in the percentage of pupils who had considered some specific physical factors during the tasks, although a slightly larger increase was evident in the Meta (37%) and the Meta+ (31%) classes compared to the Control class (20%). Thus, interacting with age variables, the Meta and the Meta+ intervention settings would seem to have proved beneficial to the development of pupils' consideration of specific physical factors. The author suggests that specific physical factors such as physical technique are more obvious to pupils in Physical Education than general or specific mental techniques; Physical Education, by name and nature, involves physical activity and physical technique. Thus, assuming that the 'supervisory' role of the metacognitive strategy (Nisbet & Shucksmith, 1986) guided pupils to consider their strategic action (Goos & Galbraith, 1996; Schoenfeld, 1987) then the Year 7 pupils, whom in the pre-intervention data considered very little strategic action, would focus upon physical factors prior to mental techniques.

There remained very few pupils who had utilised some general mental techniques during the tasks. Notably, the Apple Year 7 classes showed a greater similarity between the three classes, as did the three Apple Year 9 classes, and the difference
between Year 7 and Year 9 with regard to the percentage of pupils who utilised
general mental techniques during the tasks was eliminated. Thus, it would seem that
overt school variables, such as the standardised intervention lesson or the teacher,
were more influential regarding pupils' consideration of general mental techniques
than the intervention setting variables. Even though the Yard Meta class showed an
increase in the percentage of pupils (5%) who considered general mental techniques,
the change did not suggest that the intervention setting variables were more
influential than overt school variables.

There remained a very low percentage of pupils (a maximum of 39%) who
acknowledged having utilised some specific mental techniques during the tasks.
Apple Year 9 continued to have a greater percentage of such pupils compared to any
Year 7 emphasising, once again, the influence of age variables upon pupils' strategic
action.

The Yard Year 7 classes had no pupils who considered specific mental techniques,
although the author has already noted that it was more likely that they would show an
increase in the percentage of pupils who had considered some specific physical
factors during the tasks. In Apple, both Control classes showed a decrease in the
percentage of pupils who had considered some specific mental techniques, while the
Meta+ class in Apple Year 7 and the Meta and Meta+ classes in Apple Year 9 had
shown an increase in the percentage of such pupils. It has been implied that Year 9
pupils may have a greater repertoire of cognitive strategies compared to Year 7
(Nisbet & Shucksmith, 1986) and, therefore, they may not require as much guidance
in the development of specific cognitive strategies as Year 7 pupils. Hence, while
Year 7 seemed to require specific cognitive strategies in addition to the metacognitive
strategy, in Year 9 it was the Meta intervention setting that showed a greater increase
in the percentage of pupils (18% increase) who suggested a consideration of specific
mental techniques compared to the Meta+ intervention setting (2% increase).

Although there was an increase in the percentage of such pupils in the Apple Year 9
Meta+ class it may have been that some pupils became confused with the additional
cognitive strategies, viewing them as extra content (Biggs, 1985), they may have
failed to see the benefits of the cognitive strategies (Matlin, 1994), or they may have
been simply reluctant to abandon their own cognitive strategies (Crowley & Siegler,
1993); thus, the specific cognitive strategies presented in the Meta+ intervention
setting could have been ignored. In addition, as Brown & Smiley (1978: cited in
Armbruster & Brown, 1984) noted, pupils who are induced to utilise specific
cognitive strategies may do so more randomly than those pupils who spontaneously
used such strategies, which may explain the lower increase in the percentage of pupils
who considered specific mental techniques in the Apple Year 9 Meta+ class compared to the Apple Year 9 Meta class. Such problems could be avoided with efficient metacognitive ability but it seemed, from earlier comparisons between pre- and post-intervention data, that the intervention had not greatly enhanced pupils' metacognitive ability from the relatively low levels that were evident in the pre-intervention data.

A Summary of What Strategy?

It would appear that pupils were not sufficiently aware of the importance of strategic factors (Matlin, 1994). Nevertheless, the Apple Year 9 classes seemed to have a greater percentage of pupils who showed some awareness of their strategic actions compared to any other classes. Thus, it would seem that age variables and covert and overt school variables proved influential upon pupils' appreciation of their strategic actions. However, the intervention setting variables, once again, seemed to become part of the influential variables' interaction by helping some pupils to consider specific physical factors and specific mental techniques. The present study offers some support for literature that implies some pupils may require guidance in developing their specific cognitive strategies, adapting their specific cognitive strategies or in supervising the utilisation of their specific cognitive strategies (Alexander & Judy, 1988; Nisbet & Shucksmith, 1986; Paris, 1988; Winograd & Hare, 1988).

Theme: Why Use the Strategy?

Pre-Intervention Data:

As there were relatively few pupils who showed efficient strategic action, or were always aware of their strategic action, it could be expected that the pre-intervention data would show a large percentage of pupils (up to 69%) that, at times, were unable to explain the reasons behind their strategic action.

Apart from pupils in Apple Year 9 classes, there appeared to be a large percentage (up to 97%) of pupils who failed to make any specific cognitive conscious decisions, such as "if you did not pace yourself you would not be able to compleat the course" (sic) or "if I dropped it I would lose valuable time." Many pupils struggled to show some metacognitive knowledge of task influences and task demands and, therefore, it could be expected that these pupils would be unable to make decisions based upon predicting and pre-empting possible problems during the tasks.
However, it seemed from the specific focus upon Apple Year 7 that, in general, there was a greater percentage of pupils who made conscious cognitive decisions than there were pupils who made conscious practical decisions, but whereas the former decisions were often based on general and, therefore, more 'stock' factors (Lee, Landin & Carter, 1992; Perkins & Simmons, 1988) such as "...you had to concentrate", the latter were made as a specific reaction to specific occurrences, such as "because my feet missed the wall as I pushed off." As practical conscious decisions were based upon specific occurrences within the lesson or within previous lessons, it could be assumed that pupils would be able to be specific in the explanation behind such decisions. However, as cognitive conscious decisions require pupils to plan ahead, predict and pre-empt problems, specificity would be harder to achieve unless pupils were familiar with the tasks that they were facing.

Interestingly, there was a greater percentage of pupils in the Apple Year 9 classes (up to 83% in a single class) who suggested having made specific cognitive conscious decisions compared to any other classes. The whole Apple Year 9 Health-Related Exercise Unit of Work had been based around circuit activities and, therefore, it is possible that pupils in the Apple Year 9 classes were beginning to become familiar with the type of problems that can occur in these activities. Thus, support is offered for research that has suggested that typicality and familiarity with tasks may improve pupils' awareness behind their strategic action (Rabinowitz, Cohen & Freeman, 1992). The Year 9 classes appeared to show a greater, or an equivalent, percentage of such pupils compared to the Year 7 classes of the same school. Thus, it would seem that age variables and overt school variables, such as the teacher or the lesson events, influenced pupils' consideration of cognitive conscious decisions. Such influences could be expected considering their apparent influence upon pupils' strategic actions suggested previously in the pre-intervention data. Nevertheless, the Apple Year 9 Health-Related lesson did involve a circuit whereby pupils exercised, moved to the next activity and then rested before exercising again; pupils were given time before each task to think about each activity. From observing the lesson pupils seemed to be more concerned about getting their breath back between activities than planning strategic action, but Clive (the Apple Year 9 teacher) did remind pupils before each activity to relax, to think about the activity and to think about their pacing. Therefore, it is possible that some pupils did respond to this opportunity to consider the next activity and to make a specific cognitive conscious decision.

There was a clear minority of pupils within most classes who appeared to make specific practical conscious decisions, such as "because I was so exhausted" or "because it was hard working." Yet, as the pre-intervention data has already suggested
that some pupils do not monitor their awareness or their actions, and that some pupils do not acknowledge metacognitive experiences, it is quite possible that pupils also fail to react to specific occurrences that could suggest some necessary strategic action. Notably, while there was a degree of similarity between Year 7 and Year 9, and between Apple and Yard, regarding the percentage of pupils who suggested having made specific practical conscious decisions, there was a degree of difference between classes of the same Year and school regarding the percentage of such pupils. Thus, it would seem that overt school variables, such as the lesson events, influenced pupils the most to make specific practical conscious decisions. To utilise Apple Year 9 as an example, Clive (the Apple Year 9 teacher) suggested that he was possibly less tolerant with the Control class compared to the other classes because he felt they were "sharper"; he would not allow them to waste their potential. It is possible, therefore, that a greater percentage of pupils (up to 19% greater) in the Control class, compared to the other classes, were encouraged to react to occurrences in the lesson and to make decisions on how to improve.

It seemed from the overall focus upon Apple and Yard that there were very few pupils who suggested that they had made unconscious decisions (a maximum of 19% in a single class); the Apple classes only having a handful of such pupils and five of the six Yard classes having no such pupils at all. However, from the specific focus upon Apple Year 7 it appeared that, while very few pupils suggested having made unconscious decisions, a large majority of the pupils had stated that they, at times, had no reason, or implied that they could not offer a reason for why a decision was made. It may be that these pupils were unconsciously considering the reasons for their strategic action. Yet, literature has implied that efficient unconscious strategic action will occur only when there has been enough practice at the utilisation of the relevant cognitive strategies to make them automatic in a specific situation (Derry & Murphy, 1986; Garner, 1988); as pupils had shown poor metacognitive knowledge of task and person variables it seemed unlikely that they would have practised a specific cognitive strategy adequately enough to make it unconscious and automatic. Thus, it would appear that these pupils seemed to lack reasons for their actions and they lacked metacognitive knowledge of why strategic action and information is necessary. It is more likely that the pupils' lack of awareness of certain strategic decisions was due to them being 'forced' into actions by the task or context (Derry & Murphy, 1986; Schmeck, 1988b) rather than by the decisions becoming so efficient that they were automatic. To recapitulate a previous observation, the Yard Year 7 pupils were presented with a rhythmical counting as they performed their discus throw; rhythmical counting may be an example of a general wholist-verbaliser cognitive strategy (Luke & Hardy, 1996) but the pupils were 'forced' towards the strategic
action because the teacher did not explain that it was being used or why it was being used. To confirm pupils' lack of awareness of externally imposed cognitive strategies, such as those imposed by the teacher or the context, it was evident from the specific focus upon Apple Year 7 that when pupils were aware of a reason why certain strategic decisions had been made, it was usually an individually controlled decision; that is, even though Apple Year 7 pupils were provided with a cognitive tactic regarding the tumble turn, very few pupils suggested that 'others' had given them an idea for their strategic action.

Notably, there was a greater percentage of pupils in the Apple Year 9 classes (up to 19% in a single class) who suggested making unconscious decisions and, who therefore, may have reached a point of automatic utilisation of metacognitive knowledge of strategy variables, compared to any other classes. Furthermore, the Year 9 classes appeared to show a greater, or an equivalent, percentage of such pupils compared to the Year 7 classes of the same school, and the Apple classes showed a greater, or a very similar, percentage of such pupils compared to classes of the same Year in Yard. However, this could be expected considering the similar situation regarding the percentage of pupils who had been aware of their strategic action and the percentage of pupils who had made specific cognitive conscious decisions.

Comparison Between Pre-Intervention and Post-Intervention Data:

From the overall focus upon Apple and Yard it appeared that, in general, fewer pupils (a maximum of 61% in any one class) made specific cognitive conscious decisions following the intervention. It was evident that Apple Year 7 classes showed an increase in the percentage of such pupils, whereas Apple Year 9 and Yard Year 7 classes showed a decrease in the percentage of such pupils. As a result, Apple Year 7 and Apple Year 9 showed a greater degree of similarity with regard to the percentage of pupils who suggested having made specific cognitive conscious decisions, and Apple showed a greater percentage of pupils who made specific cognitive conscious decisions compared to Yard. Therefore, it appeared that covert variables were influential in pupils making specific cognitive conscious decisions and that overt school variables, such as the standardised lesson structure and the teacher, may have reduced the influence of age variables. For example, within the standardised lesson pupils were asked to consider what they were thinking and, therefore, how they would approach the task. Although the Apple Year 9 classes had been given time and encouragement to do this in the observed lesson, the Year 7 pupils had not. Thus, the Year 7 pupils may have benefited more from the standardised lesson design than the Year 9 pupils did.
Although it may seem that the intervention setting variables had little influence upon pupils making specific cognitive conscious decisions, on closer assessment the Meta and the Meta+ intervention settings in Apple Year 7 and Apple Year 9 may have proved more effective than the Control setting in encouraging pupils to make such decisions. The increase in the percentage of such pupils in the Apple Year 7 Meta and Meta+ classes was greater (2% and 38% greater respectively) than the increase in the Control class. The decrease in the percentage of pupils who made specific cognitive conscious decisions in the Apple Year 9 Meta and Meta+ classes was less (42% and 22% less respectively) than the decrease in the percentage of such pupils in the Control class. It would seem that the metacognitive strategy appears to have encouraged some Apple Year 7 and Year 9 pupils to be aware of why they made strategic decisions. It was expected that if pupils consciously utilised a metacognitive strategy then they would be more likely to be able to plan and be aware of the reasons for their actions (Flavell, 1979). Notably, in Apple Year 7 the specific cognitive strategies in the Meta+ intervention setting appeared to further encourage conscious appreciation of why decisions were being made, while in Apple Year 9 the additional specific cognitive strategies seemed more of a hindrance compared to simply encouraging the utilisation of the metacognitive strategy. Schoenfeld (1987) had noted that, with older pupils, a metacognitive strategy without additional specific cognitive strategies had aided pupils to solve more problems and enhance their learning, and Nisbet & Shucksmith (1986) implied that Year 9 pupils would possibly have a greater repertoire of cognitive strategies compared to Year 7. As such, it may have been that, whereas Year 7 may have needed and, therefore, utilised the additional specific cognitive strategies to help plan their strategic actions, Year 9 pupils may have had some difficulty utilising these strategies, especially if they contradicted their own 'naturally' developed cognitive strategies (McCarthy & Schmeck, 1988).

While the intervention setting variables in Apple seemed to benefit pupils with regard to the making of specific cognitive conscious decisions compared to the Control setting, they were not of benefit at all to pupils in Yard Year 7; indeed, the Meta intervention setting seemed to prove a major hindrance to pupils' awareness of the reasons behind their actions. Therefore, it seemed that the effectiveness of intervention setting variables depended upon the interaction of the covert school variables and overt school variables. That is, as it has been stated earlier, pupils in Apple may have been more used to utilising task cards and worksheets during Physical Education lessons compared to pupils in Yard, and, therefore, the Yard pupils may have adapted less quickly to the use of the self-questioning metacognitive strategy. Interestingly, the author did note that the Yard Year 7 Meta class, in
particular, seemed very surprised that they had been asked to even read something in a Physical Education lesson, which implies they may have been even slower to utilise the self-questioning metacognitive strategy than other classes were.

Interestingly, it appeared from both the overall focus upon Apple and Yard and the specific focus upon Apple Year 7 that very few pupils (a maximum of 30% in any one class) acknowledged having made any specific practical conscious decisions following the intervention. Again, the similarity between classes of the same Year and school increased, which implied that the influence of overt school variables, such as the standardised lesson structure and the teacher, proved influential.

There was a decrease in the Apple Year 7 and Apple Year 9 Meta classes and the Apple Year 7 Meta+ class regarding the percentage of pupils who made specific practical conscious decisions. As such decisions are made as a reaction to practical or physical occurrences in the lesson it would seem that the Meta and Meta+ intervention settings had not encouraged pupils to monitor or evaluate their actions during the tasks. It has been noted that pupils can often undertake little monitoring (Flavell, 1979) and, although it has been argued that metacognitive strategies can enhance such monitoring (Flavell, 1979; Goos & Galbraith, 1996; King, 1991), the short duration of the study may have meant that the metacognitive strategy included in the intervention settings had not been utilised efficiently enough, or for long enough, to have influenced pupils' tendencies and abilities regarding the monitoring of themselves during the tasks.

Nevertheless, while each Apple Year 7 class seemed to show a decrease in the percentage of pupils who made specific practical conscious decisions, the decrease was less evident in the Meta and the Meta+ classes compared to the Control class; being over three times smaller. Furthermore, the Apple Year 9 Meta+ class actually showed an increase in the percentage of such pupils that was not matched in either of the Control or the Meta classes. As such, there were small indications that, depending upon age variables, covert school variables and overt school variables, the intervention settings may sometimes influence pupils' appreciation of practical conscious decisions more positively than the Control setting.

The Yard Year 7 Meta and Meta+ classes showed a decrease in the percentage of pupils who acknowledged making specific practical conscious decisions which was not matched by the Control class where there had been an increase in the percentage of such pupils. Thus, in Yard it appeared as though the self-questioning metacognitive strategy may have actually hindered pupils in making specific practical conscious
decisions; thus further supporting the possibility that the Yard pupils were not used to planning, monitoring or evaluating in lessons and would, therefore, view the metacognitive strategy as extra content (Biggs, 1985) which they would be slow to adopt.

Notably, an extremely small percentage of pupils (a maximum of 13% in any one class) acknowledged having made any unconscious decisions during the tasks. However, there had been a slight increase in the percentage of such pupils in all three Meta+ classes. These slight increases in the percentage of pupils who acknowledged having made some unconscious decisions was only matched in the Yard Year 7 Control class. Therefore, whereas the Meta+ intervention setting may have proved no more beneficial to Yard pupils in making unconscious decisions compared to the Control setting, this did not seem to be the case in Apple regardless of age variables. Thus, it would seem that the difference in covert school variables between Apple and Yard, such as the greater opportunity that Apple pupils had to 'think for themselves' compared to Yard pupils, once again influenced pupils' awareness of their strategic action. However, what is interesting is that both Apple Year 7 and Year 9 seemed to benefit from guidance regarding the specific cognitive strategies appropriate for the task. Literature has implied that Year 9 pupils may require less guidance than Year 7 pupils in the development of specific cognitive strategies but the comparison between the pre- and post-intervention data does not necessarily support this. It would seem that to accelerate the development of automatic strategic action pupils may need guidance in the most appropriate specific cognitive strategies for the task in hand.

Nevertheless, it was evident from the specific focus upon Apple Year 7 that there remained very few pupils who implied that 'others' had encouraged them to make certain decisions which supports the views of other researchers who implied that pupils may not use specific cognitive strategies offered in the intervention settings (Crowley & Siegler, 1993). However, the Apple Year 7 Meta+ class did show a decrease in the percentage of pupils who were unable to offer any response regarding the reasons for their strategic action and, due to the short duration of the intervention, such slight improvements in awareness may have been all that could be expected.

A Summary of Why Use the Strategy?

Many pupils showed a poor awareness of the reasons behind their strategic action. Nevertheless, there were a number of interacting variables, such as the familiarity of the tasks, that seemed to influence pupils' appreciation of the reasons for the strategic action. It would seem that, without efficient metacognitive ability, the pupils' strategic
action was externally controlled by the teacher, the tasks or the context without their awareness (Derry & Murphy, 1986; Schmeck, 1988b). There were small signs that the intervention setting variables could improve pupils' appreciation of their strategic action, although, perhaps, because the intervention was too short in duration, other variables, such as age variables and covert and overt school variables, proved more influential. It may be that the present study offers support for the assumption that "laying learning strategies" on pupils without appropriate time to develop a full comprehension of them will prove relatively ineffective (Wittrock, 1988: p293).

**Theme:** When to Use the Strategy

Pre-Intervention Data:

It was evident from the specific focus upon Apple Year 7 that there was a majority of pupils in each class who failed to appreciate when specific cognitive strategies or strategic information would be useful, either in the context of the task in which they had participated or with respect to other tasks, whereas there was a minority of pupils in each class who had such an appreciation and awareness. From the overall focus upon Apple and Yard, Year 7 and Year 9, it appeared that very few pupils (a maximum of 26% in any one class) were able to suggest 'wider' tasks or actions that would utilise the specific strategies or the strategic information that was utilised during the tasks in the observed lesson. However, the pre-intervention data suggested that pupils lacked awareness of their strategic actions and as the durability and transfer of information appear to develop only when pupils can gain awareness and control of their strategic actions (Brown, Bransford, Ferrarra & Campione, 1984; Pask, 1976; Wagner & Sternberg, 1984) this was to be expected.

Both the author and other researchers have suggested that pupils may be 'forced' into utilising cognitive strategies and tactics by the tasks and the context (Derry & Murphy, 1986; Schmeck, 1988b; Singer & Chen, 1994), and, as a result, pupils will struggle to transfer that information to other tasks and will struggle with the requirements of further independent learning of material that is not highly designed (Rigney, 1978). To recapitulate a previous example, Burrows & Abbey (1986) noted that pupils who were forced to utilise the 'hit long-hit short' tactics on a long, thin badminton court did not use the same gameplay tactics on a larger court even after a few weeks practice; the author suggests that the 'design' of the task had gone and, apparently, so had the use of the gameplay tactics. Therefore, it would seem that the pre-intervention data supports the author's assumption regarding how pupils can be
'forced' into strategic action and how pupils will be unable to transfer information between tasks unless they have control of their strategic actions.

However, while there is a strong similarity between classes of the same Year and school, and between Year 7 and Year 9 classes from the same school, regarding the percentage of pupils who were able to offer suggestions for wider transfer of their strategic action, Yard appeared to have a slightly greater percentage of such pupils compared to Apple. Thus, not only does this suggest that covert and overt school variables may have proved influential in developing pupils' awareness of transfer possibilities for their strategic action, but also that research regarding the association between pupils' awareness of their strategic action and their appreciation of when that strategic action could be used is not necessarily supported by the pre-intervention data; Yard generally had a lower percentage of pupils who were aware of their strategic action and who aware of the reasons behind their strategic action compared to Apple.

Nevertheless, it is noticeable that the overall percentage of pupils in Yard who showed some awareness of the reasons behind their strategic action is very similar to the percentage of pupils in Yard who suggested some good transfer possibilities of those strategic actions. Therefore, it may be that in certain instances, as appeared to be the case in Apple, although pupils may have an awareness of their strategic actions and an awareness of the reasons for those strategic actions, they may not always be aware of when to utilise those strategic actions. This would suggest that pupils could be told about a specific cognitive strategy and may be able to 'regurgitate' the teacher's explanation for utilising that specific cognitive strategy, although they do not actually understand what they are doing. This would support research that has suggested pupils can come up with the right answers to questions even though they may not understood the tasks or the information (Marton, 1988; MacLure & French, 1980).

Comparison Between Pre-Intervention and Post-Intervention Data:

Very few pupils (a maximum of 14% in any one class) were able to suggest 'wider' tasks or actions that would utilise the specific strategies or the strategic information that was utilised during the tasks in the intervention lesson. Most of the classes showed a decrease in the percentage of such pupils and, from the specific focus upon Apple Year 7, it appeared that there was a general decrease in the percentage of pupils who even appreciated that the specific cognitive strategies would be useful in the context of the activity in which they had participated or in closely related activities. It
is possible that the intervention was too short in duration to have any positive influence upon pupils' awareness of when their strategic action could be used and, therefore, more overt school variables such as the nature of the intervention lesson, would prove more influential. For example, pupils may not have had enough time to overcome the apparent novelty of the intervention lesson with a new teacher and a different teaching approach, and, therefore, they may have viewed the intervention lesson as a 'one-off'. Ironically, this could mean that their strategic actions would be 'situated' in that context and not transferred; that is, the intervention, due to its brevity, may have worsened pupils' appreciation of when strategic actions could be utilised although it was actually attempting to improve such appreciation.

However, the intervention settings did not hamper pupils any more than the Control settings in both Apple and Yard Year 7, and in Apple Year 9 the Meta intervention setting seemed to slightly increase the percentage of pupils (7%) who suggested some possibilities for a wider transfer of their strategic action. However, in general, and assuming that metacognitive strategies can enhance pupils' transfer of strategic information (Pask, 1976; Brown, Bransford, Ferrarra & Campione, 1984; Wagner & Sternberg, 1984), it would appear that pupils neither utilised their own metacognitive strategies efficiently nor utilised the metacognitive strategy encouraged in the Meta and Meta+ intervention settings efficiently.

A Summary of When to Use the Strategy:

Both before and after the intervention, most pupils indicated a poor awareness of when their strategic action would be useful in other contexts and, therefore, they confirmed their lack of appreciation with regard to their strategic action and the reasons behind utilising that strategic action (Brown, Bransford, Ferrarra & Campione, 1983; Pask, 1976; Wagner & Sternberg, 1984). The intervention did not seem to have any major positive influence upon the development of pupils' awareness of the transfer possibilities of their strategic action, although it would seem to be the design of the intervention study, rather than the intervention setting variables, that hampered pupils' awareness of when their strategic action could be utilised.

Theme: Pupils' Monitoring of the Strategy and the Task

Pre-Intervention Data:

The overall focus upon Apple and Yard suggested that there was a large percentage (between 26% and 82%) of pupils in each class who failed to independently monitor
their specific cognitive strategies or their strategic action during the tasks. From the specific focus upon Apple Year 7 it was evident that there were as many pupils who offered no indication of whether they had monitored their specific strategies, or suggested that they had no reason for either changing or not changing their specific strategies, as there were pupils who indicated that some monitoring had taken place. It had been suggested from the pre-intervention data regarding pupils' metacognitive knowledge of person universals of cognition that there was a general lack of pupil monitoring with regard to their awareness and their understanding of the tasks. Therefore, it was not surprising that a large percentage of pupils in each class also failed to monitor their strategic action. This failure to monitor strategic action emphasises how infrequently pupils appeared to utilise metacognitive strategies (Flavell, 1987) and it may help to explain why relatively few pupils had positive metacognitive experiences during the tasks and the limited degree of strategic action transfer that was suggested (Campione, 1987).

The Apple Year 9 classes had a greater percentage of pupils who had implied that they had independently monitored their strategic action and the tasks compared to any other classes, although, from the percentage of such pupils in Yard Year 7 compared to Yard Year 9 and Apple Year 7, it would appear that age variables and covert school variables did not seem as influential as overt school variables. It may be that the activity involved in Apple Year 9 aided pupils' monitoring; that is, because each task in the Health-Related Exercise lesson involved a repetitive movement, and because pupils could rest between tasks, it may be that pupils could monitor and evaluate their strategic action both during and between the tasks.

Comparison Between Pre-Intervention and Post-Intervention Data:

As a whole, most pupils (between 44% and 76% in a single class) appeared not to have independently monitored their specific cognitive strategies and their strategic action. Once again, it would seem that the intervention was perhaps too short in duration for pupils to fully appreciate the benefits of the metacognitive strategy for monitoring their strategic action.

The Yard classes showed a greater percentage of pupils who appeared to have independently monitored their strategic action compared to any classes in Apple, although there had been very little change in each Yard class regarding the percentage of such pupils. Thus, it would seem that either covert or overt school variables may have been more influential than intervention setting variables regarding whether pupils monitored their strategic action. However, in Apple Year 7 the Control class
showed a decrease in the percentage of pupils who had independently monitored their strategic action, while there was an increase in the percentage of such pupils and a maintenance in the percentage of such pupils in the Meta class and the Meta+ class respectively. Furthermore, the Apple Year 7 Meta class showed a decrease in the percentage of pupils who appeared to rely on being informed on whether they should change their strategic action or not. In addition, although all the Apple Year 9 classes showed a decrease in the percentage of pupils who independently monitored their strategic action, the decrease was far more dramatic in the Control class (45%) compared to the Meta (19%) and the Meta+ (6%) classes. Therefore, while covert and overt school influences seemed to influence pupils' monitoring of their strategic action, and while it was evident that most pupils lacked the necessary awareness of how important it was to monitor their strategic action, it would seem that the intervention setting variables were more beneficial to pupils than the Control setting variables. It has been argued that metacognitive strategies can enhance pupils' monitoring of strategic action (Flavell, 1979; Goos & Galbraith, 1996; King, 1991) and besides the short duration of the study there were indications from the comparisons between the pre- and post-intervention data that the main study partly supported this argument.

A Summary of Pupils' Monitoring of the Strategy and the Task:

Most pupils indicated that they did not independently monitor their strategic action and, thus, the implication was that most pupils had not developed any efficient metacognitive strategies (Flavell, 1987). However, Apple Year 9 classes showed a greater percentage of pupils who implied that they had independently monitored their strategic action compared to other classes, and overt school variables, such as the type of activity the pupils were participating in (e.g. Health-Related Exercise), seemed to be important influential variables upon encouraging pupils to do such monitoring. There were small signs that the intervention setting variables were influential in the development of pupils' monitoring of their strategic action, although, once again, they only formed part of a larger influential variables' interaction that included age variables and covert and overt school variables. Nevertheless, the present study does offer some support for research that suggests the development of metacognitive strategies may enhance pupils' monitoring of their strategic action (Flavell, 1979; Goos & Galbraith, 1996; King, 1991).
Theme: Pupils' Feelings During their Strategic Action and the Task

Pre-Intervention Data:

It was evident from the overall focus upon both schools that many pupils (between 23% and 80% in a single class) had not experienced either positive or negative feelings towards their strategic action and the tasks; they either did not have, or were not aware of, any definite affective metacognitive experiences. The clear lack of monitoring that was indicated from the pre-intervention data would suggest why a large percentage of pupils failed to have any form of metacognitive experience. It is possible that pupils may have experienced feelings but did not understand how to interpret them or react to them effectively (Flavell, 1987) and, therefore, ignored them. As Nisbet & Shucksmith (1986) argued, although metacognitive experiences are important to learning, they do not inevitably lead to it. Furthermore, the preliminary study (Pre) indicated that pupils could have affective metacognitive experiences but fail to acknowledge them sufficiently; a Year 9 pupil who stated, "I think I liked using the apparatus" implies a possible lack of awareness behind the feeling of liking.

Interestingly, while age variables did not appear to be a strong influence on pupils' affective metacognitive experiences regarding their strategic action and the tasks, Yard appeared to have a greater percentage of pupils who had experienced some positive or negative feelings compared to Apple classes. Thus, it could be that covert and overt school variables, such as the teacher, could have proved influential with regard to pupils' experiences of positive or negative feelings during their strategic action and the tasks. For example, as Elizabeth (the Yard Year 7 and Year 9 teacher) was very authoritarian and reprimanded pupils for any misbehaviour, it is possible that pupils experienced negative feelings during their strategic action and the tasks because they were reprimanded.

Indeed, while Yard showed a greater percentage of pupils who experienced positive or negative feelings during their strategic action or the tasks, the Apple Year 9 classes showed a greater percentage of pupils who experienced positive feelings compared to any other classes. However, it was evident that only a few pupils from each class had experienced positive feelings about their strategic action and the tasks; it would seem that most pupils were not confident or positive about their selection or utilisation of specific cognitive strategies or strategic action. This was to be expected considering that many pupils failed to show an appreciation of their specific cognitive strategies and their strategic action, and failed to show an appreciation of the reasons behind
their strategic action. It would seem that pupils were not in control of their learning and, therefore, they were unlikely to feel positive about their strategic actions (Flavell, 1987).

Comparison Between Pre-Intervention and Post-Intervention Data:

Following the intervention, there were many pupils (between 29% to 80% in a single class) who still did not appear to have experienced either positive or negative feelings during their strategic action. As there had been a change in teacher and teaching approach it would seem that pupils' feelings were not simply related to the motivational climate established in the lesson. Indeed, even though the intervention lesson was standardised and the teacher remained the same in each intervention lesson, Yard had a greater percentage of pupils who experienced positive or negative feelings towards their strategic action and tasks compared to Apple. It would seem that there is a strong relationship between pupils' appreciation and, therefore, control of their learning and their feelings (Flavell, 1987). Yard classes, in general, showed a lower percentage of pupils who fully appreciated their strategic action compared to Apple classes, and this lack of control may have led to negative feelings regarding their actions and the tasks.

Both Year 7 Control classes showed a decrease in the percentage of pupils who had experienced positive or negative feelings during their strategic action and the tasks, whereas both Year 7 Meta classes showed an increase in the percentage of such pupils. Furthermore, the Apple Year 7 Meta+ class maintained a similar percentage of pupils who had experienced either positive or negative feelings during their strategic action, rather than showing a decrease in the percentage of such pupils that was evident in the Control class. Thus, in Year 7 the intervention settings, especially the Meta intervention setting, appeared beneficial to pupils in helping them to acknowledge or to have more affective metacognitive experiences compared to the Control setting. Research has been implied that by utilising a conscious metacognitive strategy affective metacognitive experiences may increase (Flavell, 1979), and as the development of metacognitive ability is a gradual process Year 7 pupils are likely to need guidance in the development of efficient metacognitive strategies (Nisbet & Shucksmith, 1986). The comparison between the pre- and post- intervention data would appear to support such research.

In Year 9 all three classes showed a decrease in the percentage of pupils who experienced either positive or negative feelings during their strategic action, which suggested that there were no greater benefits from the Meta and Meta+ intervention
settings compared to the Control setting. Furthermore, the influence of overt school variables, such as the lesson events, could have overshadowed any effects of the intervention settings. Interestingly, the largest decrease in the percentage of pupils who experienced either positive or negative feelings during their strategic action occurred in the Apple Year 9 Meta class; this lesson had to be shorter than any of the other intervention lessons and, therefore, the author was maintaining a degree of pressure on the pupils to ensure that the lesson was completed, which could have reduced the time that pupils had to consider or acknowledge their metacognitive experiences.

There were few pupils (between 0% and 42%) who had experienced positive feelings during their strategic action. However, all the Apple Year 7 classes showed a relatively clear increase in the percentage of such pupils (between a 7% and 18% increase) and, as such, there did not appear to be any major intervention setting variables influencing pupils' awareness or experience of positive feelings. The influence of overt school variables, such as the teacher and the standardised lesson, may have proved more influential. Indeed, from the specific focus upon Apple Year 7 the Control, Meta and Meta+ classes all showed a decrease in the percentage of pupils who expressed neutral feelings, a decrease in the percentage of pupils who expressed negative feelings, an increase in the percentage of pupils who referred to physical feelings and an increase in the percentage of pupils who claimed that they had no feelings during the tasks.

While the Yard Year 7 Control class showed a decrease in the percentage of pupils (11%) who acknowledged positive feelings during their strategic action, there was an increase in the percentage of such pupils (5%) in the Meta+ class. As such, the Yard Year 7 Meta+ intervention setting appeared to encourage more pupils to experience positive feelings towards their strategic action compared to the Control setting. It was possible that the additional specific cognitive strategies presented to the pupils in the Meta+ class increased their awareness and, therefore, their control and confidence in the strategic action they were taking.

However, in Apple Year 9 it was the Meta intervention setting that appeared to encourage more pupils to acknowledge their positive affective metacognitive experiences compared to the Control setting. Again, age variables, and the suggestion that Year 9 pupils were more likely to have additional specific cognitive strategies to draw upon compared to Year 7 pupils (Nisbet & Shucksmith, 1986), appeared to be supported.
A Summary of Pupils' Feelings During their Strategic Action and the Task:

It would seem that if pupils fail to monitor their strategic action then they are likely to lack metacognitive experiences regarding their strategic action (Flavell, 1979), or at least lack positive metacognitive experiences. However, there were signs that the intervention setting variables could help some pupils to acknowledge their metacognitive experiences. Furthermore, the awareness and control of their strategic action that the development of a metacognitive strategy (Meta) or the development of a metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies (Meta+) may bring, could increase the number of pupils' positive metacognitive experiences. Thus, the present study offers support for research that suggests a link between pupils' metacognitive ability and pupils' metacognitive experiences (Flavell, 1987). However, once again, the intervention setting variables only formed part of a larger influential variables' interaction that included age, and covert and overt school variables.

General Area: Interactional Variables

Theme: Pupils' Volitional Control

Pre-Intervention Data:

It has been claimed that there may be a reciprocal relationship between metacognitive ability and volitional control, with metacognitive ability potentially enhancing pupils' self-regulatory and volitional control over a learning situation (Nisbet & Shucksmith, 1986; Zimmerman & Risemberg, 1994) and volitional control potentially influencing the development of metacognitive ability (Pintrich & Garcia, 1994). It was evident from the overall focus upon both schools and Years that, while the Apple Year 9 classes appeared to have a strong majority of pupils (between 86% and 89% in a single class) who implied that they had some degree of volitional control, the other classes only had a slight majority or even a minority of such pupils. Therefore, as Apple Year 9 had, in general, shown a greater percentage of pupils to have each component of metacognitive ability, such as metacognitive knowledge of task, person and strategy variables and metacognitive strategies, compared to the other classes, the suggested reciprocal relationship between metacognitive ability and volitional control is supported.

Interestingly, it appeared from the specific focus upon Apple Year 7 that pupils' perceptions of volitional control were far from consistent. Pupils, at times, perceived
themselves as having volitional control, yet, at other times, perceived themselves as lacking volitional control or implied that they were unaware of their volitional control. However, as it could be argued that pupils lacked control of their strategic action and, therefore, relied upon the more overt school variables, such as the task or the teacher, for their strategic action, it may be that these pupils were also dependent upon the overt school variables for their volitional control. Thus, as the tasks changed or the teachers' comments changed so did pupils' perceptions of volitional control.

Comparison Between Pre-Intervention and Post-Intervention Data:

The Apple Year 9 classes still appeared to have a relatively strong majority of pupils (between 75% and 89% in a single class) who implied that they had some degree of volitional control, while in most of the Year 7 classes there was still a relatively large percentage of pupils (between 27% and 59% in a single class) who implied that they lacked volitional control. It would seem, therefore, that age variables and overt school variables were more influential than the intervention setting variables in influencing pupils' volitional control.

However, in Apple Year 7, while the Control class showed a decrease in the percentage of pupils who implied they had some degree of volitional control, the Meta and the Meta+ classes showed an increase in the percentage of such pupils; thus, in complete contrast to the situation that existed prior to the intervention, there was a minority of pupils in the Control class who claimed to have volitional control and a majority of such pupils in the Meta and Meta+ classes. Furthermore, although the Yard Year 7 Control, Meta and Meta+ classes all showed an increase in the percentage of pupils who perceived themselves as having some degree of volitional control, there was a larger increase in the percentage of such pupils in the Meta (17%) and the Meta+ (26%) classes compared to the Control class (5%). Therefore, in Year 7, the Meta and Meta+ intervention settings appeared more likely to enhance pupils' perceptions of having some volitional control compared to the Control setting. Interestingly, the age influence upon the effectiveness of the intervention setting variables was also evident; the Apple Year 9 Meta and Meta+ intervention settings appeared to have no positive influence upon pupils' volitional control. It has been argued that because metacognitive ability is a gradual and developing process, Year 7 pupils may have less metacognitive ability than Year 9 pupils. Therefore, assuming that metacognitive ability and volitional control have a reciprocal relationship (Nisbet & Shucksmith, 1986; Zimmerman & Risemberg, Pintrich & Garcia, 1994), if Year 7 pupils can be encouraged to efficiently utilise a conscious metacognitive strategy and
develop their metacognitive ability, they are more likely to show improvements in terms of volitional control compared to Year 9 pupils.

Interestingly, the specific focus upon Apple Year 7 showed that pupils in each of the three classes were still inconsistent in their perceptions of their volitional control. Furthermore, these inconsistencies may have been greater in the Meta and Meta+ classes rather than the Control class; although there had been a large decrease in the percentage of pupils in the Control class who had some volitional control and there had been a large increase in the percentage of such pupils in the Meta and Meta+ classes, the Control class showed a decrease in the percentage of pupils who implied that they had lacked volitional control, a decrease that was not matched in the Meta and Meta+ classes. However, these inconsistencies may indicate that pupils were becoming more aware of their perceptions of volitional control in tasks, which could be expected from intervention settings that tried to develop conscious metacognitive knowledge and metacognitive strategies (Nisbet & Shucksmith, 1986; Zimmerman & Risemberg, 1994). From the metacognitive ability conceptual framework it could be argued that awareness of volitional control may precede development of volitional control. While the Control class showed an increase in the percentage of pupils (14%) who, at some time, were unable to suggest what volitional control they had, the Meta and Meta+ classes showed a decrease in the percentage of such pupils (2% and 42% respectively).

A Summary of Pupils' Volitional Control:

There appeared to be a connection between pupils' metacognitive ability and their perceptions of volitional control (Nisbet & Shucksmith, 1986; Zimmerman & Risemberg, Pintrich & Garcia, 1994); most pupils had indicated a lack of metacognitive ability and there was also a lack of consistency with regard to pupils' perceptions of their volitional control. Assuming that most pupils did not have an appreciation of their strategic action and were, therefore, strongly 'controlled' by the teacher, tasks or context for their strategic action, it would seem inevitable that their sense of volitional control would vary depending upon the lesson events. There were some signs that the intervention setting variables may have enhanced pupils' perceptions of having good volitional control, but again, other variables also proved influential such as age.
Pre-Intervention Data:

It was evident from the overall focus upon Apple and Yard that few pupils (between 0% and 34%) implied that a purpose of Physical Education was to develop mental skills. However, this was not surprising considering that most pupils lacked metacognitive knowledge and metacognitive strategies, and that the cognitive side of Physical Education would not be seen as a great priority for most pupils in a practically oriented lesson.

It appeared from the specific focus upon Apple Year 7 that a large percentage of pupils had assumed that a main purpose of Physical Education was to develop pupils' health and fitness. Furthermore, it was perceived that Physical Education was based upon the development of the physical aspects of health and fitness and on the development of physical skills, as opposed to the development of the mental aspects of health and fitness and the development of mental skills. The strong physical focus was inevitable considering the physical nature emphasised in Physical Education combined with the most pupils' lack of efficient metacognitive ability. Interestingly, there were pupils in each class who, at times, implied that they were unaware of any purpose of Physical Education which would mean their learning in Physical Education could lack any focus and efficiency.

There was a greater percentage of pupils (between 4% and 34%) in the Apple Year 9 classes who suggested that a purpose of Physical Education was to develop mental skills compared to any other classes, and assuming from the pre-intervention data that Apple Year 9 pupils were more likely to show signs of having utilised efficient metacognitive knowledge and metacognitive strategies (i.e. metacognitive ability), the implied interaction between metacognitive ability and pupils' views on the wider purpose of Physical Education (Duda, 1992) would not have been unexpected.

Notably, the Apple classes had a greater percentage of pupils who suggested that a purpose of Physical Education was to develop mental skills compared to the Yard classes. Thus, it would seem that there were covert and overt school variables that influenced the direction of pupils' thoughts on the purpose of Physical Education. The author has stated previously that Apple pupils were more experienced with utilising task cards, charts and worksheets to help in their Physical Education lessons, and were given greater responsibility within Physical Education lessons compared with
Yard pupils. It would seem, therefore, that Apple pupils had a greater opportunity to appreciate the mental skills involved in Physical Education compared to Yard pupils.

Comparison Between Pre-Intervention and Post-Intervention Data:

Few pupils (between 0% and 18% in a single class) implied that a purpose of Physical Education was to develop specific mental skills. From the specific focus upon Apple Year 7 it was evident that health and fitness remained a strong focus for pupils regarding the purpose of Physical Education. It would seem that, as was the case with regard to pupils' awareness of the task purpose, the self-questioning metacognitive strategy had not enhanced pupils' awareness of the development of mental skills in Physical Education. Again, it may have been that the intervention was too short in duration, as Nisbet & Shucksmith (1986) has suggested that secondary school pupils will be beginning to establish thoughts and habits that may be difficult to change; pupils' perceptions upon the purpose of Physical Education is likely to be one of the most stable of these thoughts.

However, the Apple Year 7 and Apple Year 9 Meta classes both showed a slight increase in the percentage of pupils who acknowledged the development of mental skills in Physical Education (1% and 14% respectively) following the intervention, that was not matched in the Control or Meta+ classes. If pupils seemed to benefit from the development of a metacognitive strategy it may appear strange that the Meta+ intervention setting, which tried to develop pupils' awareness of relevant specific cognitive strategies and could have, potentially, emphasised the need to consider mental skills, did not prove beneficial. However, the specific cognitive strategies may have actually emphasised the physical aspect of Physical Education, because if pupils are unaware of why specific cognitive strategies are utilised then learning will be inefficient (Schmeck, 1988) and specific cognitive strategies may be viewed as offering further ways to improve physical technique. That is, the specific cognitive strategies or, more specifically, tactics, may have become 'blind tactics' and, therefore, they would be inefficient in developing pupils' awareness of their strategic action and mental skills. From earlier comparisons between the pre- and post-intervention data, it was evident that pupils' metacognitive ability had not been enhanced greatly by such a short intervention and, thus, it was unlikely that pupils would have a complete awareness of why the cognitive strategies were utilised.

Interestingly, Year 9 maintained a greater percentage of pupils who acknowledged the development of mental skills during Physical Education compared to Year 7. Furthermore, in Yard Year 7, the Control class showed an increase in the percentage
of such pupils that was not matched in the Meta or Meta+ classes. Thus, from the overall focus upon both schools it appeared that interacting age variables and overt school variables, such as the lesson events, could influence pupils' awareness of the development of mental skills in Physical Education. For example, it is possible that Year 9 pupils had a greater opportunity to experience a wider range of activity areas in Physical Education compared to Year 7 pupils, and, therefore, they were more likely to have a deeper insight into the various purposes of Physical Education including the development of mental skills.

A Summary of The Wider Purpose of Physical Education:

It would seem that few pupils appreciated the development of mental skills as part of the purpose of Physical Education; health and fitness was viewed as the main purpose by many pupils and physical skills were clearly more acknowledged than mental skills. It appears that covert and overt school variables, such as the inclusion of more obvious theoretical work and worksheets into units of work, can influence pupils' appreciation of the mental aspects of Physical Education. The intervention setting variables seemed to have little effect upon pupils' perceptions regarding the wider purpose of Physical Education, although this was not surprising considering that their views of Physical Education will have developed over years and that the intervention was only a single lesson.

Theme: Pupils' Motivational Orientation

Pre-Intervention Data:

It was evident from both the overall focus upon Apple and Yard and the specific focus upon Apple Year 7 that most pupils, at times, had suggested having a task-oriented motivation and, more specifically, a strong task-oriented motivation. However, it has been implied that there may be an inter-dependent relationship between metacognitive ability and motivation (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994), and as the pre-intervention data suggested that most pupils lacked efficient metacognitive ability, the connection between metacognitive ability and motivational orientation seemed questionable.

However, there was still a notable percentage of pupils (up to 76% in a single class) who sometimes made no suggestion of having task-oriented motivation. Moreover, it appeared from the specific focus upon Apple Year 7 that there were individual inconsistencies regarding pupils' motivational orientation as a relatively large
percentage of the same pupils in each of the three classes who had suggested that they had a task-oriented motivation also implied, at times, that they had an ego-oriented motivation as well as a lack of a specific motivational orientation. It was possible that most pupils' lack of awareness and control of their strategic actions meant that pupils' motivational orientation was dependent upon the tasks and the context. Thus, it could be expected that Apple classes had a greater percentage of pupils who implied having a strong task-oriented motivation compared to Yard classes; Elizabeth (the Yard Year 7 and Yard Year 9 teacher) often asks pupils to 'perform' in front of the rest of the class, such as having a discus throw measured, which could create an ego-oriented motivational climate and possibly influence Yard pupils to become ego- or performance- oriented. Thus, the pre-intervention data offers some support for research with regard to the importance of the perceived motivational climate upon pupils' motivational orientation (Seifrez, Duda & Chi, 1992) and research suggesting that without a degree of cognitive control pupils can be controlled by, or be 'at the mercy' to, the environment and the motivational climate (Karmiloff-Smith, 1984, 1986: cited in Shuell, 1990).

Comparison Between Pre-Intervention and Post-Intervention Data:

In general, there was a majority of pupils (up to 89%) who suggested that they had a strong task-oriented motivation in both Years and schools. However, in Year 7 there was still a notable percentage of pupils (between 31% and 59% in a single class) who had made no such suggestion and, thus, Year 9 maintained a greater percentage of such pupils compared to Year 7. It would seem that age may have had a degree of influence upon pupils' motivational orientation and this is not surprising as Year 9 pupils seemed more likely to show signs of developing efficient metacognitive knowledge of task, person and strategy variables and efficient metacognitive strategies (i.e. metacognitive ability) compared to Year 7 pupils. Therefore, as researchers have implied that there may be an inter-dependent relationship between metacognitive ability and motivation (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994), it would seem more likely that Year 9 pupils would show positive and task-oriented motivation compared to Year 7 pupils.

In Apple Year 7, the Control, Meta and Meta+ classes all showed a decrease in the percentage of pupils who indicated having a strong task-oriented motivation, although the decrease in the Meta and Meta+ classes (21% and 14% respectively) was less dramatic than the decrease in the Control class (37%). In Apple Year 9 and Yard Year 7 the Control classes showed a decrease in the percentage of pupils (14% and 7% respectively) who indicated having a strong task-oriented motivation while there was
increase in the percentage of such pupils in the Meta (10% and 17% respectively) and Meta+ (1% and 12% respectively) classes. Thus, while acknowledging the influence of overt school variables, such as the lesson events, it would appear that the intervention setting variables proved beneficial in pupils' development of task-oriented motivation. This is not surprising because literature has suggested that by guiding pupils in the development of an efficient metacognitive strategy and efficient specific cognitive strategies their metacognitive ability may improve (Nisbet & Shucksmith, 1986), and, as a result, so may their positive and task-oriented motivation (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994).

A Summary of Pupils' Motivational Orientation:

There appears to be some support for the assumed connection between pupils' metacognitive ability and their motivational orientation (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994), although other variables such as the motivational climate also seemed to influence the relationship. It may be that as pupils develop more efficient metacognitive ability then they show a more positive and task-oriented motivation.

Theme: Pupils' Locus of Control

Pre-Intervention Data:

There was a mean average of approximately fifty-five percent of pupils who implied that they had an intrinsic locus of control. The suggested connection between metacognitive ability and the locus of control (Biggs, 1985; Flavell, 1987) seemed to be supported because the pre-intervention data implies that a large percentage of pupils lacked efficient metacognitive ability and, similarly, it implies that a large percentage of pupils suggested that they did not have an intrinsic locus of control.

It was evident from the specific focus upon Apple Year 7 that there were individual inconsistencies regarding pupils' locus of control. Some pupils had suggested that they had an intrinsic locus of control and not an extrinsic locus of control, yet also implied, at times, that they had a complete lack of awareness regarding the locus of control. It could be argued that the inconsistencies shown in pupils' perceptions of the locus of control stem from the general lack of awareness and control that most pupils had of their strategic actions.
Interestingly, the relative similarity between different Years of the same school and between the same Years from different schools, suggest that there were either no strong age variables and covert school variables influencing pupils' locus of control or the important influencing variables were similar. The lack of similarity between classes of the same Year and school regarding the percentage of pupils who showed an intrinsic locus of control suggests that, as pupils appeared to lack metacognitive ability, overt school variables, such as the lesson events were influential in the development of pupils' locus of control.

Comparison Between Pre-Intervention and Post-Intervention Data:

Following the intervention, there remained a mean average of approximately fifty-five percent of pupils who implied that they had an intrinsic locus of control. Thus, it would seem that the intervention setting variables had little influence upon pupils' locus of control and, indeed, the intervention settings did not appear to benefit pupils in Apple Year 9 any more than the Control settings. However, in Year 7, both Control classes showed a decrease in the percentage of pupils (37% and 16%) who suggested that they had an intrinsic locus of control, while there was an increase in the percentage of such pupils (7% and 2%) in both Meta+ classes. Furthermore, the Yard Year 7 Meta class also showed an increase in the percentage of pupils (39%) who implied that they had an intrinsic locus of control, and the decrease in the percentage of such pupils in the Apple Year 7 Meta class (5%) was considerably smaller compared to the Apple Year 7 Control class (37%). Therefore, in Year 7 the Meta and Meta+ intervention setting appeared more likely to aid pupils to develop an intrinsic locus of control compared to the Control setting. Research has suggested that there is an interaction between metacognitive ability and locus of control (Biggs, 1985; Flavell, 1987) and as younger pupils are often implied to lack metacognitive ability (Haller, Child & Walberg, 1988; Linn & Songer, 1987: cited in Eylon & Linn, 1988; Nisbet & Shucksmith, 1986) it seemed possible that these Year 7 pupils would benefit, in terms of a desired locus of control, from the development of an efficient metacognitive strategy (Meta), and benefit even more from the development of an efficient metacognitive strategy and relevant specific cognitive strategies (Meta+).

Notably, as Year 9 showed a greater percentage of pupils who suggested that they had an intrinsic locus of control compared to Year 7, and Yard Year 7 showed a greater percentage of such pupils compared to Apple Year 7, it would appear that age variables and overt school variables, such as the teacher and the lesson events, may have been more influential. Furthermore, the additional benefit that Yard Year 7 appeared to gain from the intervention settings compared to Apple Year 7 suggests
that there were other influential variables upon the effectiveness of the intervention setting variables and pupils' locus of control. For example, the Yard Year 7 pupils were given more responsibility for their learning during the intervention settings than they were in the observed lesson, and, as Elizabeth (the Yard Year 7 and Year 9 teacher) is very authoritarian, probably more responsibility than they are used to. In contrast, Apple pupils were probably more used to having responsibility for their learning. It may be that this extra responsibility was acknowledged by the pupils in Yard and, therefore, a greater percentage of these pupils developed an intrinsic locus of control.

A Summary of Pupils' Locus of Control:

There appears to be some support for the assumed connection between pupils' metacognitive ability and their locus of control (Biggs, 1985; Flavell, 1987); pupils had shown poor metacognitive ability and an inconsistency in their views upon the locus of control. The intervention setting variables did show some signs of being influential in the development of pupils' intrinsic locus of control although age variables and covert and overt school variables were also part of the larger influential variables' interaction.

Theme: Self-Efficacy (perceived competence)

Pre-Intervention Data:

From the overall focus upon Apple and Yard it appeared that between twenty-seven and seventy-four percent of pupils in a single class perceived themselves to have good mental abilities for Physical Education. Thus, the suggested reciprocal relationship between metacognitive ability and self-efficacy (Ames, 1992; Bandura, 1986; Pajares & Miller, 1994; Schutz, 1993, 1994) has been supported to a degree by the pre-intervention data. That is, as the pre-intervention data suggests that a large percentage of pupils lacked awareness and control of their strategic actions, it was probable that a large percentage of pupils would lack strong, positive mental self-efficacy.

From the specific focus upon Apple Year 7 it seemed that over a half of the pupils in each class were, at times, only able to refer to their general abilities, such as "I'm quite good at PE", or they implied that they lacked awareness of their abilities. Once again, it would seem that many pupils in Physical Education will often consider general factors rather than more insightful, specific factors (Lee, Landin & Carter, 1992; Stevens, 1997).
However, from the specific focus upon Apple Year 7 it would seem that almost all of pupils from each class suggested that they had either strong mental or strong physical abilities. This degree of positivity regarding their physical and mental abilities is not surprising as most of the pupils lacked efficient metacognitive knowledge of person intra- and inter-individual variables, and they showed poor metacomprehension in that they were often over-confident about their understanding; it may also be that they were over-confident about their mental and physical abilities.

Interestingly, when Apple Year 7 pupils (the specific focus) viewed themselves to have either positive or negative physical or mental abilities the implication was that these abilities were 'definitely' positive or 'definitely' negative; the category scale referenced in the content analysis of pupils' responses was, in general, 'strong' as opposed to 'weak'. It would seem that pupils were only aware of their abilities if they were very clearly positive or clearly negative. Again, considering most pupils lack of metacognitive knowledge of person intra- and inter-individual variables it was not surprising that pupils seemed to lack awareness of the finer details of their abilities.

Interestingly, Year 7 classes had a greater, or an equivalent, percentage of pupils who perceived themselves to have good mental abilities for Physical Education compared to Year 9 classes of the same school, and Apple classes either had a greater, or an equivalent, percentage of pupils who perceived themselves to have good mental abilities for Physical Education compared to Yard classes of the same Year. It would seem that age variables and covert and overt school variables proved influential in developing pupils' mental self-efficacy. If it is assumed that pupils develop greater metacognitive ability as they get older (Nisbet & Shucksmith, 1986), it appears strange that Year 7 pupils would have a more confident opinion of their mental abilities compared to the Year 9 classes. However, as the pre-intervention data has previously implied that pupils' poor metacomprehension can sometimes make them appear over-confident in what they believe that they understand, if pupils' awareness and metacomprehension improves as they get older, it may reduce any over-confidence and, therefore, lower their perceptions of self-efficacy. In addition, it would appear that the Apple Physical Education Department attempts to bolster pupils' confidence slightly more than the Yard Physical Education Department; while the Apple Physical Education Department attempt to disguise divisions and power imbalances between the teachers and the pupils (Woods, 1990), the Yard Physical Education Department emphasise these differences. Thus, an explanation could be offered for the Apple Year 7 classes having a greater percentage of pupils who had a positive perception of their mental abilities for Physical Education compared to any other classes.
Comparison Between Pre-Intervention and Post-Intervention Data:

Most classes indicated a relatively weak majority of pupils who perceived themselves to have good mental abilities for Physical Education following the intervention; there remained a large percentage of pupils whose mental self-efficacy was not positive. Furthermore, following the intervention, there was very little change evident in Apple Year 9 regarding the percentage of such pupils who perceived themselves to have good mental abilities for Physical Education. Therefore, it would seem that the intervention setting variables were not influential in encouraging pupils' positive mental self-efficacy. As it has been implied that there is a reciprocal relationship between metacognitive ability and self-efficacy (Ames, 1992; Bandura, 1986; Pajares & Miller, 1994; Schutz, 1993, 1994) it may be that the intervention failed to adequately develop pupils' metacognitive ability to increase their confidence in their mental abilities.

However, in Apple Year 7, the Meta and Meta+ classes showed a very slight decrease (6%) and increase (4%), respectively, in the percentage of pupils who perceived themselves to have good mental abilities for Physical Education, while the Control class showed a dramatic decrease in the percentage of such pupils (51%). Furthermore, the Yard Year 7 Meta class showed a huge increase (50%) in the percentage of pupils who perceived themselves to have good mental abilities for Physical Education, in contrast with the decrease in the percentage of such pupils (1%) in the Control class. Therefore, it may be that the Meta and Meta+ intervention settings may have been more influential in the development of pupils' positive mental self-efficacy compared to the Control setting; thereby offering support for the reciprocal relationship between metacognitive ability and self-efficacy (Ames, 1992; Bandura, 1986; Pajares & Miller, 1994; Schutz, 1993, 1994). However, the fact that the Yard Year 7 Meta+ class showed a larger decrease in the percentage of pupils who showed a degree of positive mental self-efficacy compared to the Control class does suggest that there were other influential variables upon pupils' self-efficacy, especially overt school variables such as the class and the lesson events. For example, the Yard Year 7 Meta+ were a very quiet and obedient class; they seemed very surprised when the author began the commentary phase of the teacher modelling processes, and they almost seemed nervous that they had lost the familiarity of the usual lesson structure. Thus, it may be that these pupils were hindered by the standardised lesson structure with regard to the positivity of their mental self-efficacy, rather than by the intervention setting variables.
A Summary of Self-Efficacy (perceived competence):

It would seem that because pupils lacked efficient metacognitive ability they also lacked positive mental self-efficacy. Thus, there would seem to be some support for previous research that suggests a reciprocal relationship between metacognitive ability and self-efficacy (Ames, 1992; Bandura, 1986; Pajares & Miller, 1994; Schutz, 1993, 1994). Therefore, it was not surprising that, while other variables such as the pupils' age or the lesson events proved influential, the intervention setting variables formed part of a larger influential variables' interaction with regard to pupils' perceptions of their mental self-efficacy. In Year 7, both the Meta and Meta+ intervention settings seemed to be more beneficial to the development of pupils' positive mental self-efficacy compared to the Control setting.

Theme: Self-Efficacy (strength)

Pre-Intervention Data:

It was evident from the overall focus upon both schools that there was, in general, a minority of pupils who strongly perceived that they had the necessary physical or mental abilities to complete the tasks. From the specific focus upon Apple Year 7 it appeared that, while there were more pupils who viewed the strength of their abilities positively rather than negatively, there were just as many pupils who implied a lack of awareness concerning the strength of their abilities. However, as many pupils showed a poor awareness of the purpose behind tasks, the influences during tasks and what demands the tasks placed upon them, it is not surprising that pupils either were not positive, or were unaware, that their abilities were good enough to complete the tasks.

The relative similarity between Year 7 and Year 9 and between Apple and Yard regarding the percentage of pupils who strongly perceived that they had the necessary physical or mental abilities to complete the tasks suggests that any slight differences between classes were likely to be due to overt school variables, such as the lesson events, as opposed to age or covert school variables. For example, in Apple Year 7 it was noted by the author that the Control and Meta classes seemed more concerned with enjoying themselves rather than developing their technique during the 'experimentation' of front crawl turns compared to the Meta+ class. It may be that the Meta+ class gained a greater appreciation of the requirements of the tasks and, hence, there were fewer pupils (21%) who were willing to state that they had the necessary physical or mental abilities to complete the tasks compared to the Control (44%) and Meta (30%) classes.
Comparison Between Pre-Intervention and Post-Intervention Data:

Following the intervention there remained a clear minority of pupils who strongly perceived that they had the necessary abilities to complete the tasks; most pupils still lacked confidence in their abilities. From the overall focus upon both schools, it seemed that the Apple Year 7 and Apple Year 9 Control (29% and 5% respectively) and Meta (6% and 14% respectively) classes showed a decrease in the percentage of pupils who believed that they had the necessary abilities to complete the tasks, while both of the Meta+ classes showed a relatively large increase in the percentage of such pupils (20% and 18% respectively). In Yard Year 7 both the Meta class and the Meta+ class showed an increase in the percentage of pupils (24% and 19% respectively) who had confidence in their abilities, whereas the Control class showed a decrease in the percentage of such pupils (13%). Thus, regardless of pupils' age or school the Meta+ intervention setting appeared to encourage pupils to have confidence in their abilities more than the Control setting. It has been suggested that pupils may need to develop a metacognitive strategy (Flavell, 1979; King, 1991; Seifert & Wheeler, 1994) and some pupils may require additional specific cognitive strategies to improve their metacognitive ability (Alexander & Judy, 1988; Peterson, 1988). Therefore, if the Meta and Meta+ intervention setting variables were influential in developing pupils' metacognitive ability it was possible that a greater percentage of pupils would then be more confident in their abilities. It would seem that pupils' initial level of metacognitive ability can vary and this may explain why sometimes only guidance in the development of a metacognitive strategy was required, while at other times guidance in the development of specific cognitive strategies was also required.

A Summary of Self-Efficacy (strength):

As most pupils had implied that they did not have efficient metacognitive ability, it was not surprising that pupils were not positive, or were unaware, that their abilities were good enough to complete the tasks. Overt school variables, such as the lesson events, seemed to be the important variables upon the strength of pupils' self-efficacy, although there were signs that once some pupils were helped to develop and utilise efficient metacognitive strategies and relevant specific cognitive strategies they became more confident that they could complete the tasks.
Theme: Self-Efficacy (generality)

Pre-Intervention Data:

It appeared from the overall focus upon Apple and Yard that most of the classes had a minority of pupils who perceived that their abilities would have been useful in other aspects of Physical Education; for example, while some pupils could state that their speed was helpful during the Health-Related Exercise, they did not all suggest that being quick would be helpful in many other Physical Education activity areas. However, as pupils have indicated a lack of awareness regarding when a strategic action would be useful, that is, a lack of awareness regarding the transfer of strategic actions and information, it is not surprising that pupils struggled in their awareness of whether their abilities would generalise to other tasks when they would possibly be struggling to think of other tasks. Pupils' poor awareness of the generality of their abilities was highlighted in the specific focus upon Apple Year 7 because, although there was only a small percentage of pupils (between 21% and 33% in any one class) who viewed the generality of their abilities positively, there was an even smaller percentage of pupils who viewed the generality of their abilities negatively (between 17% and 26% in any one class); the percentage of pupils who suggested having any awareness of the generality of their abilities was, therefore, very poor in each class.

The difference between classes of each Year and school regarding the percentage of pupils who perceived that their abilities would have been useful in other aspects of Physical Education were very small. However, it was noticeable that Year 9 classes either had a greater, or an equivalent, percentage of such pupils compared to Year 7 classes of the same school, and Apple classes either had a greater, or an equivalent, percentage of such pupils compared to Yard classes of the same Year. Therefore, it would seem that age variables and covert and overt school variables were influential upon pupils' perceptions of the generality of their self-efficacy. For example, assuming that Year 9 pupils may have a greater experience of Physical Education activities compared to Year 7 pupils, it is more likely that Year 9 pupils may have developed a greater understanding of the generality of their abilities to other activities compared to Year 7 pupils.

Comparison Between Pre-Intervention and Post-Intervention Data:

Following the intervention, most of the classes continued to show a minority of pupils (between 7% and 43% in any one class) who perceived that their abilities would have been useful in most aspects of Physical Education. In Apple Year 7 and Apple Year 9,
the Meta+ classes showed an increase in the percentage of pupils (7% and 13% respectively) who perceived that their abilities would have been useful in most aspects of Physical Education that was not matched in either the Control or the Meta classes. Furthermore, in Yard Year 7, while the Control class showed a decrease in the percentage of pupils (13%) who suggested that their abilities would generalise across tasks, the Meta and the Meta+ classes showed a clear increase in the percentage of such pupils (31% and 13% respectively). Therefore, it would seem that the intervention settings were beneficial to some pupils in helping them to appreciate the generality of their abilities. Indeed, irrespective of age variables, covert school variables and overt school variables, the Meta+ intervention setting appeared to positively influence pupils' perceptions of the generality of their abilities.

A Summary of Self-Efficacy (generality):

Many pupils had seemed to lack an awareness of when their strategic action could be transferred to other tasks and, therefore, it was not surprising that most pupils perceived that their abilities would not be useful in most aspects of Physical Education. Pupils' appreciation of the generality of their abilities was influenced by age variables and covert and overt school variables, in that such variables may have influenced their experience with a variety of tasks. Notably, the intervention setting variables did form another part of the influential variables' interaction with regard to pupils' appreciation that their abilities could be useful in most aspects of Physical Education, especially the Meta+ intervention setting. Thus, there were signs that once some pupils were helped to develop and utilise efficient metacognitive strategies and relevant specific cognitive strategies they became more confident that their abilities could generalise across tasks.

Theme: General Self-Worth

Pre-Intervention Data:

It appeared from the overall focus upon Apple and Yard that few pupils (between 9% and 38% in any one class) viewed themselves positively, and the specific focus upon Apple Year 7 showed that there were, in general, more pupils who viewed themselves negatively (between 28% and 56% in any one class) than there were pupils who viewed themselves positively (between 22% and 37% in any one class). This may seem to contradict an earlier suggestion that pupils' poor metacognitive ability and poor metacomprehension could have developed an over-confidence in their understanding of the tasks and their perceptions of their abilities. However, research
has suggested that even pupils aged eight have constructed a view of self-worth as a person, over and above any specific judgements relative to a specific context (Harter, 1982). Therefore, it may be that pupils can develop a view of general self-worth prior to developing efficient metacognitive ability from which they could utilise that information during learning, and this would seem to be supported in the pre-intervention data. The relative similarity between Year groups and schools regarding the percentage of pupils who viewed themselves positively further supports the assumption that pupils' perceptions of self-worth may be developed at an early age even if this information cannot be utilised adequately until they have developed efficient metacognitive ability.

Comparison Between Pre-Intervention and Post-Intervention Data:

Following the intervention, there remained a minority of pupils (between 0% and 38% in any one class) who appeared to view themselves positively. This was to be expected assuming that pupils' general self-worth may be deep-rooted and cemented from an early age (Harter, 1982); it is unlikely that a single intervention lesson will have a dramatic effect upon pupils' perceptions of themselves.

However, while both the Apple and Yard Year 7 Control classes showed a decrease in the percentage of pupils (15% and 26% respectively) who had viewed themselves positively, as did the Apple Year 7 Meta and the Yard Year 7 Meta+ classes (13% and 15% respectively), the Apple Year 7 Meta+ class and the Yard Year 7 Meta class actually showed an increase in the percentage of such pupils (7% and 24% respectively). Thus, it would seem that the intervention setting variables formed part of the interaction that influenced pupils' perceptions of themselves. To highlight this point, it would seem from the specific focus upon Apple Year 7 that only the Meta+ class showed a decrease in the percentage of pupils who were unable to offer any response with regard to their general self-worth; this appeared to be in sharp contrast with the situation prior to the intervention where it was the Meta+ class that had the greatest percentage of such pupils. An important purpose of metacognitive strategies is to increase pupils' awareness, monitoring and evaluation of person variables (Armbruster & Brown, 1984; Flavell, 1979; Pintrich, 1990; Weinstein, 1994) and, therefore, it was possible that the metacognitive strategy involved in the intervention settings helped pupils to acknowledge previously latent knowledge of themselves.

Importantly, the fact that the Apple Year 7 Meta and the Yard Year 7 Meta+ classes showed a decrease in the percentage of pupils (13% and 15% respectively) who held a positive view of themselves, would seem to suggest that there were other influential
variables that could possibly overshadow the effects of the intervention setting variables. The greater similarity between the Apple Year 9 classes with regard to the percentage of pupils who viewed themselves positively also suggests that other variables proved influential. Overt school variables, such as the standardised lesson structure and the lesson events would appear to be important influences; for example, as the Yard Year 7 Meta+ class seemed much more surprised at the events in the standardised lesson than the other Yard Year 7 classes were, the pupils' attention and interest was unlikely to be directed towards themselves but more towards other factors, such as the teacher.

A Summary of General Self-Worth:

Both before and after the intervention there was a minority of pupils who viewed themselves positively. However, this was not surprising as pupils can construct a view of self-worth from aged eight (Harter, 1982) even though they may not utilise this information efficiently during learning until they have developed efficient metacognitive ability. The intervention setting variables did show small signs of being influential upon pupils' perceptions of self-worth and they may have helped pupils to acknowledge previously latent knowledge of themselves, although the influence was far from dramatic.

Theme: Motivational Climate

Pre-Intervention Data:

It was evident from the overall focus upon Apple and Yard that there was a majority of pupils (between 53% and 92%) from each class who suggested that there had been elements of a strong task-oriented motivational climate during the lesson. However, it was evident from the specific focus upon Apple Year 7 that pupils had shown a degree of inconsistency in their perceptions of the motivational climate; there was a large percentage of pupils in the three Apple Year 7 classes who suggested that there was, at times, a strong task-oriented motivational climate, although some of these same pupils also implied that there was a strong ego-oriented motivational climate or that they were unaware of the motivational climate. It had been suggested, with respect to pupils' motivational orientation, that the pupils' apparent lack of awareness and control of their strategic action had meant that their motivational orientation was dependent upon the tasks and the motivational climate. The relatively similar percentage of pupils who perceived themselves to have a strong task-oriented motivation and those who perceived there to be a strong task-oriented motivational
climate appears to support the suggestion that if pupils lack the awareness and control of their strategic action then the motivational climate can be critical in predicting the cognitive and affective components of pupils’ motivational processes (Ames, 1992; Seifrez, Duda & Chi, 1992).

Comparison Between Pre-Intervention and Post-Intervention Data:

While many pupils still suggested that there had been elements of a strong task-oriented motivational climate during the intervention lesson, there was still a notable percentage of pupils (between 14% and 63% in any one class) who did not perceive there to have been any strong task-oriented elements in the motivational climate. While all three Control classes showed a decrease in the percentage of pupils who had suggested that there had been elements of a strong task-oriented motivational climate during the lesson, the Apple Year 7 Meta and Meta+ classes, the Apple Year 9 Meta+ class, and the Yard Year 7 Meta class showed an increase in the percentage of such pupils. Thus, it would seem that the intervention setting variables could have influenced pupils’ perceptions of the motivational climate; it was evident from the specific focus upon Apple Year 7 that the difference between the percentage of pupils who acknowledged some elements of a strong task-oriented motivational climate in the Control class (37%) and the Meta and Meta+ classes (84% and 79% respectively) was dramatic. It could be that the metacognitive strategy and/or the specific cognitive strategies in the intervention settings helped pupils to overcome the deficiencies in their metacognitive ability (Nisbet & Shucksmith, 1986) and, thus, influenced the development of a positive and task-oriented motivation (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994). The interaction between pupils' motivational orientation and their perceptions of the motivational climate (Ames, 1992; Seifrez, Duda & Chi, 1992) would suggest that more pupils may then view the motivational climate as being task-oriented.

A Summary of the Motivational Climate:

As pupils have shown a lack of awareness and control of their strategic action and they have lacked consistency in their motivational orientation, it was inevitable that their perceptions of the motivational climate would also be inconsistent. Thus, to gain a more consistently positive perception of the motivational climate it may be that pupils need to gain awareness and control of their strategic action and, thereby, develop a more positive and task-oriented outlook towards learning (Flavell, 1987; McKeachie, Pintrich & Lin, 1985; Weinert, 1987; Weinstein, 1994). This may
explain why the intervention setting variables appeared to show small signs of being influential upon pupils' perceptions of the motivational climate.
Statistical Data

The Interaction Between Pupils' Metacognitive Ability and Their Content Knowledge

Pre- and Post- Intervention Data:

To re-emphasise, with such a basic form of statistics the author was unable to definitely state whether any changes in pupils' content knowledge were due to the intervention setting variables or other variables, such as covert school variables, overt school variables or personal variables. Nevertheless, it was suggested from the median content knowledge scores and the average rank values in each class that, regardless of age or school variables, the Meta intervention setting, the Meta+ intervention setting or both intervention settings seemed to increase pupils' content knowledge while the Control setting maintained or decreased pupils' content knowledge. Occasionally, either the Meta or Meta+ intervention setting did appear to have been more of a hindrance to pupils' content knowledge compared to the Control setting, although the differences were only slight when the both the median content knowledge scores and average rank values were assessed. Literature has suggested that the development of metacognitive ability may enhance pupils' content knowledge (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989) and the comparison between the pre- and post- intervention statistical data has appeared to offer some degree of support for such suggestions.

Importantly, from the patterns that have emerged within the descriptive statistical analysis, it would appear that there may be an age influence on whether the Meta or the Meta+ intervention setting seemed most beneficial to pupils. The patterns appear to suggest that Year 7 pupils may require specific cognitive strategies to be encouraged. Although Peterson (1988) argued that pupils can develop specific strategies on their own, she referred to these as informal strategies that may or may not be efficient. Furthermore, as metacognitive ability is continuously developing (Nisbet & Shucksmith, 1986) it may be assumed that the Year 7 pupils may lack a repertoire of specific cognitive strategies or lack the levels of efficiency in their specific cognitive strategies compared to the Year 9 pupils. As it is recognised that the cognitive strategies that pupils use when tackling a learning task are a major influence on the quality of the learning outcome (Paris & Oka, 1986), and that "people rely on cognitive strategies to promote learning, remembering and problem solving" (Paris, 1988: p299), it is clear that if the pupil has not established or developed adequate strategies, then content knowledge may suffer. As such, the encouragement of appropriate specific cognitive strategies could have proved
beneficial to pupils' content knowledge. However, as the Meta+ intervention setting differed very little from the Control setting in school 3 (MStQ) the influences of other variables such as covert school variables, overt school variables and personal variables were also influential upon pupils' content knowledge. The Year 9 pupils seemed to benefit more from the development of a metacognitive strategy without specific cognitive strategies as in the Meta intervention setting. It has been suggested that, potentially, pupils may 'possess' the necessary specific cognitive strategies and learning ability already, but are unable to use them in a skilful or an appropriate manner (Nisbet & Shucksmith, 1986; Schoenfeld, 1987). Flavell (1976) referred to this concept as product deficiency, and suggested that pupils may know that a cognitive strategy exists but lack the awareness of a situation, and fail to monitor why and when the strategy is useful. However, although it could be that only a metacognitive strategy was required, it is important to consider why appropriate specific cognitive strategies could almost appear to hinder performance. As Nisbet & Shucksmith (1986) noted, in secondary school pupils are already beginning to establish habits which may be difficult to change later. Alexander & Judy (1988) noted how pupils can have a 'robustness of misconceptions' and, therefore, often refuse to eliminate their own beliefs, even distorting presented information to match their existing knowledge and persevering with naïve strategies. As such, although it was not clearly evident in the main study, it may have been that the cognitive strategies involved in the intervention settings possibly confused and hindered the cognitive strategies that pupils already had. It may be that the specific cognitive strategies mismatched pupils' stylistic tendencies that are potentially more stable for Year 9 pupils than for Year 7 pupils. Even though specific cognitive strategies were offered in the main study to match all stylistic tendencies (Riding & Cheema, 1991), and these were appropriate for the tasks covered, it is uncertain whether there was an accurate match. The problem may have been that the intervention was too short; there was insufficient time to encourage the selection and development of appropriate specific cognitive strategies over those specific cognitive strategies directed by stylistic tendencies. There may have been less confusion and hindrance with the Year 7 pupils as their personal specific cognitive strategies may not have been as developed or cemented compared to the Year 9 pupils.

Summary of Statistical Data:

The present study would appear to offer some support for literature that suggests pupils' content knowledge will be enhanced as they develop efficient metacognitive ability (Derry & Murphy, 1986; Pressley, Goodchild, Fleet, Zajchowski & Evans, 1989). However, there seemed to be an age influence upon whether pupils would
require guidance in the development of a metacognitive strategy (Meta) or guidance in the development of a metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies (Meta+). Thus, there is further support for research that suggests all pupils may benefit from guidance in the development of an efficient metacognitive strategy (Nisbet & Shucksmith, 1986; Schoenfeld, 1987), younger pupils are more likely to lack a repertoire of specific cognitive strategies compared to older pupils (Nisbet & Shucksmith, 1986), pupils can develop their own specific cognitive strategies (Alexander & Judy, 1988; Peterson, 1988), and unless pupils have developed efficient metacognitive ability then additional specific cognitive strategies may prove to be a hindrance to learning (Alexander & Judy, 1988; Biggs, 1985).
Chapter Six

Conclusions, Implications & Recommendations
6.1 Conclusions, Implications and Recommendations

6.1.1 Conclusions

The present study investigated the metacognitive ability that pupils showed in Physical Education lessons, the influences upon pupils' metacognitive ability and the effects of pupils' metacognitive ability (Objective A: A1 to A5 & Objective C) and whether the development of pupils' metacognitive ability could be guided by intervention treatments (Objective B: B1 to B4).

Pupils' Metacognitive Ability Shown in the Physical Education Lesson (Objective A: A1 to A5):

The pre-intervention data derived from the main study emphasised that research cannot assume that there is a direct link between teaching and learning outcomes, as pupils' metacognitive ability may mediate teaching and shape what learning takes place. While it may be accepted that efficient metacognitive ability is required for efficient learning, it would appear that a large percentage of pupils between eleven and fourteen years of age in the present study struggled to develop such efficient metacognitive ability. Thus, it would appear that many pupils showed poor metacognitive ability in their Physical Education lessons. Furthermore, the sheer variety of categories that emerged from the content analysis of pupils' responses to the pre-intervention questionnaire indicated how pupils could differ in their metacognitive ability.

The Influences Upon Pupils' Metacognitive Ability (Objective A: A1 to A5):

It would seem that until pupils have developed efficient metacognitive ability they may be controlled by, and 'at the mercy' of, a range of contextual variables (Karmiloff-Smith, 1984, 1986: cited in Shuell, 1990). Numerous variables emerged as potential influences upon pupils' metacognitive ability: age variables, covert school variables (the school and the school ethos, the Physical Education Department and the Physical Education Department ethos), overt school variables (the teacher, the class, the lesson events) and pupil variables (pupils' perceptions of their volitional control, the purpose of Physical Education, their motivational orientation, their locus of control, their self-efficacy and the motivational climate) all appeared to have some form of influence upon the development of pupils' metacognitive ability. It is suggested that such variables do not act individually, but it is the combination and
interaction of these variables that are influential. Thus, in consideration of objectives (A1) to (A5), there was never a consistent difference or similarity between pupils of the same class (A1), between classes of the same Year and school (A2), between different Years of the same school (A3) or between the same Years of different schools (A4 & A5) with regard to the efficiency of their metacognitive knowledge of task, person and strategy variables and their metacognitive strategies.

While the exact nature of the interaction between the influential variables could not always be ascertained, important variables upon the development of an aspect of metacognitive ability could sometimes be recognised. For example, it was noted that older pupils (Year 9) sometimes showed a greater development of metacognitive ability compared to younger pupils (Year 7). However, it cannot be assumed that older pupils will be provided with the opportunities to develop every aspect of metacognitive ability, and it cannot be assumed that older pupils will utilise such opportunities even if they arise. Thus, it may be possible for other variables, such as the teachers' comments, to prove more important and influential in the development of pupils' metacognitive ability.

While there was not consistency between pupils, classes, Years and schools with regard to the efficiency of metacognitive ability, there was a greater tendency for pupils from Apple Year 9 classes to indicate some development of efficient metacognitive ability compared to pupils from any other classes. More often than not, Apple Year 9 classes had a greater percentage of pupils who had developed efficient metacognitive knowledge of task, person and strategy variables and efficient metacognitive strategies compared to any other classes. Moreover, due to the development of such metacognitive ability, these Apple Year 9 classes, compared to the other classes, also showed a greater percentage of pupils who indicated favourable or appropriate tendencies in their volitional control, their perceptions of the purpose of Physical Education, their motivational orientation, their locus of control, their self-efficacy and their perceptions of the motivational climate. It may be that the interaction between the age variables and covert and overt school variables with respect to Apple Year 9 was more beneficial to the development of metacognitive ability compared to interaction between the same type of variables with respect to Apple Year 7, Yard Year 7 and Yard Year 9. This could be explained by the fact that the older pupils may have had a greater opportunity to develop metacognitive ability compared to the younger pupils, and both the covert and overt school variables relevant to Apple, in contrast with Yard, seem to encourage pupils to take responsibility for their learning, to experiment with their learning, and, therefore, to appreciate their learning.
The Effects of Pupils' Metacognitive Ability
(Objective A: A1 to A5 & Objective C):

The effects of efficient or inefficient metacognitive ability could also be implied from the present study as they were not only evident in terms of pupils' perceptions and understanding of task, person or strategy variables, but also in their content knowledge. A relatively large percentage of pupils implied that they had poor metacognitive knowledge of task, person and strategy variables and inefficient metacognitive strategies. Thus, many pupils seemed to have learning goals that contradicted the intentions of the teacher and the tasks, they failed to appreciate the organisation and prioritisation of task information, they assumed that they had learned information when they had not, and they failed to appreciate any need to consider strategic action. Furthermore, it was evident from the seemingly reciprocal relationship of metacognitive ability with pupil variables, that metacognitive ability was not only influenced by, but could also effect, pupils' perceptions of volitional control, motivational orientation, locus of control, self-efficacy and motivational climate.

The Development of Pupils' Metacognitive Ability
(Objective B: B1 to B4):

Following the intervention, it was not surprising that the effectiveness of the intervention setting variables tended, in general, to depend upon the interaction of other variables. It is acknowledged that the intervention was possibly too short in duration to expect any dramatic development in pupils' metacognitive ability; Meloth (1990: p796) suggested that in a natural 'classroom' setting, "...it may be unreasonable to expect immediate, dramatic improvements in knowledge of cognition." However, there were signs that the intervention setting variables of a metacognitive strategy (Meta) or a metacognitive strategy, metacognitive knowledge of person and strategy variables and specific cognitive strategies (Meta+) could influence the development of some pupils' metacognitive ability. It appeared that pupils who were struggling to develop efficient metacognitive knowledge of task, person and strategy variables and to develop efficient metacognitive strategies required such additional guidance as that in the intervention settings. It has been suggested that, while pupils can become strategic without external help, appropriate strategic action often follows favourable external guidance (Singer & Chen, 1994).

The effectiveness of the intervention setting variables and whether a Meta intervention setting or a Meta+ intervention setting was required depended upon the
pupils' initial degree of metacognitive ability within the contexts of age and school. For example, it appears that as metacognitive ability is continually developing (Nisbet & Shucksmith, 1986), older pupils could have a greater repertoire of specific cognitive strategies to draw upon compared to younger pupils. Therefore, it was not unexpected that younger pupils (Year 7) would sometimes find the specific cognitive strategies suggested in the Meta+ intervention setting more beneficial than the older (Year 9) pupils. The statistical data, with regard to the relationship between pupils' metacognitive ability and their content knowledge (Objective C) further supported this possibility.

The author is wary of suggesting that simply by encouraging a metacognitive strategy, additional metacognitive knowledge information and specific cognitive strategies, the deficiencies in pupils' metacognitive ability can be overcome. However, it is evident that further study is required into the total context within which pupils are better encouraged to make their metacognitive knowledge and metacognitive strategies conscious and also the total context within which pupils' metacognitive ability can be best developed.

6.1.2 Implications

It is suggested that cognitive factors need to be investigated more in Physical Education (Singer, 1995; Turner & Martinek, 1995) as "...it is imperative to learn more about student attributes and thought processes that mediate learning in physical education" (Solmon & Boone, 1993: p418). The main study in the present investigation has offered an insight into pupils' metacognitive ability and, therefore, into their learning processes, and it has emphasised the importance of the pupil mediating between the teacher or teaching environment and the learning outcome. Unfortunately, such research is not only scarce in Physical Education, but it rarely offers insights around such a complex concept as metacognitive ability. However, it is clear from the present work that pupils' learning processes are very complex.

Previous literature has considered aspects of pupils' learning processes, pupils' thoughts and pupils' perceptions, but they have often remained in isolation, unconnected to a conceptual framework of learning. The metacognitive ability conceptual framework developed by the author appears to encapsulate much of this literature, incorporating and suggesting associations between such concepts as metacognitive knowledge, metacognitive strategies, cognitive style, cognitive strategies, information transfer, volitional control, motivational orientation, locus of control and self-efficacy. However, as this type of work is in its infancy in Physical
Education, it is possible that the conceptual framework underpinning the investigation may provide the foundation from, or around, which to structure further research regarding these concepts, and teaching and learning in general.

Returning to the reason for the author's initial interest in pupils' learning processes, for the first time an explanation or a justification can be offered with regard to differentiation and the selection of a variety of teaching approaches. By using the conceptual framework of metacognitive ability and the main study data, areas of differentiation can be suggested and supported as can a variety of learning situations that may enable pupils to experience, consider and appreciate task, person and strategy variables. Thus, the metacognitive ability conceptual framework would seem to enable researchers and teachers to break the cycle of blindly using methods of differentiation or testing one teaching approach against another based around unquestioned and often vague assumptions on how pupils learn.

The categories that emerged during the content analysis of pupils' responses to the pre-intervention questionnaire have provided some idea of the thoughts and perceptions that pupils can have during Physical Education. As a large percentage of pupils evidently perceived learning situations differently to the teacher, illustrated by the variety of categories and category scales that emerged during the content analysis, pupils' thought processes cannot be assumed. While the National Curriculum Physical Education (DFE, 1995) now states that pupils should have the ability to monitor, evaluate and self-direct their learning, and OFSTED inspectors are keen to endorse this point, there appear to be too many assumptions that these abilities are being developed in Physical Education lessons. To imply that a teaching approach such as guided discovery will always and inevitably lead to specific learning outcomes including an understanding of task principles (Mosston & Ashworth, 1990; Williams, 1996) appears too simple.

For pupils to understand and learn efficiently, rather than simply to perform, in Physical Education, the author suggests that efficient metacognitive knowledge of task, person and strategy variables, as well as efficient metacognitive strategies, are needed. It is possible that teachers and researchers may believe that metacognitive ability, although not necessarily referred to as such, has already been considered in the development of teaching approaches. For example, the 'Teaching Games for Understanding' approach does appear to encourage pupils to consider how a task or game is structured, to monitor their performance and the occurrences within the task, to develop gameplay strategies for each task and to evaluate what happened during the tasks. Unfortunately, while such an approach will create a context or environment
that is 'metacognitive' in nature, pupils may still lack the necessary metacognitive ability to learn efficiently. A large percentage of pupils in the present research programme appeared to look superficially at how a task was structured. Often they perceived a reason behind the structure quite different to those of the teacher, they failed to monitor the tasks and their learning, they showed poor metacomprehension and, as such, perceived there to be little reason to consider further strategic action or even to evaluate the tasks.

By investigating the type, the quality, the influences and the effects of metacognitive ability, common areas of pupil misunderstanding have been identified and pupil weaknesses have been identified that will undoubtedly have implications for teaching and learning approaches in Physical Education. For example, as it appears from the pre-intervention data that pupils are frequently unaware of the main purpose behind various tasks, teachers need to re-consider how to develop pupils' awareness of task information.

However, the present investigation not only provided original insight into pupils' metacognitive ability in Physical Education, the quality, the influences, the effects and the common inefficiencies of pupils' metacognitive ability, it also points to potential assessment procedures for pupils' metacognitive ability. Although the assessment of metacognitive ability is not easy because of the complex nature of the concept, the main study indicated that procedures can be developed to tackle these problems. If teachers are to fully appreciate pupils' learning needs, both teachers and researchers must develop approaches to assess pupils' metacognitive ability.

6.1.3 Recommendations

The present study offered support for the view that research findings in classroom subject areas regarding pupils' learning processes are of value to those who research in Physical Education. While it would be a mistake to assume that conclusions drawn from classroom research will be valid in Physical Education (Denscombe, 1980; Evans, 1995), it would be as a big a mistake if the vast amount of classroom research and literature regarding pupils' learning processes were shunned by Physical Educationalists. In fact, it was classroom research that directed the author in the development of the metacognitive ability conceptual framework.

As the main study implied that the development of metacognitive ability is both gradual and continuous it is wrong to convey the message that quick-fix solutions exist (Singer & Chen, 1994) with regard to pupils' ability to learn. It is important that
future intervention research is not seen as 'training' pupils to be strategic in their learning, but more as 'developing' pupils' strategic ability. Thus, there would be a greater possibility of moving away from the present situation in most schools where pupils are forced to utilise isolated tactics without any awareness of the strategic action they are taking (Derry & Murphy, 1986; Nisbet & Shucksmith, 1986; Wittrock, 1988).

It would appear that the present study intervention was possibly too short in duration to have significantly influenced pupils' development of efficient metacognitive ability. While it seems appropriate that pupils are offered favourable external guidance, ideally, pupils should be given time to experiment (Singer & Chen, 1994) and to fully appreciate the advantages of developing their metacognitive ability. As such, longitudinal research needs to consider the learning contexts that develop metacognitive ability and the long-term and short-term influences upon the development of metacognitive ability. The inclusion of basic ethnographic data in the present study may offer insights into contexts that may need to be assessed further, and possibly individual case studies may enable researchers to highlight important long-term and short-term variables that appear to influence pupils' metacognitive ability. For example, it may be that overt school variables, such as the teacher, become less influential as pupils develop a degree of efficiency in their metacognitive ability and can monitor, evaluate and regulate their own learning much more, and this could explain why Haller, Child & Walberg (1988) suggested that teacher variables and teacher differences have relatively little effect upon the development of pupils' metacognitive ability. Thus, further assessments of the interactions between the influential variables and pupils' metacognitive ability are required.

There were suggestions in the present study that by guiding pupils in the development of metacognitive ability, pupils' perceptions of their volitional control, the purpose of Physical Education, their motivational orientation, their locus of control, their self-efficacy and the motivational climate may be positively enhanced. However, further research is required into both the positive and potentially negative effects of developing efficient metacognitive ability. It may be that desired abilities in Physical Education such as evaluation and target setting could improve, and this may be an important consideration because Stevens (1997: p22) was shocked at how "useless" pupils' attempts at target setting in Physical Education were even in Year 10. However, it is also suggested that there could be negative effects of developing metacognitive ability, for as Nisbet & Shucksmith (1986) cynically implied, pupils could develop enough metacognitive ability to appreciate how they can be successful without necessarily understanding or working hard.
The author presented the metacognitive strategy intervention setting variable in a similar manner to previously successful classroom research (King, 1991), although he selected one of three main intervention study approaches (Ennis, 1989), selected one form of metacognitive strategy and selected certain cognitive strategies. These are clearly not the only options, and further research is needed to consider the potential of developing metacognitive ability utilising a different intervention approach, different metacognitive strategies and different cognitive strategies. As Wittrock (1988) suggested, the details of each intervention study need to be assessed and compared. However, any intervention setting variables must not be impractical to the Physical Education context and must be simple enough to utilise in a variety of conditions.

One of the problems with any intervention study is whether a subject is overloaded with information in a short space of time. In the present investigation, and with the Meta+ classes, it is possible that the metacognitive strategy should have been stabilised prior to the introduction of specific cognitive strategies. Thus, the author suggests that combined with long-term research into the development of metacognitive ability, interventions may need to progress on an incremental basis.
References
References


Almond, L. (1996). Discussion with regard to 'Teaching Games for Understanding'.


Evans, J. (1994). Discussion with regard to 'An Examination of Pupils' Metacognitive Ability in Physical Education'.


Gusthart, J. L. and I. Kelly (1990). Relationship of Instructor and Student Variables to Achievement in Volleyball Skills. AIESEP World Convention, Loughborough University, E & FN Spon.


Harris, J. (1996). Discussion with regard to 'Teaching Heart Target Zone Information during Health-Related Exercise Lessons'.


Linton, H. B. (1952). Relations Between Mode of Perception and the Tendency to Conform, Yale University.


# Appendices

<table>
<thead>
<tr>
<th>List of Appendices</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix 1: Stage One: The Preliminary Study</td>
<td>527</td>
</tr>
<tr>
<td>Appendix 2: Teacher Guidelines for the Completion of the Questionnaires</td>
<td>543</td>
</tr>
<tr>
<td>Appendix 3: An Example Questionnaire</td>
<td>545</td>
</tr>
<tr>
<td>Appendix 4: Interacting Variables with Pupils' Metacognitive Ability</td>
<td>575</td>
</tr>
<tr>
<td>Appendix 5: The Metacognitive Strategy</td>
<td>582</td>
</tr>
<tr>
<td>Appendix 6: The Rationale Behind the Specific Cognitive Strategies and the Selected Specific Cognitive Tactics for Each Lesson</td>
<td>583</td>
</tr>
<tr>
<td>Appendix 7: Deprivation Indicators utilised in the Department of the Environment's Index of Local Conditions</td>
<td>591</td>
</tr>
<tr>
<td>Appendix 8: The Teacher Modelling Processes</td>
<td>593</td>
</tr>
<tr>
<td>Appendix 9: An Example Lesson Plan Used During the Main Study Intervention</td>
<td>595</td>
</tr>
<tr>
<td>Appendix 10: List of Requirements for Main Study (MSt &amp; MStQ) Schools</td>
<td>600</td>
</tr>
<tr>
<td>Appendix 11: A Transcription of an Interview from the Main Study Intervention</td>
<td>602</td>
</tr>
<tr>
<td>Appendix 12: A Questionnaire Summary from the Main Study Database</td>
<td>612</td>
</tr>
<tr>
<td>Appendix 13: The Basic Ethnographic Data Collected during the Main Study</td>
<td>614</td>
</tr>
<tr>
<td>Appendix 14: The Content Analysis Categories of Pupils' Responses to the Metacognitive Ability Questionnaire</td>
<td>649</td>
</tr>
<tr>
<td>Appendix 15: The Ideal Categories and Category Scales Utilised in the Overall Focus of the Content Analysis</td>
<td>673</td>
</tr>
<tr>
<td>Appendix 16: Content Knowledge Data Sets Utilised for Non-Parametric Kruskal-Wallis Statistical Analysis</td>
<td>682</td>
</tr>
<tr>
<td>Appendix 17: Preliminary Study: Foundation Lesson Questions</td>
<td>687</td>
</tr>
</tbody>
</table>
Appendix 1:  **Stage One: The Preliminary Study**

**Introduction**

From the literature review, the development of metacognitive ability and the understanding of cognitive style combinations and cognitive strategies appeared to offer potential benefits to the teaching and learning of Physical Education. However, research in these areas had been carried out in either laboratories or classrooms and not in Physical Education settings. Furthermore, Denscombe (1980) claimed that Physical Education lessons vary considerably from the 'normal' academic context. As such, it cannot be assumed that conclusions drawn from classroom research will be valid in Physical Education, especially when you consider that individuals in Physical Education lessons have to try and express understanding through movement rather than through 'language' (Evans, 1995). As such, a preliminary study (Pre) was deemed necessary.

**Objectives**

The first objective of the preliminary study (Pre) was to investigate whether pupils' metacognitive ability could be assessed, and whether the various cognitive style combinations were evident as pupils' cognitive strategies were also assumed to be related to pupils' cognitive style combinations. The second objective of the preliminary study (Pre) was to validate previous classroom based research in a Physical Education setting and, therefore, support further cognitively focused research in Physical Education.

**Research Methods**

The study involved conducting semi-structured interviews with sixty pupils from Year 7 and Year 9 of two schools. The number of pupils was split evenly across the schools, and consideration was given to age and gender, so that there were eventually fifteen girls and fifteen boys interviewed in both Years 7 and 9 from four classes. Both schools were Middle schools (11-14 year old pupils) because it was assumed that the years of opportunity for the development of metacognitive ability rested between ten and fourteen years of age (Nisbet & Shucksmith, 1986). As the schools were going to have to be frequently visited, they were selected according to distance and, therefore, physical accessibility. The four classes, and therefore the activities, were selected randomly (Borg & Gall, 1983). The author felt that it was beneficial to include a variety of activity areas as to consider the possible effects of activity on
metacognitive ability, cognitive style combinations and cognitive strategies. Indeed, Brown, Collins & Duguid (1989) argued that learning is very much activity, content and situation specific. The eventual activity areas examined depended upon the timetable at the schools, and these were Hockey, Gymnastics, 'Foundation' (a core games activity), Cricket and Netball. Five activity areas were observed as one of the classes separated girls and boys in Year 9 and, therefore, they had to be observed separately.

The preliminary study (Pre) both directly and indirectly investigated the concepts of metacognitive ability and cognitive style combinations in Physical Education. That is, the questions either enquired specifically about their existence or the questions referred to the influences and the effects, as suggested by literature, that the concepts may have. For example, a direct question investigating pupils' monitoring of a learning situation and, therefore, part of their metacognitive ability, read, 'Did you check at any stage that you understood what was wanted?' An indirect question focusing upon cognitive style combinations asked, 'Do you prefer descriptions or demonstrations? Why?' Although each question had a main focus, the fact that metacognitive ability, cognitive style combinations and cognitive strategies, in practice, interact, specific questions offered insights into some or all of the concepts.

The questions were based on the content from each lesson that was observed as it is stated that interviewers should ask learners to report on specific events and not hypothetical situations (Ericsson & Simon, 1980). The pupils were selected by a process of simple randomification (Borg & Gall, 1983), and letters were then sent to parents to gain their consent (Yando & Kagan, 1970). The author placed particular emphasis on confidentiality, not only in the letter but also at the beginning of the interviews and when the author was approached throughout the school by pupils.

Like previous Physical Education research (Crum, 1984: cited in Underwood, 1988), the author was in danger of placing the responses into pre-determined categories. However, as Hitchcock & Hughes (1993: p83) stated, "the semi-structured interview is itself quite valuable as a pilot study, that is a short, preliminary, investigative study designed to reveal issues which can be explored in more depth later by means of a variety of techniques". The questions aimed to establish a conversation that would be relative to the consideration of metacognitive ability, cognitive style combinations and cognitive strategies. For example, a question that enquired about the purpose of a task and whether the purpose was considered during the task, was aimed at assessing whether pupils had some metacognitive knowledge of the task purpose and whether pupils consciously accessed this metacognitive knowledge. The pupils were
encouraged to explain their answers fully so that the author was left to 'assume' as little as possible about why they answered the way they did. A problem, of course, is that the questions may have actually only tapped each pupil's linguistic competencies rather than their cognitions and metacognitive capabilities (Nisbet & Shucksmith, 1986). Therefore, the questions were made as simple and clear as possible and were also vetted by an experienced researcher, who examined the wording used. The questions were of a standard format for all five activities, although the specific examples and content varied between each. For example, returning to the question that assessed pupils' metacognitive knowledge of the task purpose, for the gymnastics group the question read, "In the lesson you were asked to 'try' all of the equipment. Why do you think the teacher was asking you to do that? Did you ask yourself 'Why?' during the lesson?" Within the foundation (a core games activity) lesson, the same question read, "In the lesson you were asked to play 'Stick in the Mud'. Why do you think the teacher was asking you to do that? Did you ask yourself 'Why?' during the lesson?"

(Appendix 17, Preliminary Study: Foundation Lesson Questions)

Unfortunately, the author was faced with the problem of only being allowed to interview the pupils at specific times in the day, and this meant that, in some cases, there was a relatively large delay between the lesson observed and the interview taking place. For accuracy, reliability and validity of self-report data, the time between the actual occurrence of the process and the report should be as short as possible (Brown, Bransford, Ferrarra & Campione, 1983; Nisbett & Wilson, 1977). However, it is suggested that as long as any delay is acknowledged and the verbal reports are "interpreted with full understanding of the circumstances under which they were obtained" (Ericsson & Simon, 1980: p227), they are still a valuable source of information about cognitive processes. The interviewing was undertaken in available rooms during the day. However, as suggested by Kreutzer, Leonard & Flavell (1975) for interviews concerning metacognitive ability, every endeavour was taken to obtain a room or environment that maintained privacy. Furthermore, the pupil and the author sat side by side during the one-to-one interview, with the microphone and tape recorder in front of the pupil. Rapport was established (Hitchcock & Hughes, 1993), often through humour, before the purpose of the study, to find out the different ways that pupils learn in Physical Education, was explained. It was emphasised that there were no 'right' answers (Kreutzer, Leonard & Flavell, 1975), and there were apparently no problems with the pupils accepting this point. Indeed, the pupils often stated that they had previously been told by parents and teachers that pupils do learn in different ways. Interviews were kept informal in the sense that they were designed to keep pupils relaxed. However, in this atmosphere, the author sometimes became so
interested in what the pupils were saying that there was often a shift from topic to topic and he tended to wander away from the structure of the interview more than necessary. Although this can encourage informative dialogue and probably helped the author to develop the pupils' trust (Fontana & Frey, 1994), returning to the central focus often involved direct questioning rather than conversation.

Results

From Figure 2.02 it can be asserted that metacognitive ability refers to the adequate development and utilisation, be it conscious or unconscious, of metacognitive knowledge and metacognitive strategies for a given task. As such, in an attempt to assess metacognitive ability, metacognitive knowledge and metacognitive strategies were separated. Metacognitive knowledge was further divided into task and person variables for the sake of clarity. It has been suggested that cognitive style combinations may be at the heart of pupils' metacognitive knowledge of person variables (Pennell, 1985; Riding & Powell, 1993). Therefore, the results regarding cognitive style combinations are presented with those regarding pupils' metacognitive knowledge of person variables. Pupils' cognitive strategies and their metacognitive knowledge of strategy variables were not a direct focus of the preliminary study and were, thus, ignored. As each pupil was required to show a conscious awareness of their metacognitive knowledge and their metacognitive strategies, it was inevitable that metacognitive experiences may have been evident. Therefore, pupils' metacognitive experiences were also assessed.

Metacognitive Knowledge: Task Variables

Lee & Solmon (1992) stated that in the complex Physical Education environment, pupils' perceptions of task and instructional behaviour will be a critical variable. The pupils interviewed in the preliminary study demonstrated a general lack of metacognitive knowledge of task variables which supported the ideas of Nisbet & Shucksmith (1986) in their consideration of pupils of a similar age group. To highlight pupils' general lack of metacognitive knowledge of task variables the pupils' thoughts on the purpose of a specific task can be considered. Most of the pupils stated that during the lesson they did not think about why a task was set, and even when they were asked to consider this during the interview, they were often unsure of their answer. For example, when a Year 9 pupil was asked what the aim of the non-stop cricket lesson was, he replied, "to improve your Cricketing I suppose, and your teamwork I suppose, and your fielding because you have to know who to throw the ball to." Baird (1992: p 41) noted in a study of grade 7-11 pupils that "many students
seemed to have little idea of the answers to such questions as 'Why were you doing the topic?" In the Physical Education context, it was also noted that pupils during tennis instruction often stated that they understood, but when they were asked a follow-up question: 'What did the teacher say?', none of the pupils could provide a complete answer, providing general, very vague or indeed no details (Lee, Landin & Carter, 1992). In the preliminary study there were clear variations in pupils' responses to why tasks were undertaken. Responses ranged from correct responses, to guesses and vague responses, to having no idea or extreme responses. For example, a sheer lack of understanding was suggested by a Year 7 pupil in a Hockey lesson who stated, in response to why a specific task was given, "I dunno, it's just one of those topics that we do, I mean we do every topic usually don't we and err...that was one of them." Therefore, in summary, the metacognitive knowledge of task variables was both limited and varied within each Year and class. Furthermore, it is questionable whether pupils can learn efficiently if they have limited thoughts on the purpose of tasks.

Metacognitive Knowledge: Person Variables

Having metacognitive knowledge of person variables involves an understanding of the universals of cognition. As such, pupils should attempt to appreciate and develop metacomprehension. It appeared in the preliminary study that the pupils were, in general, convinced that they understood the information provided. For example, when a Year 9 pupil in a non-stop Cricket lesson was asked whether they understood what the teacher explained, the response was, "Yes, because I've played Cricket a fair few times at clubs and we play it at school a bit so it just comes like natural, you just play." However, from the responses pupils offered regarding the purpose of tasks there is clearly often a failure in pupils' metacomprehension. Can pupils 'fully' understand if all have different ideas of what the purpose is of a lesson?

It appeared from the preliminary study that there were differences between pupils' cognitive style combinations, which supported previous research (Riding, Glass & Douglas, 1991). With respect to the wholist-analytic style dimension it is suggested that pupils may have tendencies in how they process information, either preferring to process information into loosely clustered wholes or preferring to separate information into sections or parts (Douglas & Riding, 1994). Pupils within the preliminary study seemed to suggest a tendency along the wholist-analytic cognitive style dimension. While responding to a question asking whether they viewed passing and catching a ball across and down two lines as separate tasks, pupils indicated that it may be viewed as a single action or as two actions. A Year 9 pupil stated, "One thing because you do it all in one movement" (wholistic) whereas a different Year 9
pupil stated, "Separate parts. I think you ought to be taught like I was in Primary School how to in P.E. one lesson like one week that start to show you how to do your throwing and like special moves how to throw and then other weeks we'd do catching and techniques of catching" (analytic). Some pupils appeared to imply that there was an interaction between their processing preferences and their metacognitive knowledge of the task variables. For example, a Year 7 pupil argued that the dribble, stop, pass and run task that was performed during a Hockey lesson was actually a single activity, and explained that this was due to the fact that there was a major purpose in a game which structures these 'separate' activities as a whole, "One big...Well, say you was in a game again, you would be running a bit with the ball and you would be passing it, because you wouldn't be running with the ball from one end to the other and you would be passing it and running with it."

With respect to the verbaliser-imager cognitive style dimension, pupils demonstrated preferences for both demonstrations and descriptions, seemingly desiring the teacher to match their preference. For example, a general question was asked concerning whether the pupils preferred demonstrations or descriptions. In support of a demonstrations a Year 9 pupil argued that, "...you can actually see what you have to do and not just be told what you have to do." Similarly, another Year 9 pupil stated, "Demonstrations" and explained, "Because like, they're talking about it and they're saying different moves, but you perhaps don't understand what that move looks like, but if they show you that move it helps you to copy them sort of thing." Furthermore, a Year 7 pupil suggested that, with demonstrations, "...you just like remember them in your brain and then just copy them from what you saw." However, in support of descriptions, a Year 9 pupil claimed, "...demonstrations always make it look more complicated." Similarly, a Year 7 pupil stated, "I suppose the description would be like better...[because] with a demonstration you just see it and sometimes he goes back and you put you're hand like this and you don't do it like that and something like that, you'd understand it a bit better if you did it like that instead of thinking right, whatever."

However, while most pupils suggested that they had a preference, some pupils struggled to explain why they had these preferences, and this perhaps indicates a lack of metacognitive understanding of person variables. For example, after claiming that demonstrations were better than descriptions, a Year 9 pupil was unable to explain why? "I dunno, I just seem to be able to do it better if I see somebody else do it first, and then I can have a go at it." Similarly, another Year 9 pupil suggested a preference for descriptions but when asked for a reason the pupil was only able to offer, "because it's just easier to understand." Some pupils indicated that their preference for
demonstrations or descriptions was more related to their desire for a mismatch, rather than a match, of their representative preferences. It seemed that some pupils desired either demonstrations or descriptions to compensate for their inabilities. For example, a Year 7 pupil suggested that demonstrations were better than descriptions, "because you can see what you're supposed to be doing and demonstrations and, no, descriptions, everyone has to picture them in your mind to see what's happening ...Sometimes I find it quite hard to picture them in my head." It may be that rather than imagers preferring demonstrations, for example, verbalisers prefer demonstrations because they are unable to create an image of the movement or activity on their own. A Year 9 pupil stated, "...I find it harder to see something as erm...imagine, than if you actually see it, you know it's there, whereas if you imagine it you could be wrong." The indication is that if pupils do not tend towards imagery then any attempted translation of verbaliser representation to an imager representation may be difficult and hinder learning. As such, they would prefer to copy a demonstration. However, it may be that if imagers have poor ability they may still require images to be developed to enable copying to occur. Riding and Read (1996) suggested that ability can affect what pupils desire from instruction. Furthermore, it was noted during the interview that the same Year 9 pupil gave numerous hand gestures during a description the activities involved in the lesson which may suggest a tendency towards imagery, even though there appeared to be a poor ability in developing a coherent image. It has been argued that there may be differences in voluntary and involuntary control with respect to the verbaliser-imager dimension (Douglas & Riding, 1994; Riding & Read, 1996). Riding & Tempest (1986) suggested the imagers can struggle with a task such as drawing from memory and it is assumed that this may be due to interference and displacement by other involuntary intrusive images (Douglas & Riding, 1994; Riding & Read, 1996). As a consequence, the Year 9 pupil may struggle in accurately picturing the task or action from memory and, therefore, required an instant demonstration to copy.

It is claimed that with respect to the verbaliser-imager cognitive style dimension, some pupils may be bimodals in that they will tend to use either mode of representation (Riding & Buckle, 1990; Riding & Pearson, 1994). A Year 7 pupil stated, with reference to demonstration or description preferences, "Aah...both the same really, because they're both different, because on when they're telling it is actually telling you what to do, but on the thing is actually showing you what to do, so both the same."

As the wholist-analytic and verbaliser-imager cognitive style dimensions are independent of each other (Borg & Riding, 1993; Riding & Douglas, 1993; Riding &
Mathias, 1991), it is argued that an individual's position on one of the dimensions does not affect their position on the other. From the preliminary study, it appeared that the resulting combination of cognitive styles were developed. For example, during an explanation of the preferences for demonstrations, a Year 9 pupil indicated that there may be tendencies towards the analytic end of the cognitive style processing dimension, "demonstrations, because it isn't always as easy as it looks, where you're gonna put your hands and how you're gonna move, and what space you've got." The pupil appeared to indicate that the movement was broken down into individual parts and that some of these parts may be exaggerated out of proportion compared to other parts (Riding & Sadler-Smith, 1992; Riding, Glass & Douglas, 1993). While explaining the preference for descriptions, a different Year 9 pupil suggested a much more wholistic view of a task, "just descriptions, because they tell us what sort of things to do and you've got it in your mind, it's already set and you know what to do." These two examples highlight how certain pupils may be an analytic-imager or a wholist-verbaliser respectively.

Although it was not a direct focus of the preliminary study, it appeared that the stability of pupils' cognitive style combinations was questionable, which again supported previous research (Geiger & Pinto, 1991). For example, the discipline and the practicalities of a lesson appeared to influence whether a pupil preferred to be told exactly what to do or to have some choice. As one pupil stated, "I just like having rules given to you. Because if people make up the rules then people start arguing about how, what rules they want and they think it's wrong and stuff". The instability of cognitive style combinations may support the idea that learning styles do exist rather than purely cognitive styles (Dunn & Dunn, 1978). Indeed, pupils did indicate sociological, environmental, physiological and emotional preferences which further support the idea that the other learning style preferences interact with cognitive preferences. Sociological preferences were suggested by two Year 7 pupils who stated, respectively, "Yeah, I enjoyed the game at the end [because]...erm...on the practices we were just doing it between two people and we were all doing it, but like in the game we were all spaced out and we were together with lots of people", "Yeah, I enjoyed the lesson a lot [because]...you get involved with other people and you can learn how they play and then you can learn how you play." Environmental preferences were indicated by a Year 7 pupil and a Year 9 pupil who responded, respectively, to the question enquiring whether they enjoyed the lesson, "I enjoyed the whole lesson...It's better than being inside because it's a bit more space, erm.", "Yeah! Erm [because]... it's better playing games than going outside all of the time, because it's warmer most of the time and the team games you're not like playing a certain position, you can do what you like." Arousal and mobility requirements involved in
physiological preferences were suggested by a Year 9 pupil who stated that the lesson was enjoyable, "because I like running around and using energy, and sport really." With reference to emotional preferences a Year 7 pupil indicated a strong desire to conform suggesting that there was never any questioning of why the teacher developed specific tasks, "I just did what I was told." However, a Year 9 pupil appeared to be requesting extra responsibility stating, "For us to learn it better I don't think they should be too afraid of giving us, like they're saying 'you're not quite ready' for, well, just try and see if we are."

It is suggested that the cognitive style dimensions are continua with individuals distributed along them (Riding & Cheema, 1991; Riding & Sadler-Smith, 1992). Therefore, pupils would vary in the strength of their tendencies to a specific end of each cognitive style dimension. The preliminary study indicated that there was, indeed, a variety in the strength of tendency to cognitive style combinations between pupils. Some pupils may be more susceptible to other influences, such as those involved in learning style, which may over-power their natural cognitive style tendencies even though the natural tendencies may never change. It may be possible that 'instability' shown in cognitive style may simply be that the pupil has the metacognitive ability to select appropriate cognitive style combination characteristics and appropriate cognitive strategies for the given task. It is suggested that pupils tend towards cognitive style combinations consistently and it is not claimed that pupils only use a single cognitive style combination. For example, if an apparent wholist appears to break information down, it does not mean that they have lost wholistic processing tendencies but may understand that analytic processing is more appropriate for the given task. The pupil may also appreciate other important variables in the learning situation which may mean that preferences, in practice, will change. For example, whereas it is argued that analytic pupils may be willing to structure and to re-structure information (Schmeck, 1988) it seemed that due to pupils' thoughts on issues such as class discipline, these preferences or tendencies altered. Most pupils answered similar to two Year 9 pupils who suggested that making and structuring rules for a game was not practical, "I just like having rules given to you. Because if people make up the rules then people start arguing about how what rules they want and they think it's wrong and stuff" and "I prefer to be given them. Because then you get to play the game properly instead of everyone making up different rules all the time." Similarly, the wholistic tendency to be impulsive (Pask, 1988; Schmeck, 1988) appeared to alter due to pupils' thoughts on issues such as class discipline and teacher demands. When asked whether they preferred to stop and think about a task or to have a go immediately a Year pupil 9 stated, "I think you should stop and think about it, but sometimes there can be too much stop and think about it, and not enough
trying out the apparatus." The pupil appeared to imply that there was actually a wholistic preference to be a little more impulsive and, indeed, when questioned further the pupil stated, "I prefer to try it out, because then we're actually doing it and not just sitting down and listening to somebody else talking about it." It appeared that the content or type of task also influenced the stylistic preference stability. For example, the Year 7 pupils involved in the 'Foundation' lesson where they were constructing games, and the Year 9 pupils who were using gymnastic apparatus, were much more willing to restructure information and willing to develop their own rules and ideas irrespective of whether they tended to be analytic or not. For example, a Year 7 'foundation' pupil stated, "Erm...have freedom...err...because if you, if the teacher tells you something and you don't like it, well you like, well, the teacher tells you something and you don't like it, and you don't like, know the game and you don't enjoy it" and a Year 9 gymnastic pupil stated, "I prefer to be given the freedom, because like, people would always be trying it. When there's like loads of things to do, and you're like given freedom to try them out then that's good, but in some lessons you can't always do that." Similarly, the Year 7 'foundation' pupils suggested that it was better to be reflective rather than be impulsive, even if they had previously tended towards wholistic tendencies. A Year 7 pupil stated, "Stop and think about it [because]...you won't just go jumping into the game, you won't know what to do unless you ask yourself what to do and ask your partners whose playing the game with you. However, these thoughts concerning the need to be reflective in the lesson were not always accompanied with an awareness why it was better, "Think about it...I dunno, because if you think about it then it's easier isn't it?"

Indications of changes in cognitive style combinations may actually be a demonstration of even stronger tendencies to a specific cognitive style combination. For example, an assumed Year 9 analytic pupil appeared to provide a very general, simplistic and wholistic description of the game 'Dodgeball'. However, it may be that each single point had been exaggerated to the exclusion of other points, which far from suggesting wholistic tendencies, may indicate even stronger analytic tendencies, "Well you just need to know that you threw the ball to one person and that as soon as the ball had been hit you could run and if you're hit below the knee then you're out."

It is argued that pupils should appreciate the desires, preferences and tendencies of other people involved in the learning situation, such as peers or teachers (Flavell, 1979). There were a variety of ideas in the preliminary study of what the teacher wanted in each lesson. It seemed that these ideas, or this metacognitive knowledge of person variables, influenced whether pupils utilised their cognitive style combination preferences or abandoned them. For example, the tendency to stop and think may
have been due to the pupils' thoughts about what the teacher, or indeed the researcher, would have wanted to hear them say.

In summary, pupils responded to the learning situations within the structure of the cognitive style combinations. Stability of these cognitive style combinations could be questioned, but it is argued that stability is not necessarily the crucial point. The combinations suggested by cognitive style research indicate how pupils can process and represent information, and whether or not a pupil is consistent in their use of a specific combination is not significant in a class that may have thirty pupils responding differently. Interestingly, although it was not a major purpose of the preliminary study, it also appeared that if metacognitive ability can be developed then pupils may be able to match the appropriate cognitive style combination and the respective cognitive strategies to a specific learning situation.

Metacognitive Strategies

There was clearly a range of metacognitive ability between the pupils. There was some with good awareness, monitoring and evaluation. For example, a Year 7 pupil suggested that a Hockey lesson could have been altered to improve it, "I think that when we were doing the dribbling up and down and then the passing bit, I think it would have been better if we could have, like erm...moved it around so that we could have passed it to each other so you get, like, the feeling as if you were in a real game, if you know what I mean." A different Year 7 pupil seemed fully aware of why a specific passing task had been selected in Hockey and related it to other activities, "Passing skills in the game, like, if we were playing in the game you have to, we all have to, pass the ball instead of ball-hogging, like, you always have to pass in a game, Hockey game, Football game or whatever." Similarly, a Year 9 pupil offered an accurate suggestion for the purpose of the Gymnastics lesson, where the pupils were asked to 'try' the equipment, and indicated superb evaluation of the lesson in suggesting possible alterations to improve it, "[the purpose] I suppose [was] to try and get you used to all the equipment, and like, using all the equipment, erm...so you are used to it and you know like, all the things you can do on it and learn them, just a bit of experience on the different sorts of equipment. To improve it, "well, people tended to stay on the same thing, I think the teacher should of said, like, every five minutes you should have swapped round, whereas she just sort of said it's up to you, for you to go on what you want and when you change over, and people just sort of like tended to stay on the same thing and so it didn't get sort of like experience, so the teacher should have put, like a time limit on it and put you in groups and stuff, so that you move round."
However, metacognitive ability was, generally, inadequate in both Year 7 and Year 9. For example, even though all pupils believed that they had been given enough information, there was a large variety in the reasons offered to why specific tasks had been selected, which, therefore suggested that the information offered had not been monitored or evaluated. For example, a Year 7 pupil claimed that enough information had been provided by the teacher and the aim of a Hockey lesson was, "to improve your passing skills and erm...your tackling skills." However, the lesson contained no reference whatsoever to tackling apart from its natural occurrence in the mini-game at the end of the lesson. Similarly, a Year 9 pupil suggested that the key features of success in a game of non-stop Cricket were to, "Err...make sure that the other person that's going in next has got a bat and organise the team in what order and so you have no arguing." The suggestion is that the pupil was more concerned with organisation rather than batting, bowling or fielding skills. If this was the key feature of success, the pupil again claimed that the teacher had provided adequate information although no reference and no suggestions made to how a team should line up. Importantly, the focus on organisation offered by the pupil supports the literature, taken from classroom subjects (Eylon & Linn, 1988; Edwards & Mercer, 1987: cited in Claydon, Desforges, Mills & Rawson, 1994), concerning pupils' possible tendencies to examine presentation and organisation in an attempt to gain an insight into the nature of specific learning situation. As argued earlier, if this is the case then it may have important consequences for Physical Education teaching approaches such Teaching Games for Understanding.

Furthermore, there was a general uncertainty as to whether a lesson could have been improved or not, and a confusion between the purpose of the lesson and how things could have been changed to improve the achievement of this aim. These problems were clear in both Year 7 and 9. For example, A Year 7 Hockey pupil suggested the purpose of the lesson, "Erm, so that you could get better skills, erm, err...so you could play Hockey and the more games, the different games you can play, you can choose Hockey." However, the pupil's evaluation of the lesson was seemingly poor as the suggestions offered for improvement were, "Erm, I could've practised the err...like in goal more, like jabbing the ball out of people's hands, out of the...[because]...when, err...the defenders are coming in you could jab tackle it so it err...they won't be able to score. Or you could put your stick down on the floor, like down on the floor and stop."

Such an evaluation had no relevance to the actual lesson or, indeed, the pupil's thoughts on the purpose of the lesson. A Year 9 pupil suggested the purpose of 'trying' all of the equipment was, "to get more flexibility..." which was seemingly inaccurate.
However, even if this was the purpose of the lesson, the pupil could not offer any suggestions as to how the lesson could have been improved for this aim although, clearly, there are numerous activities that could have been changed to improve flexibility. Similarly, a different Year 9 pupil suggested the purpose of the Gymnastics lesson was, "to see how creative you were with style" but continued to argue that, "...perhaps the teacher might have demonstrated some of the moves on the swings and stuff". However, if the teacher offered numerous suggestions the possibility of creativity would potentially be decreased. It was clear that the pupils in the preliminary study did not question themselves or anyone else how well they were doing, even if they suggested that they were unsure of the reasons why they were doing things. For example, a Year 9 Gymnastics class were asked to perform with 'quality' and in response to a question concerning what quality actually was, a pupil stated, "I don't know". However, the same pupil did not monitor or evaluate the performance, "I just did it, I'm not bothered what anyone else thinks...No, I just did it".

If the pupils did attempt an evaluation of their performance, it tended to be unconscious. For example, a Year 9 pupil suggested that, "I sort of asked myself, yeah, I sort of asked myself whether it was any good. I sort of asked varying questions..." A different Year 9 pupil stated, "I suppose I thought to myself, 'yeah, this is good, I must be doing okay', because it is unusual." Although self-evaluation was not common, and when it occurred it seemed to be unconscious, some pupils did ask others to evaluate their performance. For example, a Year 9 pupil claimed, "Yeah, I asked me friend, and then I went and asked the teacher whether I was doing it right, and the teacher said I was, so..." It may be that the pupils rely quite heavily on others to tell them if they are doing things well or not, and will continue otherwise. For example, a Year 7 pupil stated, "I think a lot of people would comment if they thought that you were doing something wrong in our class". Similarly, a Year 9 pupil suggested that there was no need to monitor or evaluate performance, "because we didn't have to." MacLure & French (1980) noted how pupils continue without self-evaluation and may rely on others to inform them of mistakes. During a classroom activity there were fifteen calls of 'pliers' and 'clippers' in response to a question which was looking for the answer 'cutters', even though the teacher did not positively respond to any of them. As such, further support was offered from the preliminary study to the importance of classroom literature concerning metacognitive ability and cognitive strategies to the Physical Education setting.

While there appeared to be some pupils who indicated good awareness, monitoring and evaluation of the learning situations, there was, in general, an inadequate
efficiency and utilisation of metacognitive strategies. A Year 9 pupil offered an
accurate suggestion for the purpose of the Gymnastics lesson, where the pupils were
asked to 'try' the equipment, and indicated good evaluation of the lesson by
suggesting possible alterations to improve it. The purpose, "I suppose [was] to try and
get you used to all the equipment, and like, using all the equipment, erm...so you are
used to it and you know like, all the things you can do on it and learn them, just a bit
of experience on the different sorts of equipment. To improve it, "well, people tended
to stay on the same thing, I think the teacher should of said, like, every five minutes
you should have swapped round, whereas she just sort of said it's up to you, for you to
go on what you want and when you change over, and people just sort of like tended to
stay on the same thing and so it didn't get sort of like experience, so the teacher
should have put, like a time limit on it and put you in groups and stuff, so that you
move round."

Interestingly, all pupils believed that they had been given enough information during
the lesson regarding a specific task. However, there were a large variety of reasons
offered to why specific tasks had been selected which, therefore, suggested that the
information offered had not been monitored or evaluated. To recapitulate an example,
a Year 7 pupil claimed that enough information had been provided by the teacher and
that the aim of a Hockey lesson was, "to improve your passing skills and erm...your
tackling skills." However, the lesson contained no reference, whatsoever, to tackling.

Metacognitive Experiences

Pupils appeared to have some 'cognitive' metacognitive experiences. For example, a
Year 7 noted how sometimes, "I just didn't understand it." However, the pupil did not
act on this experience as the pupil laughed when asked if there had been any self-
evaluation of the performance in the task. Other pupils admitted that they would not
know how to react to cognitive experiences, such as not understanding. It is suggested
that 'cognitive' metacognitive experiences are not enough to encourage learning,
especially as most pupils, when they were asked how they would check if they did not
understand, stated that they would ask the teacher. As Van der Meij (1990) noted,
pupils realising that they have to ask questions is not enough as they need to be able
to understand what they need to know and to be able to structure the question
accordingly. In the preliminary study, even when pupils didn't understand the
information given, they were often unable to provide details of the extra information
they would like. Furthermore, 'cognitive' metacognitive experiences were not
common. They tended not be deliberate searches of the mind and they were only
sporadically triggered by the tasks. Even if 'cognitive' metacognitive experiences
occurred there was little indication that pupils knew how to utilise the experience, as suggested by Nisbet & Shucksmith (1986).

Some pupils appeared to have 'affective' metacognitive experiences. For example, they appeared aware of their feelings concerning a specific lesson, be they positive or negative. For example two Year 9 pupils stated respectively, "Yeah, it was great...all of it...because I was using my arms a lot and that's one of my strong parts of my body, so it was easier", "I don't like the bits where the teacher says you will perform a routine or you will decide a routine and then you will perform it. I don't mind if we're in groups, but I hate doing that on my own. I really don't like doing that. I didn't like the bit where the teacher says you're going to perform afterwards, I just don't like that. That makes me nervous and you can't perform, you know, you can't do it as well if she hadn't said that." However, while these two pupils offered specific reasons why they liked or dislike a lesson, most responses were general in nature, suggesting that pupils acknowledged 'affective' metacognitive experiences but were unaware of the reason for them and presumably, therefore, unaware of how to utilise them. For example, a Year 9 pupil noted, "Yeah, I enjoyed it all" and explained, "because P.E. is my favourite lesson and I always enjoy it, because I enjoy doing sporty things". Similar general responses could be negative, as a Year 9 pupil emphasised, "I don't like P.E." The confusion behind the reasons for pupils affective metacognitive experiences was highlighted by the comment made by a Year 9 pupil, "I think I liked using the apparatus." The pupil's use of 'think' suggests a lack of awareness behind the feeling of liking. As Nisbet & Shucksmith (1986) argued, although metacognitive experiences are important to learning, they do not inevitably lead to it. Young pupils may have metacognitive experiences but do not understand how to interpret them or how to react to them effectively (Flavell, 1987). The preliminary study appeared to support these assertions.

Summary

From the results of the preliminary study it appeared that metacognitive ability, cognitive style combinations and, therefore, presumably, cognitive strategies should be considered more in Physical Education settings. There was evidence that pupils' metacognitive knowledge, metacognitive strategies, metacognitive experiences and, therefore, metacognitive ability could be assessed. Furthermore, the preliminary study appeared to validate some of the classroom based research in a Physical Education setting which implied that further cognitively focused research in Physical Education may prove beneficial. Notably, there has been recent support for cognitive factors, in general, to be examined more in Physical Education (Singer, 1995; Turner &
Martinek, 1995), and it has been argued that, "...it is imperative to learn more about student attributes and thought processes that mediate learning in Physical Education" (Solmon & Boone, 1993: p418).
Appendix 2: Teacher Guidelines for the Completion of the Questionnaires

Firstly, I would like to thank you for helping me in the whole process of completing these questionnaires. I know you must already be busy, and I truly appreciate the time and effort you are expending on my behalf.

Points about the Questionnaire:

(1) The questionnaire may seem to be large and the pupils are likely to comment about this. However, please reassure the pupils that there are only two or three questions on each page and it should not take them longer than a lesson.

(2) Please ensure that the pupils' personal details are completed in the space provided at the top of the first page.

(3) The answer boxes have been designed to help the pupils structure their answers. However, they may use diagrams to answer certain questions if they prefer.

(4) The pupils do not have to worry about spelling.

(5) If a pupil asks what a certain word means, then please check the whole question before simply giving an answer. Some questions are examining what certain words or concepts mean to the pupils; for example, one question asks what being 'successful' means. Obviously if they are struggling with the word 'successful' and the teacher explains it, they will be writing the thoughts of the teacher and not their own interpretation. Therefore, if it appears that the question depends on the interpretation given to a certain word, please try to rephrase the question rather than offering a meaning.

(6) If a pupil does not know an answer, or does not have a reason for an answer, simply write in the allocated space, 'I don't know' or 'I have no reason' respectively. However, if the pupil does not understand the meaning of a question, then they should write 'I do not understand the question'. It is important to differentiate between not being able to answer a question and not understanding a question. Pupils often assume that if they don't have an answer then they cannot understand the question - this is not always the case and the difference may need to be explained.
(7) If possible, please make a note of the pupils who did not appear to put any effort into the completion of the questionnaire.

Thank you again for all your help.
Appendix 3: An Example Questionnaire (Metacognitive Ability)
School 6 (MSt) 'Yard' Year 9 questionnaire following an observed Volleyball lesson focusing on the 'dig' and the 'serve'.

All Information Will Remain Confidential

Name:

Class:

Gender: boy / girl

Are you in any sports club? : yes / no
(if so, what club?)

Date of Birth:

What Happened in the Volleyball Lesson?

You may use diagrams, descriptions, or both, in answering all of the questions.

(1) During the lesson you had to perform a 'dig'.

Explain what the task of doing a 'dig' involved. Why were you doing the task?
(2) What could have affected how well you performed a 'dig' in the lesson?

- 

- 

- 

(3) (i) Were you given enough information by the teacher to perform the 'dig' well?

(ii) What did you think was the most important point of the information that the teacher gave?

(i) 

(ii) 


(4) What abilities or skills does someone need to be able to perform the 'dig' well?  
*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

(5) Could someone, or something around you, during the lesson, stop you from  
performing the 'dig' as well as you normally would?  
*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
(6) What feelings did you have when the teacher explained that you were going to Practising the 'dig' and 'serve'?

(7) What are the difficulties that you come across when you are trying to perform the 'dig'?
(8) (i) Did the task of practising the 'dig' suit everyone in your class?
(ii) Who did it suit the most and who did it suit the least?

*Give reasons for your answers.*

(i) 

The reasons for my answer are...

(ii) 

The reasons for my answer are...

(9) (i) Were the instructions for the 'dig' clear?
(ii) What extra information would you like about any part of the 'dig'?

*Give reasons for your answers.*

(i) 

The reasons for my answer are...

(ii) 

The reasons for my answer are...
(10) What did you know before the lesson that helped you in performing the 'dig'? 

- 

- 

- 

(11) What parts of the 'dig' practice did you do well?

Give reasons as to why you were able to do these parts well.

- 

- 

The reasons for my answer are...

- 

- 

-
(12) What parts of the 'dig' practice did you do poorly?

Give reasons as to why you were not able to do these parts well.

The reasons for my answer are...

(13) Did you have enough time to think about performing the 'dig' before trying it?

Give reasons for your answer.

The reasons for my answer are...
(14) Are you happier when the teacher describes an activity or happier when the teacher demonstrates it?

Give reasons for your answer.

The reasons for my answer are...

(15) If you were a teacher would you,

(a) describe the action of performing the 'dig' to pupils?

or (b) give a demonstration of performing the 'dig'?

or (c) give both a description and a demonstration of performing the 'dig'?

Give reasons for your answer.

The reasons for my answer are...

-
(16) List two of the differences between the 'dig' and the 'serve'.

1. 

2. 

(17) List two of the similarities between the 'dig' and the 'serve'.

1. 

2. 
(18) What did you think about when the ball came over the net to you and you needed to perform a 'dig'?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

(19) Do you think the practice that you did was the best way of learning about serving and performing a 'dig'?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
(20) During your attempts at doing a serve, what did you think about in order to do it well?

(21) (i) During your attempts at doing a serve, what ideas did you have for improving each time?

(ii) What made you think of these ideas?

(i)

(ii)
(22) Would the ideas that you had for doing a serve well be useful for any other activity, game or practice?
Give reasons for your answer.

The reasons for my answer are...

(23) Did you change your plan for how to do a serve at any time, in order to do it better?
Give reasons why you did or did not change your plan.

The reasons for my answer are...

(24) What feelings did you have when you had to do a serve in front of the class?

- 

The reasons for my answer are...

- 

(25) When you were trying to perform a 'dig', were you able to concentrate on the task?

Give reasons for your answer.

- 

The reasons for my answer are...

- 
(26) What actions could you have taken to make sure that you were able to complete the task of performing a 'dig' to the best of your ability?

(27) (i) What could stop you from completing the task of performing a 'dig' to the best of your ability?
(ii) How could these problems be avoided?
(28) What is the point of doing PE and especially Volleyball?

(29) What purpose does PE have?

(30) When do you feel successful in Volleyball?
(31) Generally, how does someone 'achieve' in Volleyball?


(32) When do you feel that you have 'achieved' in Volleyball?


(33) Do you feel that it is important to achieve in Volleyball?

Give reasons for your answer.


The reasons for my answer are...


(34) When you performed a 'dig' well, what do you think were the reasons for the success of your attempt?

- 

(35) When you did not perform a 'dig' very well, what do you think were the reasons for the lack of success of your attempt?

- 
(36) What abilities and skills do you have which are useful for performing a 'dig'? Give reasons for your answer.

- 

The reasons for my answer are...

- 

(37) Are these abilities and skills that you have good enough to complete the task of performing a 'dig' well? Give reasons for your answer.

- 

The reasons for my answer are...

- 

- 

-
(38) Are these abilities and skills that you have always useful in Volleyball? 
*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

(39) Do you think the teacher thought that you were able to complete the task of performing a 'dig'? 
*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
(40) Are you usually good at P.E. activities at school?
   *Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

(41) Would you prefer to
   (a) watch
   or (b) join in
   with Volleyball?
   *Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

(42) Is there anything that you would like to change about yourself when you are doing P.E. activities?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

(43) What do you like and dislike about P.E. in general?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>I Like...</th>
</tr>
</thead>
<tbody>
<tr>
<td>The reasons for my answer are...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I Dislike...</th>
</tr>
</thead>
<tbody>
<tr>
<td>The reasons for my answer are...</td>
</tr>
</tbody>
</table>
(44) What do you like and dislike about Volleyball?
Give reasons for your answer.

<table>
<thead>
<tr>
<th>I Like...</th>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I Dislike...</th>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(45) (i) To be successful in the group during Volleyball, what must you do?
(ii) What do you have to do for the teacher to think that you have 'achieved'?
Give reasons for your answers.

<table>
<thead>
<tr>
<th>(i)</th>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ii)</th>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(46) Within your group, when do you feel that you have achieved something during Volleyball?

(i) Did you try to help other pupils to learn during the Volleyball lesson?
(ii) Did other pupils try to help you?
Give reasons for your answers.

(i)
The reasons for my answer are...

(ii)
The reasons for my answer are...
Do you think that you were able to learn new information during the Volleyball lesson?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Do you think that you were able to work upon improving your weaknesses in the Volleyball lesson?

*Give reasons for your answer.*

<table>
<thead>
<tr>
<th>The reasons for my answer are...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Do you think that equal attention was paid by the teacher to all of the pupils during the Volleyball lesson?

*Give reasons for your answer.*

The reasons for my answer are...

1.

2.

Explain two important technique points to remember when performing a 'dig'.

1.

2.
(52) Explain why the 'dig' is an important technique in a Volleyball game.

- 

(53) Which part of the hand does the ball hit during a serve?

(Draw a picture if you prefer)

- 

(54) Why is it important to make the serve go low over the net?
(55) Explain **when** a 'dig' may be needed rather than any other volleyball shot?

- 

(56) Explain **two ways** how you can increase the level of control **you** have over where the ball goes when you are performing a 'dig'.

1. 

2. 

(57) Give a reason why **you** may slice the ball (hit it in a wrong direction) when **you** are doing a serve?

- 

- 

- 

- 

- 

- 

- 

-
(58) Give one reason why it is important to keep your arms straight during a 'dig'?

(59) Why is it important to have balance when you are doing any volleyball shot?

(60) When you are getting ready to receive a ball, should you face where the ball is coming from or where you want to play it to?

Give reasons for your answer.

The reasons for my answer are...
(61) Give two reasons why it may be useful for a volleyball team to spread out over their half the court?

1.

2.

(62) Give a reason why it is useful to have some players from your team close to the net?

-
(63) Explain when you would play a volleyball shot with one hand rather than two?

(64) Why should a 'dig' be performed with two hands if at all possible?

(65) Why can it often be better to serve to the back of the court rather than the front?
Appendix 4: Interacting Variables with Pupils' Metacognitive Ability

Pupils' volitional control, their thoughts on the wider purpose of Physical Education, their motivational orientation, their locus of control, their self-efficacy and their perceptions of the motivational climate, arguably all interact, influence, and indeed are influenced by, the level of metacognitive ability pupils' have developed. Pupils' beliefs about the nature of a subject and about themselves may enhance or interfere with their metacognitive ability (Goos & Galbraith, 1996). As such, in a study of pupils' metacognitive ability and cognitive strategy development, a number of interacting variables must be considered. Weinert (1987: p13) had previously emphasised the "importance of co-ordinating studies of the cognitive, metacognitive, and motivational determinants of learning behaviour and performance." For the sake of clarity, each possible interacting variable is considered separately.

Volitional Control:

Zimmerman (1989) noted how pupils' ability to control their cognition and their volitional control can significantly influence learning efficiency. In addition, Pintrich & Garcia (1994) suggested that even if pupils are motivated, they may have difficulty in enacting their intentions, given all the internal and external distractions that they can confront. The implication is that volitional control may influence the development of metacognitive ability and cognitive strategies. However, it may be a two-way relationship as the development of metacognitive ability may actually enhance pupils' self-regulatory and volitional control over a learning situation (Nisbet & Shucksmith, 1986; Zimmerman & Risemberg, 1994). Bouffard & Dunn (1993) implied that enhanced self-regulatory and volitional control would benefit pupils of Physical Education encouraging them to become more independent learners and enable coaches and teachers to spend more time on the crucial development of technical and aesthetic skills. As such, the questionnaire investigated volitional control through questions such as,

(25) When you were trying to do the circuit, were you able to concentrate on the activities?

Give reasons for your answer.

(27) (i) What could stop you from completing an activity in the circuit?
(ii) How could these problems be avoided?
The Purpose of Physical Education:

Duda (1989: cited in Duda, 1992) suggested that there was a strong interaction between pupils' goal perspectives and their perceptions on the wider purpose of sport involvement. Task-oriented pupils viewed sport as supporting intrinsic dimensions and pro-social consequences. Ego-oriented pupils viewed the purpose of sport in terms of extrinsic benefits and personal gains. The stronger the ego-orientation, the stronger the belief that sport should increase pupils' sense of self-importance, make pupils' popular and should build a competitive spirit (Duda, 1992). As such, pupils' views on Physical Education has a strong link with their cognition and, therefore, how they would approach any Physical Education task. Clearly, pupils' views on the purpose of Physical Education could interact with their metacognitive ability. As such, questions were included,

(28) What is the point of doing P.E. and especially Fitness Training?

(29) What purpose does P.E. have?

Motivational Orientation:

As Paris, Lipson & Wixon (1983) noted, even when pupils are knowledgeable about the desired strategies for a specific learning situation, they must view the task and strategies as important and beneficial. In addition, McKeachie, Pintrich & Lin (1985) argued that pupils' will only use cognitive strategies if they have developed the motivation to use those strategies. Therefore, motivation, cognition and metacognition should not be treated as separate entities (Flavell, 1987; Schutz, 1994; Weinert, 1987; Weinstein, 1994) as learning performance is enhanced when all are employed by pupils (McKeachie, 1990; McKeachie, Pintrich & Lin, 1985; Pintrich & Schrauben, 1992: cited in Schutz, 1994). It is an inter-dependent relationship, as motivation must be accompanied by the cognitive learning strategies needed for successful learning performance (Schutz, 1993; Schutz & Lanehart, 1994; Weinstein, 1988; Weinstein & Mayer, 1986: cited in Schutz, 1994), and a degree of motivation must be present for cognitive strategies to be utilised (Garner, 1990; McCombs, 1988; Palmer & Goetz, 1988).

In general, the literature suggested that pupils demonstrate task- and ego- oriented goals within the context of Physical Education (Duda, 1992). Studies have indicated that task and ego involvement influences causal attributions for performance, perceptions of competence, and subsequent intrinsic interest in the sporting domain.
(Duda & Chi, 1989: cited in Duda, 1992). During a study involving tennis pupils Solmon & Boone (1993: p422) claimed that, "It appears that students whose criterion for success or competence is self-referenced and based on the mastery of a skill or task tend to employ cognitive processes that foster learning." Task-oriented pupils seem more likely to believe that pupils' are successful if they work hard, co-operating, and try to understand the information rather than memorise it. Ego-oriented pupils seem to believe that school success is a result of being smart, trying to outperform other pupils, and knowing how to impress the teacher (Duda, 1992). Therefore, it was deemed necessary to investigate pupils' goal-oriented motivation. In studies of 10-through 12-year old pupils (Duda & Nicholls, 1989; Duda, Oslin & Templin, 1991) the Sport Task Orientation and Sport Ego Orientation Scales (the orthogonal scales in the TEOSQ - the Task and Ego Orientation in Sport Questionnaire) have been found to be internally consistent, and have acceptable test-retest reliability following a three-week period (Duda, 1992). The pupils are asked to note which of the given list of items suited them following the phrase,

"I feel most successful in sports when..."

As such, the author's questionnaire included a question concerning motivational orientation, "When do you feel successful in athletics?", and was supported by the question "When do you feel you have 'achieved' in athletics?" The specificity of naming the activity was utilised by Seifrez, Duda & Chi (1992) within a study concerning basketball, and this seemed necessary here to maintain the focus on the activity area throughout the whole questionnaire where possible. It is important to note that, although the question may have been basically repeated, it was left as an open ended question rather than providing a choice of answers.

Urdan & Maehr (1995) argued that a more thorough understanding of motivation and achievement can be gained by expanding goal theory to include social goals. It has been argued that social motives are important determinants of behaviour and are related to achievement motives (McClelland, 1985: cited in Urdan & Maehr, 1995). Urdan & Maehr (1995) suggested that such social goals may include the social approval goal (perceiving achievement or under achievement as a means of gaining approval from others), a social solidarity goal (perceiving achievement as a means of bringing honour in one's group) or a social compliance goal (demonstrating that one is a good person). Urdan & Maehr (1995: p236) argued that each social goal can be expected to influence cognitive activity and, therefore, claimed that, "Particularly in the case of early adolescent students, an understanding of school engagement will not
be forthcoming unless social goals are considered. As such, pupils were asked questions that encouraged responses relating to social goals. For example,

(32) When **you** feel that **you** have 'achieved' in Health-Related Exercise?

(33) Do you feel that it is important to achieve in Health-Related Exercise? 
*Give reasons for your answer.*

As such, the questionnaire acknowledged that motivational orientation is contextualised because pupils will create unique cognitive interpretations of events, goals, and probabilities in different situations (Paris & Turner, 1994). The questionnaire attempts to appreciate that motivational orientation may influence, and be influenced by, the development of metacognitive ability and cognitive strategies.

**Locus of Control:**

Flavell (1987) argued that if pupils' developed an internal locus of cognitive control then it could promote the monitoring and regulation of their cognitive activities. Furthermore, Biggs (1985) argued that the cognitive control that metacognitive ability encourages may develop an internal locus of control within pupils. As such, it was indicated that metacognitive ability and an internal locus of control could be interacting variables. Therefore, the questionnaire include questions relating to pupils' locus of control. However, it is suggested that to investigate locus of control in Physical Education, questions should be made relevant to a specific context (Persson, 1987). As such, the questionnaire included questions such as,

(34) When **you** exercised within your target zone, what do you think were the reasons for the accuracy of your training?

(34) When **you** did not exercise within your target zone, what do you think were the reasons for the lack of accuracy of your training?

**Self-efficacy:**

Bandura (1982) implied that metacognitive ability, and the sense of personal responsibility in the learning processes that it enhances, may increase judgements of self-efficacy. It has been claimed that strategy use requires not only effort and, therefore, motivation but will also depend upon pupils' self-efficacy and their belief that they can utilise the required strategy successfully in the specific learning situation
(Ames, 1992; Bandura, 1986; Schutz, 1993, 1994). In addition, Carver & Scheier (1990: cited Butler & Winne, 1995) suggested that any reassessment of a learning situation encouraged by metacognitive experiences and/or the use of metacognitive strategies leads learners to estimate how probable it is that they can achieve their goal if they invest further effort, modify their plan, or both. As such, a study that is attempting to develop metacognitive ability and cognitive strategies must acknowledge the potential reciprocal relationship with self-efficacy (Pajares & Miller, 1994). Furthermore, with respect to Physical Education, self-efficacy has been found consistently to be an important and necessary cognitive mechanism in explaining behaviour in physical activity and sport (Feltz, 1992).

Pupils' self-efficacy is a context-specific assessment of their competence to perform a specific task, a judgement of their capabilities to execute specific behaviours in specific situations (Pajares & Miller, 1994). As such, "Self-efficacy must be specifically rather than globally assessed, must correspond directly to the criteria performance task, and must be measured as closely as possible in time to that task." (Pajares & Miller, 1994: p194). Bandura (1977: cited in Feltz, 1992), stated that any research investigating self-efficacy must have microanalysis, checking level, strength and generality of perceived competence. Furthermore, any questions must be specific to the activity, through consultation with coaches concerning most important sub-skills and variables (Feltz, 1992). However, Harter (1982) suggested that pupils aged eight and over may not only make discrete judgements about their competence in different domains, but may have also constructed a view of self-worth as a person, over and above these specific competence judgements. Harter (1982) appeared to suggest that overall self-worth cannot be tapped through a wide array of specific abilities, rather it must be gained through inquiry into how much the individual likes him or herself as a person.

Therefore the questionnaire included,

For self-efficacy - level;

(36) What abilities and skills do you have which are useful for discus throwing? 
*Give reasons for your answer.*
For self-efficacy - strength:

(36) Are these abilities and skills that you have good enough to complete the task of throwing the discus well?

Give reasons for your answer.

For self-efficacy - generality:

(38) Are these abilities and skills always useful in athletics?

Give reasons for your answer.

For general self-worth:

(42) Is there anything that you would like to change about yourself when doing P.E. activities?

Give reasons for your answer.

Some questions were adapted from Harter's (1982) 'Perceived Competence Scale for Children' concerning physical competence. For example,

(40) Are you usually good at P.E. activities at school?

Give reasons for your answer.

(41) Would you prefer to
(a) watch
(b) join in with Health-Related Exercise?

Give reasons for your answer.

Motivational Climate:

"From a motivational perspective, the subjective meaning (Maehr, 1983) of the environment is the critical factor in predicting cognitive and affective components of motivational processes" (Ames, 1992: p164). In the sport context, Seifrez, Duda & Chi (1992) studied high school varsity basketball players and noted that pupils' perceptions of the motivational climate and pupils' dispositional goal orientation predicted their intrinsic motivation. Ames & Archer (1988) suggested that learning would be enhanced if individuals perceived a climate to be task-oriented rather than ego-oriented and, with respect to Physical Education, task-oriented motivational
climate has appeared to encourage greater development in pupils' motor skill performance (Theeboom, De Knop & Weiss, 1995) and develop positive attitudes towards learning (Papaioannou, 1995: cited in Treasure & Roberts, 1995). As such, the questionnaire strived to investigate pupils' perception of the motivational climate, understanding that this may reciprocally interact with the development of metacognitive ability and cognitive strategies. The self-regulation and control that efficient metacognitive ability encourages in individuals, may help them to understand the impact that the environment has on them covertly and behaviourally during knowledge acquisition (Zimmerman & Martinez-Pons, 1990). In turn, this understanding may suggest to them how to improve the environment to fit their needs through the use of various cognitive strategies (Pintrich, 1990; Zimmerman & Martinez-Pons, 1990). Without a degree of cognitive control pupils can be controlled by, or be 'at the mercy' to, the environment and the motivational climate (Karmiloff-Smith, 1984, 1986: cited in Shuell, 1990).

The pupils' were, therefore, asked such questions as,

(45) (i) To be successful in the group during Health-Related Exercise, what must you do?
(ii) What do you have to do for the teacher to think that you have 'achieved'?
Give reasons for your answers.

Some questions were adapted from a specific questionnaire utilised to investigate pupils' perceptions of the motivational climate (Seifrez, Duda & Chi, 1992)

(48) Do you think that you were able to learn new information during the Health-Related Exercise lesson?
Give reasons for your answer.

(50) Do you think that equal attention was paid by the teacher to all the pupils during the Health-Related Exercise lesson?
Give reasons for your answer.
Appendix 5: The Metacognitive Strategy: as presented to pupils' during the main study intervention

General Strategy

Awareness

- What am I trying to do?
- What could affect how I do it?
- Why am I trying to do it?
- How am I going to do it?

Monitoring

- Am I getting closer to the goal?

Evaluating

- Did I achieve what I wanted to achieve?
- What can I do differently next time?
- Do I understand it?
Appendix 6: The Rationale Behind the Specific Cognitive Strategies and the Selected Specific Cognitive Tactics for Each Lesson

It has been argued that cognitive style will influence the types of general strategies and, therefore, the specific cognitive strategies and tactics that pupils tend to utilise. As such, pupils' specific cognitive strategies and tactics may be categorised under the cognitive style combinations (Luke & Hardy, 1996),

• wholist-imager
• wholist-verbaliser
• analytic-imager
• analytic-verbaliser

During the intervention study it was argued that the author had to establish specific cognitive strategies that 'matched' each cognitive style combination. These specific cognitive strategies could then be utilised to develop relevant tactics for the particular content covered in a Unit of Work. The author acknowledged that the development of pupils' metacognitive knowledge and their metacognitive strategies may encourage greater flexibility in how pupils approach a learning situation. Therefore, as long as a specific cognitive strategy was appropriate for a task and it was accompanied by adequate metacognitive ability, it could prove beneficial irrespective of whether that strategy actually matched a pupil's cognitive style combination. However, as the development of metacognitive ability and the effects of such development were being investigated in Physical Education for the first time, it was argued that such assumptions should not be made. Therefore, all cognitive style combinations and their resulting specific cognitive strategies and tactics were considered.

Nevertheless, it was argued that by encouraging four specific cognitive strategies there may have been some confusion caused for the pupils, as specific cognitive strategies should be introduced and emphasised one at a time (Mayo, 1993). Hence, the author limited the number of specific cognitive strategies to two, analogies and mnemonics. It was assumed that analogies would appeal to both wholistic and imager pupils in particular, while mnemonics would match analytic and verbaliser pupils in particular. However, far from ignoring the wholistic-verbaliser and analytic-imager style combinations, it was argued that these pupils would still benefit from the analogy and mnemonic specific cognitive strategies, although possibly not as much as pupils with wholistic-imager and analytic-verbaliser cognitive style combinations.
It is assumed that cognitive style combinations and general strategies may not only encourage certain specific cognitive strategies, but they will also probably influence how strategies are used (Kirby, 1989; Pask, 1988). Furthermore, the strength of a pupil's tendency towards a cognitive style combination may filter down to influence how specific cognitive strategies are utilised. For example, Pask (1988) noted that while all wholists generally used analogies, some relied on the task material to provide the analogies while others created their own. Those developing their own analogies may be less dependent upon the contextual variables and, therefore, may have weaker wholistic tendencies. As such, although the 'type' of general and specific cognitive strategy may be determined by cognitive style, there may be variations in the selection and utilisation of these strategies (Pask, 1988).

All specific cognitive strategies and tactics were discussed with experts in the relevant activity area and were confirmed as appropriate for the particular age group and the particular activity area. For example, the cognitive tactic of using bike gears as a form of analogy (specific cognitive strategy) for understanding Heart Target Zones in Health Related Exercise was confirmed by Harris (1996, 1997). The choice of specific cognitive strategies were also influenced by relevant guidelines from research concerning cognitive strategy development and encouragement (Mayo, 1993; Palmer & Goetz, 1988; Paris, 1988). For example, the specific cognitive strategies and tactics were made practical and meaningful, and within the ability of all pupils to employ (Mayo, 1993; Palmer & Goetz, 1988; Paris, 1988). The use of bike gears seemed meaningful to Year 9 pupils in a low deprived area who are likely to have experienced riding a bike. It was made clear how the specific cognitive strategies and tactics could be applied and when and why they were helpful. Therefore, the author tried to develop specific cognitive strategies and tactics that pupils would view as useful and necessary (Paris, 1988). It was acknowledged that if pupils believe that specific cognitive strategies and tactics are only plausible but not required, they may not utilise them (Paris, 1988).

**Analogy**

The use of analogies seemed appropriate as they are commonly used in Physical Education lessons. For example, the tennis overarm serve has been described as a throwing action. However, analogies may naturally benefit wholists and imagers more than analytics and verbalisers. Furthermore, there are detailed procedures to follow in the development of efficient analogies suitable for a particular task (Newton & Newton, 1995).
The Focus on Wholists and Imagers

It has been claimed that wholistic pupils may frequently use analogies to relate one area of knowledge to another and to develop a more overall picture (Miller, 1987; Pask, 1988). The development of an overall picture and image suggests that such a specific cognitive strategy may also benefit imagers. Entwistle (1981: cited in Miller, 1987) implied that wholist pupils were not only more likely to use analogies but that they were also more likely to develop their own idiosyncratic analogies which may help in understanding a particular learning topic, but may not be formally correct. It may be that the use of analogies as specific cognitive strategies provides a degree of structure for the pupils during the learning situation. Analytic pupils are not hindered by such imposed structure, although they do not particularly benefit as they are reasonably good at imposing structure themselves. However, as wholist pupils tend to struggle with imposing structure, such strategies may be more useful (Satterly & Telfer, 1979).

The Development of the Study Analogies

Newton & Newton (1995) argued that creating an appropriate analogy is pragmatic depending on the content and context. However, some basic processes can be utilised in the development of an appropriate analogy (Glynn, 1991; Newton & Newton, 1995). For example, it has been noted that pupils, like adults, tend not to apply or relate analogies spontaneously unless the sources are extremely familiar (Goswami, 1992: cited in Newton & Newton, 1995) and, as such, the source of the analogy had to be relevant to pupils of a particular age and background. The author emphasised that pupils were expected to use the analogy source to consider some aspects of the learning topic (Glynn, 1991; Goswami, 1992: cited in Newton & Newton, 1995; Newton & Newton, 1995), although care was taken not to over-extend any analogy as this may have encouraged the pupils to develop misconceptions from it (Newton & Newton, 1995). Instruction, as much as possible, followed the structured guidelines suggested in Glynn's Teaching With Analogy Approach (Glynn, 1991): introduce the learning topic, develop or recall the basis of the analogy, identify relevant similarities in the analogy source and the learning topic, map the analogy source to the learning topic, draw conclusions, and indicate any limitations. It has been argued that the process utilised by the author in the development and teaching of analogies can encourage young pupils to reason by analogy (Goswami, 1992: cited in Newton & Newton, 1995).
Mnemonics

Mnemonics are frequently utilised in Physical Education lessons. For example, B.E.E.F. (Balance, Elbow up, Extension, Follow through) is a specific example of a mnemonic being used to identify and focus attention on the technique points of a basketball free throw. However, mnemonics may be more naturally beneficial to analytics and verbalisers rather than wholists and imagers. Furthermore, developing useful mnemonics for a task is a complicated procedure.

The Focus on Analytics and Verbalisers

The mnemonic involves creating and 'labelling' sections of a whole and represents information verbally, and, as such, may be more suited to analytics and verbalisers. The similarity between analytics and verbalisers in breaking information into small sections has been suggested previously (Riding & Mathias, 1991; Riding & Sadler-Smith, 1992). Mnemonics can be used to identify and focus attention on specific technique or gameplay information. Spitz (1993) suggested that mnemonics were useful to focus on individual points of information, and described how a pupil remembered apparently random numbers in a mnemonic technique of relating race times to numbers.

The Development of the Study Mnemonics

The author strived to develop mnemonics that were related to the particular tasks the pupils were involved in. For example, during an athletics lesson the phrase 'Run Fast For Long Hard Races' was utilised with the first letter of each word representing a single point of information important to a long-jump technique which was the focus of the lesson. The author emphasised that the mnemonic should be used to help focus on individual points of technique which may be useful during the preparation for a task and also during the evaluation of any attempts at a task.

The analogies and mnemonics developed for each school and task during the main study intervention are presented separately. As these are specific cognitive strategies being utilised in a specific learning situation they are technically referred to as tactics. However, for the sake of clarity each analogy and mnemonic will be labelled as so.
School 5 (MSf) 'Apple'

Year: 7
Activity: Swimming
Focus: Recapitulate Breaststroke Leg Action
Breaststroke arm action / Back crawl start

Analogy: The focus of the breaststroke leg action was simply to circle to the legs, recapitulating the standing jump analogy of the previous week. The focus of the breaststroke arm action was upon getting pupils to stretch underwater, feel the water and circle the hands in front of the chin keeping the elbows high. As such, the idea of the snow plough with hands was suggested, and how pupils should be reaching through a hole and pulling themselves through.

Pupils should be looking back, leading with their arms and stretching for the entry. As such, the analogy of a flic flac (demonstration) or back dive was utilised.

Mnemonic: The pupils were asked to consider some of the specific technique cues relevant to the breaststroke leg action and arm action. As such, the mnemonic Have To Circle Legs represented Heels to seat, Turn out feet, Circle the legs, Legs come together and stretch. The mnemonic S.P.E.C.S. was utilised, meaning, Stretch/streamline, Pull the arms back, Elbows kept high, Circle the hands, Stretch/streamline.

Any Late Starts Give Problems, meaning Arms above head, Look back, Stretch for the entry, Glide on entry, Pull with one arm to the surface.

School 5 (MSf) 'Apple'

Year: 9
Activity: Health Related Exercise
Focus: Heart Target Zones

Analogy: Five Bike Gears. Each increase in gear signifies an increase in the effort required. As such, to achieve the heart target zone pupils should be pushing from third gear to forth gear, or possibly just up to fifth gear. Pupils should feel the effort they are putting in, they should be
sweating and breathing more heavily without reaching their maximum heart rate.

Mnemonic: The focus is upon the target zone in which the pupils should be training (55% - 90% of their maximum heart rate) and the suggestion that pupils should be exercising for at least twenty minutes, 3 times a week.

Train For Fitness Now, meaning Target zone, Fifty-, Five, Ninety.

Time, 20 to 3, meaning Target zone, 20 minutes, 3 times a week.

Note: The idea of 'time' is the association with both times per week and literally the time required for exercise. The visual image of a clock face may also have proved beneficial to imagers.

School 6 (MS) 'Yard'

Year: 7
Activity: Athletics
Focus: Long Jump (Stride)

Analogy: There is a need to emphasise that the pupils should be running fast into the jump, holding a balanced split leg position and reaching through at the end with both hands and feet. Strong emphasis was upon the shapes that the pupils would be showing, the dance/gymnastic split leap, followed by the pike or touching the toes to reach through. The reach was further referred to as a two-footed kick through.

Mnemonic: The emphasis was placed on specific technique cues relevant to each part of the long jump. Run Fast For Long Hard Races, meaning Run fast, Focus straight ahead, Flat foot take-off, Lift, Hold the position, Reach through.

School 6 (MS) 'Yard'

Year: 9
Activity: Volleyball
Focus: 'Setting'

Analogy: The focus was on the use of the legs for the power and how the body fully extends and stretches as the 'set' is being completed. As such, the pupils were asked to consider a spring uncoiling, with the emphasis on being small and compact and then the whole body extending to a full
stretch position. The uncoiling spring also suggested the slight rotation that would be sometimes necessary to guide the ball to a team-mate.

Mnemonic: Specific cues for each part of the 'set' action were considered, as was the purpose of the set. As such, pupils were asked to consider the L.A.W. of setting, meaning, Legs extend, Arms extend and stretch Wrists and fingers flick the follow through (alliteration aiding verbalisers even more). Furthermore, pupils were asked to consider the A.I.M. of setting, meaning, Aim upwards above the level of the net, Identify who you are passing to, Maximise their chances for a smash.

School 3 (MSt Q)
Year: 7
Activity: Dance
Focus: Dance Composition

Analogy: Dance composition is very difficult to develop as an analogy. However, the pupils were asked to consider a dance composition as a party. If you were having a party, who would you invite to be there? where would the party be, what space is there? How would you like your guests to act or be? and, therefore, what activities would you have, what would want people be doing?

Mnemonic: The emphasis was placed upon the four elements of dance to consider when focusing on a stimulus. As such, the mnemonic utilised was, Really Smooth Dance Actions, meaning, Relationships, Space, Dynamics, Actions.

School 3 (MSt Q)
Year: 9
Activity: Hockey
Focus: 'Spreading the play'

Analogy: Pupils were asked to consider that the ball was at the end of a piece of string with the other end attached to the goal. With the goal as a hinge, the ball was a pendulum swinging, the ball moving slightly further away as it is hits the middle of the pitch and then closer to the goal line when it is on the wings. As such the ball is drawing an arc. However,
the rebound analogy was also utilised, especially as an introduction to the mnemonic utilised. The emphasis was bouncing the ball off the pivot player, like a basketball bounce pass. The ball would go to the pivot player, like it would go to the floor on a bounce pass. The ball moves away from the defenders in the game as it would move away from the defender's hands in basketball. Finally, the ball is bounced to the other wing, just as the ball would bounce back up to the team-mate.

Mnemonic: The emphasis was placed upon using the pivot player in the middle of the pitch. As such, pupils were asked to consider, H.I.P.P.O.W. meaning, Hit Into Pivot, Pivot Out to Wing, or B.O.P. it! meaning Bounce Off Pivot!
Appendix 7: Deprivation Indicators utilised in the Department of the Environment's Index of Local Conditions

- Unemployed persons
  (source: 1991 Census)

- Children in low earning households
  (source: 1991 Census)
  *No earner or with one parent in part-time employment*

- Overcrowded households
  (source: 1991 Census)
  *More than one person per room*

- Residents in households without basic amenities
  (source: 1991 Census)
  *Lacking or sharing a bath/shower and/or WC, or in non-permanent accommodation*

- Households with no car
  (source: 1991 Census)

- Children living in 'unsuitable' accommodation
  (source: 1991 Census)
  *In flats, non self-contained or non-permanent*

- Educational participation
  (source: 1991 Census)
  *Seventeen year olds no longer in full time education*

- Ratio of long-term (over one year) to all unemployed 1991
  (source: Employment Department, NOMIS)

- Income support recipients 1990/91
  (source: Benefits Agency)
  *As a proportion of adults*

- Standardised mortality rates 1991
  (source: OPCS, Vital Statistics)
- Low educational attainment 1991
  (source: Department of Education)
  Proportion of G.C.S.E. exams not passed at grade C or above

- House contents insurance premiums 1991
  (source: Norwich Union, Refuge Assurance and Sun Alliance)
  As a crime proxy, using the average of area weightings quoted by major insurers

- Derelict Land 1988
  (source: Department of the Environment's Derelict Land Survey)
  Proportion of land that is derelict
Appendix 8: The Teacher Modelling Processes

Stage One of Teacher Modelling

Using Vygotskian principles, Meichenbaum (1971) suggested a self-instruction programme which began with a responsible model, such as a teacher, thinking aloud as they tried to cope in a situation, such as solving a problem (Nisbet & Shucksmith, 1986; Seifert & Wheeler, 1994). As Graves (1983) noted, the teacher is giving a form of commentary which goes beyond simple procedural instructions, with the aim to make explicit what the pupils ordinarily cannot see; that is, the thoughts and feelings that go with decisions. Therefore, the teacher must have enough conscious awareness of his or her own cognitive processes so that the pupils can see, for example, how the teacher responds intellectually and emotionally to an activity, how the teacher establishes a suitable set of working conditions for themselves, how the teacher controls the information or searches their memory for related facts, and how the teacher copes with the stress of time limits, distractions and so forth (Nisbet & Shucksmith, 1986).

Stage Two of Teacher Modelling

The second stage of the modelling process involves the pupils in guided practice with overt self-verbalisations (Meichenbaum, 1971; Nisbet & Shucksmith, 1986). The process of verbalisation is thought to play an important role in learning, as verbalising a skill can lead to greater skill acquisition (Nisbet & Shucksmith, 1986; Schunk & Cox, 1986; Seifert & Wheeler, 1994) and can focus attention on important strategy information which can, therefore, guide pupils' behaviours through a task in an efficient manner (Schunk, 1982).

Stage Three of Teacher Modelling

However, as the pupils become more fluent in overt verbalisation, the teacher can decrease the level of guidance offered and, therefore, leave the pupils to talk aloud while solving a problem (Meichenbaum, 1971; Seifert & Wheeler, 1994). Overt verbalisation is gradually faded to whispering, which in turn is faded to covert speech (Seifert & Wheeler, 1994) and hopefully allows the improved cognitive control and self-regulation to gradually become internalised and unconscious (Nisbet & Shucksmith, 1986). By encouraging both overt and covert verbalisation the level of metacognitive ability and self-instruction within pupils has seemingly been increased (Bornstein & Quevillon, 1976: cited in Borkowski, Estrada, Milstead & Hale, 1989).
As Nisbet & Shucksmith (1986) noted, modelling clearly involves the transfer of control from demonstrator to pupil through a sort of transition in which language is the most important factor. Ainsworth & Fox (1989) claimed that within Physical Education, motor skill acquisition is enhanced when the pupils begin to feel responsibility for their own learning. The implication is that demonstrations and didactic teaching by itself is not enough (Light, 1983; Nisbet & Shucksmith, 1986), although this is frequently what is observed in lessons (Nisbet & Shucksmith, 1986). With respect to the present study, the exact nature of the content and the modelling would obviously vary depending on the school and Year involved.
Appendix 9: An Example Lesson Plan Used During the Main Study Intervention

The lesson plan was jointly designed with Jo Harris, a lecturer from Loughborough University, Leicestershire, who specialises in the Health-Related Exercise activity area. The lesson plan includes the metacognitive strategy and the specific cognitive strategies that the author encouraged in the metacognitive strategy (Meta) class and the metacognitive strategy, the metacognitive knowledge of person and strategy variables and the cognitive strategies class (Meta+). For the Control class the lesson remained exactly the same apart from the references made to the metacognitive strategy and the specific cognitive strategies.

School 5 (MSL) 'Apple'

Year: 9
Time: 55 minutes
Facility: Gymnasium
Activity: Health Related Exercise
Focus: Heart Target Zones

Analogy: Five Bike Gears. Each increase in gear signifies an increase in the effort required. Therefore, to achieve the heart target zone pupils should be pushing from third gear to forth gear, or possibly just up to fifth gear. Pupils should feel the effort they are putting in, they should be sweating and breathing more heavily without reaching their maximum heart rate.

Mnemonic: The focus is upon the target zone in which the pupils should be training (55% - 90% of their maximum heart rate) and the suggestion that pupils should be exercising for at least twenty minutes, 3 times a week.

Train For Fitness Now, meaning Target zone, Fifty-, Five, Ninety. Time, 20 to 3, meaning Target zone, 20 minutes, 3 times a week.

Note: The idea of 'time' is the association with both times per week and literally the time required for exercise. The visual aid of a clock face may also have proved beneficial to imagers.
Lesson Design:

Four activity stations would be prepared around the gymnasium. It was important not to have too many activity stations as this would have meant that too much time was lost in explanations of the activity rather than the pupils' participating in physical activity. It was deemed important not to have activities that required too much skill as this may have interfered with the raising of the heart rate. Clearly, the activities should use the major muscle groups to ensure a call for a large blood supply which would, therefore, ensure an increase in the pupils' heart rate. Harris (1996) suggested that pupils may be encouraged to understand how the heart target zone theory is applicable to all activities, if those activities selected for the lesson considered the access to facilities and clubs within the vicinity of the school. As such, the activity stations combined two activities that linked well to local sports clubs and two general individual circuit activities. The activity stations involved were basketball drills, aerobics, benchball and skipping. Heart target zone charts were utilised to ease any need for calculations regarding the pupils' heart target zone percentages and also because it may be a useful visual aid.

Introduction and Explanation:
Key points,

- "Everyone learns differently, just as all teachers teach differently. You will find out about how you learn and how this will help in not only Health-Related Exercise but also in all Physical Education activities. What we do today will help us to learn in Physical Education, be the activity Health-Related Exercise, Basketball, Gymnastics or Football. You will hopefully discover how you personally learn and what you can do to improve your learning. However, the responsibility is with you."

- Explain the purpose of lesson. Recapitulate last lesson's work on pacing and then progress to the introduction of heart target zones. Offer the theory of heart target zones, utilising heart target zones wall charts, and how they could be beneficial to the pupils. For example, explain how an individual's maximum heart rate is two hundred and twenty beats per minute minus the age of the individual. The heart target zone is between 55% and 90% of this maximum. If an individual trains in his or her target zone that individual will develop his or her cardio-respiratory system. This would help the individual to perform any activity that they choose, be it something simple such as walking or something slightly more energetic such as football or cycling.
• Introduce, briefly, the metacognitive strategy, the analogy and the mnemonics.

• Introduce the activity stations and equipment.

Teacher Modelling:

From the pilot study in school 4 (Pil) it was suggested that overt verbalisation should quickly be replaced by covert verbalisation. Furthermore, it was important that the teacher should initially and overtly encourage pupils' self-questioning as the intervention was to be so brief. As such, less dependence was placed upon the discussion and co-operative learning to encourage the latter stages of teacher modelling. Discussion and co-operative learning would be more indirectly encouraged within each group at each activity station. Therefore,

• The teacher should demonstrate on one of the activities. The teacher should overtly work through the metacognitive strategy, offering a commentary of any thoughts that emerge. For example, to follow the 'awareness' questions of the metacognitive strategy; What am I trying to do? "Okay, what am I trying to do here? I must try and get into my target zone. I'm twenty-four, so two hundred minus twenty-five is one hundred and ninety-six. Look on the chart and that means my pulse rate needs to be between approximately one hundred and eight beats per minute and one hundred and seventy-six beats per minute. Okay, well the activity is skipping so I am simply trying to keep going enough to push up my heart rate. That means my technique does not have to be good as long as I keep going. I suppose I could do it by just swinging and bouncing really, I wouldn't even have to jump over it if I didn't want to." What could affect how I do it? "Right, I should be able to do that, but what could affect how I do it? Well, my technique is not important so as long I concentrate and pace myself, like you all did last week, I should be okay. I suppose I have got a little injury in my leg though, that means I could find it hard to keep working enough. But as long as I keep going I should be alright." Why am I trying to do it? "I must try and keep going, I mean, why am I trying to do this?, why am I trying to get in my heart target zone? Well, this injury had stopped me from exercising so I'm even finding simple tasks like running to the shops tiring now. I need to improve that. But why am I doing this activity? Well, skipping is an excellent way of raising the heart rate so that should work. I always sweat and feel tired doing skipping." How am I going to do it? 'Okay, what must I think about? I know the range in which I need to raise my heart rate to but I can't check my pulse during the activity. Now I like to have an overall image in mind of what I am going to have to do but I must not
lose sight of the specific percentages that are involved in heart target zones. I need something simple to help me think about my heart rate, allowing me to appreciate the increase in levels of my heart rate but providing me with a less complicated, overall image. I know analogies are useful for developing an overall image and, therefore, the tactic of thinking of bike gears may help. I know I need to get into about fourth gear to be certain of being in my heart target zone. I’ve know only got to think about five levels of effort, I can guide myself with regard to the effort I put in." A similar process can be followed throughout the metacognitive strategy.

- Emphasis should be placed on the individual to have control of what learning takes place. Encourage pupils to talk out loud but it is likely that they will prefer to consider the metacognitive strategy covertly.

- The teacher should go around to pupils individually and encourage them to use the metacognitive strategy and the specific cognitive strategies. Question them individually. Call out the questions from the metacognitive strategy card if necessary. Stop the class and ask them to consider the metacognitive strategy between activities. Pupils can take their pulse during activity stations to monitor how effective the specific cognitive strategies are being and also these encourages the pupils to consider the monitoring and evaluation sections of the metacognitive strategy.

Motivational Issues:

Harris (1996) suggested that music may aid in the motivation of pupils during Health Related Exercise, as well as helping the teacher to keep time during the activities. However, the choice of activities, teacher enthusiasm and verbal encouragement appeared to be the most simple methods of developing a pleasant learning and motivational climate. The focus on motivational issues considered the task, authority, recognition, grouping, evaluation and time dimensions or structures (T.A.R.G.E.T.) of the learning environment (Ames, 1992; Epstein, 1988), which has proved successful in Physical Education (Theeboom, De Knop & Weiss, 1995; Treasure & Roberts, 1995). For example, the tasks had been discussed with Jo Harris as suitable and enjoyable for Year 9 pupils, authority would be placed with the pupils to control their pacing and their degree of effort, recognition would be offered for pupils appearing to pace themselves and putting effort into the activities, groupings would be friendship based in the hope of encouraging support, evaluation would be upon whether a pupil reached their heart target zone and not upon the number of repetitions or goals
achieved by the pupil, and the teacher's time would be split evenly between groups and activities (the teacher talking and encouraging each class as a whole and as individuals).
Appendix 10: List of Requirements for Main Study (MSt & MStO) Schools

- The study is 'blind' to prevent any possible bias in the results and, therefore, there is a limitation in the amount of information that the author can provide. However, it is emphasised that the unit of analysis is child and not the teachers or the school. Furthermore, the study is of an intervention design assessing how children learn in Physical Education classes.

- The school, classes, pupils and teachers will remain anonymous.

- Need three classes from Year 7 and Year 9. Classes must be intact, mixed ability and mixed gender.

- The groups need to be taught the same content, by the same teacher and in a similar manner (as similar as practically possible).

- It would be preferable if there were one male teacher and one female teacher involved in the study, and that the teachers had approximately five years of teaching experience.

- The study will include all pupils completing a questionnaire both before and after an intervention lesson taught by the author. There will be no change to the unit of work presently at the school. Two pupils from each class will also be interviewed.

- The questionnaire is extremely thorough and, therefore, lengthy. It would take approximately an hour to complete. Would a P.E. period be available for the completion of the questionnaires or would it be possible to use a tutor period? The questionnaire has to be given twice, both prior to and following the intervention lesson. Pupils do not appreciate missing physical activity so if questionnaires could be completed elsewhere, then they would appreciate it.

- Could the questionnaire be completed in a classroom or somewhere the pupils could sit and feel comfortable. The pilot study suggested it was necessary to limit the number of distractions for the pupils and to help the pupils gain the right 'frame of mind' for writing.

- Pupils need to have a brief introduction before the questionnaire to ensure they understand what they are supposed to do. This introduction must be standardised.
so no-one benefits. If possible, the author would like to be present for this introduction and throughout the completion of the questionnaires.

- If it is not possible to use tutor periods for the questionnaire could pupils be taken from tutor periods for interviews? Interviews will take approximately twenty minutes.

- Must timetable, or work out, which lessons can be used for the completion of the questionnaires, when the intervention will take place and when pupils could be interviewed. The questionnaire and interviews need to be as close to the observed and intervention lesson as possible.

- What activity areas are feasible?

- Are there any practical problems regarding the school's timetable or facilities?

- Could I be allowed in meetings or staff sessions at beginning of a day? Is there a prospectus available and details of catchment areas and socio-economic variables?

- What is the best way to contact each other?

- Schools will receive a copy of the report upon completion.
<table>
<thead>
<tr>
<th>Pupil:</th>
<th>Dawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year:</td>
<td>7</td>
</tr>
<tr>
<td>Activity:</td>
<td>Swimming</td>
</tr>
<tr>
<td>Focus:</td>
<td>Breaststroke leg action / Turns</td>
</tr>
</tbody>
</table>

**Author:** We're talking about the swimming lesson amazingly enough. When you did your breast stroke turn; you remember the breast stroke turn?

**Dawn:** Yeah.

**Author:** What does that actually involve? What do you have to do for your breast stroke turn?

**Dawn:** Well, you have to touch the wall with both hands. And then you have to... take one arm off and put it towards the way you are facing then bring your other arm over the top of the water to push off underneath the water.

**Author:** Cor blimey, that was superb, well I'm impressed. So, what do you think can actually affect how well you did that turn?

**Dawn:** Hmm.../

**Author:** Did anything affect it?

**Dawn:** How well you can... if you drag your arm in the water a lot when you turn and if you bring your arm over it's quicker, if you drag it through it's slower.

**Author:** Oh right okay you look pretty nervous, don't panic I am not nasty, I may look it but I'm not. Do you think anybody else, any other people, or anything in the surroundings, in the pool itself, could stop you from doing the turn as well as you normally would?
Dawn: Erm...if people are like talking to you, then you might not be listening and you don't know what you are doing and when you turn someone turns the wrong way they may whack you in the face or something.

Author: Erm, the front crawl grab turn do you think that suited everybody in the class?

Dawn: Erm, yeah, well no, not really, not everybody.

Author: Who do you think it suited the most?

Dawn: The people who have had lots of swimming lessons before because it is a bit hard to do if you haven't done it before.

Author: So who do you think is suited the least then?

Dawn: Erm, the people... who aren't very good at swimming and haven't tried it before.

Author: Fair enough, that seems reasonable to me. So what parts of the front crawl grab turn did you think you did well?

Dawn: Erm...the pushing off the wall.

Author: Why do you think you did that so well?

Dawn: Because I can push off the wall hard.

Author: Fair enough, what parts did you think you did less well?

Dawn: When you turn I seem to like, turn and push of at the same time instead of turn and then push off.

Author: Right I'm with you, fair enough, okay, when the teacher introduces one of these activities are you happier when he describes it, or happier when he demonstrates it?

Dawn: Erm...yes.
Author: Which one do you prefer?

Dawn: Demonstrates it.

Author: Why do you prefer a demonstration?

Dawn: Because I can actually see how it is done, instead of just explaining how it is done.

Author: Why do you think that makes a difference to you?

Dawn: Because sometimes like, you might not exactly know what he means when he says it.

Author: Fair enough, good answer yeah. Do you think the instructions were clear then for the front crawl crab turn.

Dawn: Yeah.

Author: You do? Is there anything you would like more information about?

Dawn: No, not really.

Author: Okay, What are the differences between a front crawl crab turn and a breaststroke turn?

Dawn: You have to touch the wall with both hands on a breast stroke turn and...when you push off the wall in a front crawl turn you can kick out...with a front crawl leg kick, but with breast stroke you can't.

Author: Right yeah, that's fine. So what are the similarities, what is similar about the two turns?

Dawn: Erm...the way you turn around when you've touched the wall.

Author: Yeah, anything else except that little bit?

Dawn: No, not really.
Fine, brilliant. What do you feel like when the teacher said, 'Right we are going to do the front crawl crab turn'?

I didn't really care, because I have done one before.

Fair enough, when you had a go at the tumble turn; you had a go at the tumble turn didn't you? What did you think about, what went through your head just as you were about to do the tumble turn?

I was scared I was going to hit the wall with my head.

Did you?

No.

Was that the fear though?

Yeah.

Okay, so what did you think about each time? What ideas did you have for improving?

You have to do it a bit quicker because I'm a bit nervous about doing tumble turn.

So you had to keep trying to do it a bit quicker each time. What made you think of that?

Because I kept going over so slow that sometimes I didn't get all the way over.

Ah, okay, fair enough. What did you feel like when she said 'Right, we're going to be doing a tumble turn'?

Err...Well I was a bit nervous but I didn't really care.

Okay, when you tried to do the front crawl grab turn were you able to concentrate on that, do you think?
Dawn: Yeah.

Author: You were? What can actually stop you from like... doing the turn or stop you from concentrating on it?

Dawn: Err... sometimes you watch what's going on around you instead of concentrating on what you're meant to be doing.

Author: Uh uh. That's okay then. Is there anything else that could possibly stop you from doing it?

Dawn: Err, well if you see someone and they do it wrong and they hurt themselves or something, you are a bit wary of doing it.

Author: Yeah right, indeed, indeed. So how could those problems be avoided do you think?

Dawn: Err... the teacher... says, 'Well you're not to look at anyone else, just concentrate on what you're doing because it's a safe turn and you're not really going to hurt yourself that much'.

Author: Okay, brilliant. What do you think the point is of doing P.E.? There's a good one for you. Why are you doing P.E.?

Dawn: So that you get fit 'cause like, at home you might not do any exercising at all and you might just sit on the arm of the settee watching telly and eating crisps all day.

Author: What's the point in doing swimming then, especially swimming, what's the point in doing that?

Dawn: So you know how to swim if ever you need to, if you get, fall into a lake or something.

Author: Hmm, good answer, yeah. Do you think it's important to actually achieve in Swimming?

Dawn: Err...Yeah.
Why do you think it's important?

Because you really need to...like, get as well as you can in swimming 'cause it's quite an important subject.

Okay. Err...when do you actually feel successful in swimming?

Err.../

When did you personally feel successful?

When I think I've done something as well as I can and tried as hard as I could.

Excellent. Right, when you're front crawl crab turn went well, what do you think the reasons are that it went well?

Because from the first few times I realised what my mistakes were and I tried to put them right.

Ah, so if it went wrong, what were the reasons for that?

Err.../

Well, didn't go as well I should say rather than that.

Well...I just kept turning round wrong and I kept pushing off the wall before I'd turned.

Ah ha.

And I kept going on top of the water and dragging myself through, instead of going under.

Ah ha. Okay, excellent. What do you like about P.E.?

I like it 'cause it's fun and it's good to do.

Fair enough. What do you think you dislike about it?
Dawn: Erm...on Fridays 'cause we have short lessons and I don't really like that...and I don't like it when...we have to do...when the boys do rugby and Football and we have to do Netball.

Author: Why don't you like that?

Dawn: I don't like that 'cause I don't think it's fair.

Author: Right, I agree with you on that one. What do you like about swimming?

Dawn: Err.../

Author: Can you think why?

Dawn: Err...I like it when we do fun things and learn at the same time. I like when we do relays and things and practising diving and swimming as well and it's fun to do.

Author: What do you dislike about it do you think?

Dawn: Err...It's such a long way from the school and we have to walk. I don't like doing that.

Author: I don't blame you.

Dawn: And...I don't like it that there are so many people in the pool.

Author: Okay, that's fine.

Author: Do you think you have got any physical or mental skills, abilities, talent, whatever you want to call it, have you got anything that's useful for swimming?

Dawn: Err...not really.

Author: Not really. Would you say there is anything about you physically that makes you good at swimming or bad at swimming.
Dawn: Not really.

Author: No. Right. Fair enough. If you want to be successful in your swimming group what must you do?

Dawn: Try hard and listen to what your teacher's telling you.

Author: Why do you think those are so important to doing well.

Dawn: Because if you don't try then you won't get anywhere and you have to listen 'cause otherwise you won't know what to do.

Author: Pretty simple. Well done. Erm. What do you have to do for the teacher to think, 'Yes, Dawn's achieved today'? What do you have to do for the teacher to think that?

Dawn: Just do as well as you can...and just listen to the teacher and behave.

Author: Okey dokey, do you think the teacher paid equal attention to everybody?

Dawn: Erm...well it's a bit hard for her because we have lots of people in our thing.

Author: Okay, do you think the class tries to help each other then?

Dawn: Yeah.

Author: They do? Did you help anybody or did anyone help you?

Dawn: I helped my friend.

Author: What sort of things did you try to help her with?

Dawn: 'Cause like, I go to swimming club and she's not quite sure how to do some things so I help her, I tell her.

Author: Fair enough. I want to tell you a couple of questions about the actual swimming content you did. Why do you think it is important, when
you are doing a grab turn, why do you think it is important to sink before you push away from the wall?

Dawn: Because you have got less resistance going under than on top.

Author: Fair enough. That's excellent, I'll give you that one. When would you use, why would you use a front crawl crab turn rather than a tumble turn?

Dawn: Erm...why?

Author: Yeah, why would you use a grab turn rather than a tumble turn?

Dawn: Well it is easier. I wouldn't really, I would use a tumble turn.

Author: You would always use a tumble turn? Okay, so when would it be advisable to use a grab turn instead? Is there a time you have to use a grab turn or it would be useful to?

Dawn: No, I can't really think of one.

Author: Okay, fair enough. Why do you think the front crawl is faster than the breaststroke?

Dawn: The turn or the stroke?

Author: The actual stroke. Why is the front crawl actually faster than the breaststroke?

Dawn: Because...the leg kick's more powerful and you have got...your arms are going quicker and your legs. When you pull through you push through harder.

Author: On the front crawl?

Dawn: Yeah.
Author: Okey dokey, fair enough. When you are doing a surface dive...if you are going to do a surface dive, why is it important to lift your legs, right above you, in a direct line?

Dawn: Then you go down deeper and don't smack them on the water, because if your legs go over your head then they'll just hit the water first and you won't go very deep.

Author: Right, okay, last one. Imagine you're doing four widths; you've been told to do four widths as quick as you can. What sort of turn would you use?

Dawn: Tumble turn.

Author: Would you use the tumble turn every time?

Dawn: Yes.

Author: Superb. Well that wasn't bad was it?

End of interview.
Appendix 12: A Questionnaire Summary from the Main Study Database

The following information is taken directly from the 'Main Study Database'. As such, the information is in a continuous note form. The category that a response was placed within is underlined, with the number of references to this category and the category scale in the brackets directly afterwards. Occasionally, a direct quotation of a questionnaire response is also shown, and signifies either that the author found the response interesting or that it was slightly different to other pupils' responses.

Pupil: Dawn
Year: 7
Activity: Swimming
Focus: Breaststroke leg action / Turns

Metacognitive Knowledge of Task Variables:

Activity Description (S): "Touch the wall with both hands. Pull yourself up against the wall. Put one arm out towards the way you want to go and bring the other arm over to meet it. Push off the wall with your feet" (sic). Intrinsic Mental (S). Intrinsic Physical (S). Extrinsic Physical (S): "they could swim on top of you. They could have pushed off wrong". Enough-Physical Technique (S): "Touch the wall with both hands". Physical Properties (G): "to be well coordinated, you have to turn round with your arms and push off with your feet quickly". Neutral Feelings: "I was alright about it as I already knew how to do one".

Metacognitive Knowledge of Person Variables:

Practical Factors (S): "There is not enough room". Awareness - Mental Factors (S): "Not everyone..did like going under water". Awareness - Physical Factors (G): "It suited people with coordination you have to turn and then push off". Enough - No Ideas: "everything was explained". Mental Processes (S). Physical Processes (2S): "Turn and then push off I kept turning and pushing off together". Wholist - Awareness (Pr): "I had time to think about it when I was waiting for my turn". Imager - Awareness (Pr): "So I can see what it looks like as sometimes it may not be explained clearly". Verbaliser - Imager - Awareness (Gen): "It helps people understand better". Wholist - Awareness (1A+1A-, 2W+).
Metacognitive Knowledge of Strategy Variables:

**Nothing:** "I thought it was quite hard to do". **Conscious Decision (3PractS):** "I kept missing the wall". **Physical Factors (2S):** "...get a good push" "...hitting the wall". **No Context:** "I can't think of anything that relates to the tumble turn". **No Change-Couldn't:** "We only had 2 tries". **Negative Mental:** "A bit nervous".

**Interactional Variables:**

**Volitional:**  
- **No Volitional (2):** "nobody distracted me" "having less people in the pool".  
- **Volitional:** "To listen and do my best".

**Purpose:**  
- **Health and Fitness (2Phys):** "To keep fit" "To make sure that you take exercise".  
- **Physical Skills:** "Avoid drowning".

**Motivation:**  
- **Task (4St):** "When I have tried my best" "by trying hard and listening as best they can".  
- **Task (3Wk):** "I want to get on with it".  
- **None:** Dislike walking back "I get frozen".

**Locus:**  
- **Intrinsic (2):** "I tried my best" "not trying hard".

**Self-Efficacy:**  
- **Positive Physical (2St):** "I am quite fit..".  
- **Positive Strength**.  
- **Positive Generality:** "You need to move your body quite often".  
- **Unaware**.

**Positive Mental (St):** "I like learning new things". **Positive General Self-Worth.**

**Climate:**  
- **Task (3St):** "when I have tried my best" "My friends help me..".  
- **Task (Wk):** "When I can do the task well".  
- **Ego (3St):** "We did not have enough tries to improve" "There are lots of people in the pool. Too many really".

**Content Knowledge**

Score: 21 out of a possible 22 points.
Appendix 13: The Basic Ethnographic Data Collected during the Main Study

The author emphasises that the purpose for gathering basic ethnographic data during the main study was not to create a detailed and in-depth account of the school, but to provide details of the context in which the main study was undertaken, and to potentially offer areas of influence upon the results. The author was not attempting to discover direct cause and effect relationships, but to identify 'plausible patterns of influence' (Guba & Lincoln, 1988: p82: cited in Langley, 1995) with regard to pupils' development of metacognitive ability. The basic ethnographic data enabled the author to identify several types of variables that may have influenced pupils' metacognitive ability; age variables, covert school variables (the school itself and the school ethos, the Physical Education Department and the Physical Education Department ethos), overt school variables (the teacher, the class, the lesson) and intervention setting variables.

The ethnographic data relevant to each school are presented separately. Socio-demographic statistical data extracted from the 1991 census, Form 7 1996 and the County Council Education Department Pupil Database, details regarding each school's ethos, Physical Education Department, Physical Education Department ethos and teachers are presented. Some of the author's notes taken during the main study with regard to the observed lessons and the intervention lessons are also presented.

Apple School

Socio-Demographic Statistical Data

- Apple had a lower than average proportion of pupils that were eligible for free school meals, having only 6% eligible compared with the county figure of 13%. Indeed this percentage was lower than 53 of the 79 secondary schools in the area. Shuttleworth (1995) argued that free school meal eligibility at the pupil level is an adequate indicator of deprivation which, therefore, suggested that Apple pupils were generally far from deprived.

- Apple had a number of feeder schools and appeared to be popular with parents and pupils. 571 of 603 pupils aged 11+ to 13+ (94.7%) in the catchment area attended Apple, and 152 pupils from outside the catchment area also attended.
• The ethnic breakdown within Apple area was 99% White, with the remaining 1% split between Indian, Black Caribbean, Black African, Black other, Chinese and Other Asian.

• Within the catchment area, there were approximately 66% of people aged 16+ who were 'economically active'. Of these people, 4.2% were unemployed on the census date. Such an unemployment rate was lower than the Local Authority (66% economically active and 4.37% unemployed) and the County (64% economically active and 7.54% unemployed). Indeed, the unemployment rate for the Apple catchment area was lower than 24 of the 31 high school catchment areas within the county.

• 77.4% of the permanent dwellings within the Apple catchment area were owner-occupied. Although lower than the equivalent figure within the Local Authority (80.7%), it is higher than the equivalent figure for the County (72.48%).

• Statistics concerning overcrowding within households (percentage of dwellings over 1.5 persons per room), the percentage of households lacking or sharing the use of bath/shower and/or inside WC, and percentage of households without the use of a car, showed Apple catchment area comparing favourably with the County averages.

• The most popular male occupation within the Apple catchment area was Managers and Administrators, and the most popular female occupation was Clerical and Secretarial.

The statistical analysis clearly shows that Apple had one of the least deprived catchment areas in the County, as confirmed by the ranking of the Local Authorities in which the Authority is the least deprived in the County and was relatively highly-ranked in England.

Apple School Ethos

Within the school prospectus the headteacher stated, "My personal starting point as Headteacher is to affirm that every child is unique and important...We recognise that every individual has needs which we must meet and we are seeking all the time to encourage and praise effort and excellence". Such a statement may be the result of how Mr. Knight eventually came into teaching and the reasons he did so, but he was a very sociable man. The author 'bumped into' Mr. Knight while wandering around the
school and they began to have an informal chat moving through the normal pleasantries. The walk and chat eventually led them to the dining/assembly hall as the tables and chairs for lunch were being set up. Mr. Knight carried on talking as he drifted over to the piano in the corner. "I was a jazz musician you know" as he sat and began to play. Although he was always very relaxed and friendly, the music seemed to make him suddenly much more open about his own past, almost as if he was reminiscing. Nobody turned their heads, none of the pupils coming out of classes or the dinner staff walking in and out of the hall - it seemed normal practice that the headteacher sat in the corner and played the piano. It turned out that Mr. Knight had been a musician until he met his wife and then needed to get a more 'stable job'. "I thought about what else I liked and what I was good at, so I tried teaching. I enjoyed it and so I stayed with it" Although Mr. Knight "had ended up a headteacher", he refused to become distant from either staff or pupils, and his commitment seemed very much now 'vocational' (Woods, 1990). Mr. Knight taught whenever he could, especially within the Physical Education Department where he ran a juggling class for a Year 9 options programme, he organised an all girls' Netball class and was involved with extra-curricular Netball and Tennis. The pupils quite happily joked with him, exchanging insults and comments as if he were some 'normal' adult friend. Mr. Knight always came down at dinner times to supervise the corridor in which the queue was formed, again joking with pupils and talking to the pupils. Interestingly his office had its window directly facing the gates so he could see the pupils entering the school and so they could see him. A tall man, Mr. Knight was quite a striking figure as he wandered outside either recreationally or for the Physical Education lessons in his woolly hat and large jacket - the same suit, the same jacket and same hat every time. Mr. Knight was a very 'comfortable' man, comfortable to be with and comfortable with himself, with regular routines and habits. Therefore, if the ethos of a school is promoted by the headteacher (Woods, 1990) then Apple would indeed "create an environment of co-operation, peace and kindness" as claimed by Mr. Knight in the prospectus' addressing letter to parents.

'Ethos' is, indeed, one of the most important factors in both academic and behavioural achievement among pupils (Rutter, Maugham, Mortimer & Ouston, 1979: cited in Woods, 1990). However, ethos is not purely in the hands of the headteacher, as ethos is manifested in the nature of relationships between staff and pupils, the nature of rewards and punishments, the relative emphasis on pastoral or academic goals, the prevailing pedagogical orientation, and the decision-making processes among staff (Woods, 1990). Furthermore, schools are also affected by material and social factors which can influence possible and desirable goals. For example, deprived inner-city areas may feel forced to increase the importance of classroom control and pastoral
care over academic instruction (Denscombe, 1985; Woods, 1990). Yet, as Clive (Head of the Physical Education Department) stated, Apple was generally middle class background, often rural, and the pupils were enthusiastic and receptive; "a far cry from inner city schools", where he had taught previously for 10 years.

Materially the Physical Education Department was well stocked although there was a slight lack of indoor space. Socially, as stated in the socio-demographic details, the area surrounding the school was far from deprived and all pupils at the school would be moving to the Grammar school (Upper school) 'down the road', and a key aim of Apple was to prepare the pupils for that experience. Discipline was not a problem and although a pastoral system is established, it was far from dominant in the school. It is even stated in prospectus that, "Most routine matters will be dealt with by the tutor". However, the school did not seem to be undermining the importance of pastoral care and it had detailed procedures intact. It would appear that, in general terms, there was a significant 'opportunity to teach' (Woods, 1990: p1) in the school, where teachers were free to consider the purer problems of teaching, such as promoting pupil learning of important skills and knowledge.

Woods (1990) noted how the notion of 'ethos' may either assume a degree of consensus within a school, or may be marked by conflict and diversity. Within the school as a whole, there were separate subject departments that had developed their own views, loyalties and agendas, a point that Woods (1990) noted can lead to conflict; Apple differed slightly. Entry to the staffroom provided a completely different image of the school from that created by the headteacher. It was a 'dull' room (although apparently recently decorated!) with dark wooden pigeon holes and tables. All items were very neatly organised, even the cups and coffee. It was immediately obvious that all the women and the men sat separately and there was no communication at all between the two sides. Only Caroline (Head of Girls' Physical Education) would talk to the male side. No one introduced themselves, and the author just sat quietly, without a drink in the middle of the room, waiting for an opportunity to join in with a conversation - and this did not come until the end of break when Caroline and Richard (Second in the Physical Education Department) spoke. As the conversations continued during the breaks, and there were jokes about teaching older brothers and sisters of present pupils, the author realised that the staffroom only seemed to include the staff who had been at the school for a long time. So as well as the male - female divide, it appeared that the staffroom provided a meeting place for 'established' staff only, with the newer teachers, even Clive who had been at the school for seven years, only venturing into it for short periods of time. Therefore, in terms of conflict, it did not really appear to be rooted between departments as such,
but potentially more within school teaching years and gender. Nevertheless, the staffroom conversations did suggest that Physical Education was respected by most members of staff, and exercise was frequently the topic of conversation. Furthermore, teachers from other departments often helped with practices, Year 9 options sessions and chatted to the Physical Education staff. Thus, the Physical Education Department was a significant department within the school.

*Apple Physical Education Department*

Apple Physical Education department consisted of a small gymnasium (one small basketball court) and a hall, which was also used for assemblies and as a dining hall. The gymnasium was well stocked with equipment, with numerous gymnastic equipment (trampette, three trampolines, two boxes, and benches). Other store cupboards were the outside shed containing athletic equipment, netball posts, hockey sticks and so forth. All balls and bibs were stored in a cupboard inside the boys’ changing room. Small equipment such as table tennis balls, tapes and stopwatches, and technical equipment such as a video recorder/camcorder and a tape deck, were in the small Physical Education office directly opposite the changing rooms. The camcorder was frequently used for gymnastic activities where the pupils would create a routine and watch to evaluate. Outdoor space however was extremely large considering the size of the school; there were large playing fields behind the school, plus hard court area covering approximately five tennis courts. Additional field space could also be used just down the road from the school which was shared with the local primary school. Indeed this latter area was so large that the whole of sports day with spectators and competitors was held on this ‘second’ area. A swimming pool was available but involved walking approximately 7 minutes, and this was not always clear appreciated by pupils or staff.

As a department, Physical Education had a fairly high status in the school (probably aided by the length of time Caroline and Richard had been at the school), it was continually praised by the headteacher and indeed was seen favourably by the OFSTED inspection. Even with respect to funding, the Physical Education Department seemed to be able to obtain what they required. For example, although the author was unable to obtain details of the budget for the department, he was present when the headteacher joked with Caroline about the purchase of a ‘line machine’. Although the headteacher joked that the machine couldn’t be claimed for on the budget as a necessary requirement for Physical Education, he concluded, "it is to do with ground maintenance and nothing to do with me", whereby Caroline smiled,
nodded, turned to me and said, "there is more than one way to get what you want around here".

The high regard for Physical Education was emphasised by the fact that everything stopped for a swimming gala and sports day while the author was present. Other lessons were cancelled as the school would spectate and encourage other competitors in the various races. House games were very important, and house success was a frequent source of humour between staff and pupils. In the Physical Education Department, Caroline often joked how her House always seemed to get poor sports people whereas Richard, who was in charge of allocating pupils to houses, was a member of the House that seemed to win many of the sports activities. The close relationship between Caroline and Richard was emphasised by this type of joke, whereby they would end up exchanging insults.

However, despite these apparent positive factors, there had been some problems with Clive fitting into the department, not because he was disliked, but because Caroline and Richard felt the latter had been badly treated with respect to the Head of Department post. Yet, this wasn't the only source of conflict, as in terms of ideology, where teachers within the same department may have profound differences (Woods, 1990), Clive indeed differed from Caroline and Richard; for example, Clive wanted mixed-gender Physical Education where he felt it was appropriate, such as Basketball, Swimming and Health-Related Exercise, i.e. in activities that both genders had not had much experience, and would not be influenced by media labelling and indeed out-of-school activities. Clive felt that games such as Football were so influenced by the media and pupils' previous experiences that placing girls and boys together could cause too great a divide and preferred to keep such activities as single-sex ones. Richard wanted basically single-sex Physical Education, and Caroline didn't seem to be too concerned. In fact, Richard saw girls as "a waste of space" with "no idea".

Furthermore, Richard often broke away from the curriculum and played 'unihoc' because he could not "face doing Health-Related Exercise again", and became disgruntled by the issue of extra-curricular activities. As stated, Clive thrived on extra-curricular activities, whereas Richard accepted doing it, but felt the focus was too much on competitive games as he believed that schools were being forced to ignore important activities such as Swimming, Dance, Gymnastics and problem-solving activities. Similarly, whereas Clive wanted an 'Academy of Excellence' (see later notes), Richard argued that extra-curricular should not just be for the elite. "You don't get maths teachers coming back after school and on Saturdays to teach the top 10 students for competitions against other schools."
Another example highlighting differences in the department came from a senior management suggestion that it may be beneficial to introduce a form of 'teacher monitoring' whereby a colleague would view your lesson with the aim to improve and an aspect of teaching that you had both previously agreed upon to examine. Clive was willing to try the idea, believing that it could improve the pupils' experiences or could possibly improve his teaching ability. Caroline and Richard were extremely against the idea. "Clive is supposed to monitor me and tell me what I am doing wrong and what I need to do; I don't need that. What I need is to be given the money to go on courses, say to Loughborough, to learn the new content; I mean, my swimming is 20 years old". Both Caroline and Richard felt this way and seemed to view teaching as purely content oriented, whereas, it appeared, that Clive appreciated that the wider requirements of teaching such as presentation, organisation, praise, discipline and so forth are just as important to improve teaching ability. As Woods (1990) noted, Physical Education departments can have their own ethos with conflicts and there is definitely no 'settled state of affairs'; Apple Physical Education Department was no exception.

Apple Physical Education Department Ethos:

Similar to the school described by Woods (1990), it appears that the ethos of Apple Physical Education Department could be conceptualised as one of 'middle ground'. Teachers sought to make links with pupil cultures, by appropriating elements of them that promised to further their aims. Thus, they constructed an identifiable 'middle ground' between teacher and pupil cultures upon which the official business of Physical Education was conducted. By conceptualising a 'middle-ground', 'front' and 'back stage' regions are also acknowledged, where contrasting value systems are frequently displayed by pupils and staff (Goffman, 1971: cited in Woods, 1990) away from the 'middle ground'. For example, one pupil often caused disruption in Physical Education with his 'attitude' towards other pupils of the opposite gender and those of lower physical ability, yet outside school he worked patiently with his disabled brother and, indeed, wanted to be a special needs teacher. For the teachers, taking Clive as an example, he always provided an enthusiastic image in lessons, accepting that if he wasn't motivated then how could he expect the pupils to be, but outside lessons he often showed signs of tiredness from workload and a complete lack of enthusiasm for administrative aspects of his job.

Woods (1990) noted that the ethos promoted by the staff, therefore has to be seen within in this framework of a 'middle ground', where teachers frequently use tactics and strategies to disguise divisions and power imbalances, while maintaining
authority in case the 'middle ground' collapses. Teachers appeared to work along certain lines;

(1) adopting and tolerating modified appearances

The required Physical Education kit, as stated in the Apple prospectus is;

girls
• Suitable outdoor and indoor footwear.
• Black cycling shorts with white 'T' shirt for P.E. and games.
• Shinpads for use during Hockey and Soccer lessons.
• Regulation swimming costume, preferably black.
• A towel will be required for swimming lessons.

boys
• White 'T' shirt, black shorts and trainers for P.E.
• Football boots or training shoes, black shorts and yellow reversible rugby shirt.
• Shinpads for use during Hockey and Soccer lessons.
• Regulation swimming trunks.
• A towel will be required for swimming lessons.

NB: All items of clothing (excluding swimwear) required for Physical Education lessons can be bought directly from the school. Sportswear will be available for purchasing during the 'New Intake' evening held on...

Firstly, it is worth noting that the requirement for such items as shinpads may be seen as a slight 'luxury', as they are items that were far from required in other schools. In addition, they emphasise the lack of deprivation in the catchment area and the school's expectancy that expenses will be met by the parents. However, the Physical Education kit is far from enforced. During an interview with Clive, he stated that the main problem with Year 9 was that they didn't bring any kit and, recently, the department had a purge, forcing pupils without kit to sit with another teacher and work through various Physical Education activity worksheets. The action appears to have been successful, with numbers 'forgetting' kit being reduced. The fact that this action was taken suggests that the focus was more on having kit rather than whether it was regulation kit and, indeed, there seemed great leniency, with any colour swimming kit, favourite team football tops, any colour cycling shorts, lack of sports socks and so forth. Interestingly, there appeared a progression from regulation to non-regulation clothing from Year 7 to Year 9 and Clive, the Head of Department,
probably made more comments than anyone else in the department about 'poor' kit, with Caroline (although the Head of Girls Physical Education) being more relaxed and often joking about the issue. This 'joking' about informal kit was common among the other Physical Education staff apart from Clive. The lack of concern and the pupils' ability to 'get away with it' was heightened by the number of non-specialist staff in the Physical Education Department who were far from concerned about what kit the pupils were wearing. However, this relaxed attitude to kit was obviously accepted to encourage pupils get involved in Physical Education.

(2) language

Both inside and outside lessons language was fairly relaxed with the Physical Education Department using pupils' nicknames; for example, one boy was referred to as 'Killer'. However, probably the most noticeable attempts to relate to the pupils' language were such examples as referring to soccer teams that were popular to most pupils, and by using popular phrases of encouragement. Clive stated in an interview that 'if the teacher is motivated then the kids will be', and worked on the principle that 50% are already motivated, 30% are on the fence and 20% never will be. The teacher 'must earn their interest' and try to sway the 30%. As such, praise and encouragement was common in Clive's lessons and the phrases were the same ones you could hear during the break. They were often said with such conviction that it was as if Clive was in the activity or the game himself; 'Yes Charlie, now, now, now......pace it....time, time'. However, the use of language closely relates to the humour used within the department.

(3) humour

The use of 'joke' insults was common between P.E. staff and the pupils, even with the headmaster who helped out in the department. The difference in the department was that as Clive joked infrequently, the pupils didn't seem to expect it and vary rarely laughed. Similarities were noted with Woods (1990), who stated that not all teachers could carry an ethos off. For example, on some occasions he noted that teachers tried too hard especially with humour that fell flat. Caroline and Richard joked much more than Clive with the pupils but sometimes these jokes were at specific pupils and, while obtaining a 'laugh' from the rest of the class, could potentially isolate the individual selected.

As noted by Woods (1990), some teachers were also willing to open up their private world to pupils in some degree. However, again it was Caroline and Richard much
more than Clive. It seemed that Clive, as Head of Department, had more 'power' from the pupils point of view and, therefore, the pupils always seemed to be more wary of him compared to either Caroline or Richard. Nevertheless, pupils were allowed to enter the Physical Education office at any time to get keys, look for bags, have a chat and so forth. It was within these chats that Caroline would open up about herself and would exchange jokes with the pupils. Pupils even enquired whether she was attracted to the author or not and, along with Richard, joked about the author being married to a support teacher in the school!

Woods (1990) suggested a range of extra-curricular activities also helped the formal blend into the informal, but the author argues this also depends upon the enthusiasm of the teacher. For example, Clive had previously been forced to give up the County Schools Football due to illness and openly admitted that he missed his participation in this activity. Thus, it was not surprising that Clive was very enthusiastic about school football practices. Caroline and Richard, both seemed to verbally resent their practices because they were being forced to push the elite for competitive games. Yet, they enjoyed mixing with the pupils and Caroline joked about the pupils and how they were scruffy compared to the other school at a tennis tournament, "but they still won." It was as if she felt a gratitude to the pupils as they had helped her 'get one over' on the teacher from the other school who had annoyed her by being formally dressed and enquiring about the quality of the equipment. Richard, on a similar note, loved his dinner-time gymnastics club; he noticeably joked and flirted a lot within it, and used it as a method of getting to know the pupils better.

In summary, as (Woods, 1990: p91) noted, "The middle ground is distinguished by openness and flexibility, by equality of treatment, by sincerity, and by friendliness. But it is also notable for its boundedness and for its limitations" Most pupils knew where they stood with respect to the Physical Education Department and very few 'crossed the line'.

*Apple Selected Teacher s*

Clive

Clive was, as the headmaster had immediately told the author before any introduction, extremely enthusiastic about teaching and about Physical Education. However, from later discussions with him, he appeared to be becoming more and more disillusioned about his role as Head of Department and frustrated about what was being achieved in the department. He stated that for the first half of his career, "I couldn't believe I was
getting paid for it - I enjoyed it so much" but continued to state that the latter half of his career had led to a dramatic increase in paperwork and, as a result, he didn’t seem to 'know the pupils as well'. Knowing the pupils was crucial to Clive; it was the crux of his philosophy on teaching, but his role as Head of Department, with its many administrative duties, was restricting his knowledge of the pupils.

Clive had been at Apple for approximately seven years, and he admitted he had found, and still was finding, it hard to 'slot in'. Before Clive came to the school, another male member of staff (Richard) was performing the Head of Department duties while the normal Head of Department was away ill. However, rather than Richard getting the job, Clive was awarded it from 'outside'. Although Clive stated that Richard never expressively showed any resentment towards him, he did note that it had been a 'little awkward' initially. Indeed, the author was given a slight insight into Richard’s feelings about not being promoted to Head of Department in a discussion about his career. Richard noted how early on in his career he had quickly got promotion, but a few years back he claimed that he was "shit on" by the school. Clive's unease was, therefore, understandable and he possibly felt isolated in the department; both Caroline and Richard had worked at the school for over 20 years and were close friends, visiting each other's houses and looking after each other's children and going out a lot together.

Clive stated that the best thing for the department had been the OFSTED inspection, as everyone had to pull as a team to complete the paperwork and 'survive' the experience. Clive stated that he was conscious that he couldn't confront the others and direct change, so he tried to lead by example, such as providing more after-school activities. Clive felt this had began to work but the OFSTED report had finalised the connection in the department because since the report the whole department had gone out socially "for some beers". It appeared from this information that Clive had a strategic orientation, that is referred to by Lacey (1977) as strategic compliance, wherein the individual accepts the prevailing system though entertains private reservations. What was strange was that although Clive had the 'formal' power to create strategic redefinition (Lacey, 1977), and therefore the ability to change what was happening, he lacked 'actual' power because he ran the risk of being completely isolated within the department and the school (noting, of course, that Caroline and Richard had both worked a long time at the school and were firmly established within the staff network).

The author was intrigued about Clive's comment concerning couldn't 'direct' change as it clearly indicated that he was not happy with the situation when he arrived. When
pushed a little, Clive explained that he was frustrated because the department wasn't achieving its potential. The author was briefly shown a draft copy of the OFSTED report which stated that the department was a forward looking one and strived for excellence. Clive indeed wanted this to be the case, but practically felt frustrated as he thought that it wasn't happening. He claimed that the school and Physical Education Department were able to advance pupils' achievement in a wide range of activities but they were not fulfilling this role; Clive even stated that with approximately 750 pupils the school should be an "Academy of Excellence". The possible divide between Clive and the other specialised Physical Education staff was hinted at again when Clive continued to note that neither Caroline and Richard had worked anywhere else. He felt that they did not appreciate both what a good school Apple was, and the potential and opportunity that they have, which other schools do not, to improve standards in Physical Education. Interestingly, this frustration and apparent divide was not overt in any sense; the department seemed to talk and joke quite freely, leading the author in fact to write in his journal relatively early on in the study (Friday, 8th March, 1996), "We all joke and chat happily - the department is obviously close and friendly - a great working atmosphere". Such a misguided comment suggests, possibly, that as well as the teachers and pupils having a 'middle ground' (Woods, 1990) to work in, colleagues can have a similar 'middle ground' between each other where the 'business' of school occurs within. Brown & Kompf (1990) noted that teachers often form 'lies of concealment' to avoid confrontation and to maintain favourable interaction norms. This would further explain why Clive felt 'direct' use of his formal power would be inappropriate and may also explain Clive's desire for a friendly atmosphere.

Clive wanted to have a close department and, in our increasingly open conversations, Clive admitted that he felt the department wasn't very close. Although everyone joked, chatted and tried to help each other, he commented that they didn't seem as closely knit as his previous school - even though (or possibly because) the previous school was somewhat harder to teach in. People in the previous school, according to Clive, appreciated the need for teamwork and tried hard to ensure that the bonding was there both at the workplace and socially. Clive's commitment to creating a close department was emphasised to the author on 28th February, 1996, when the author approached him concerning the fact that the author felt as if he was imposing upon the department and this was distressing him. The reason the author approached Clive was that the author had realised that he wasn't talking freely to Caroline at this stage and to be blatantly honest, was becoming frustrated by her actions. Clive enquired about whether it was the author who felt he was imposing or whether it was the department making the author feel in such a way. The author stated it was just a personal feeling. Initially, Clive simply tried to reassure the author and left it at that.
What was important, from the author's point of view, was that later in the day Clive approached him and initiated an in-depth conversation, "You are here now, you are now part of the department and you can do what you like. That's important to me, otherwise it will ruin your enjoyment of it all". Clive had obviously thought about our previous talk and it had bothered him; he had obviously realised what the problem could have been, and in this second talk, referred to the effects of the OFSTED inspection on the department, "You must remember, just two weeks ago or whatever, we were scared; and we were scared!" Clive was well aware that the department could make people sometimes feel slightly uneasy and seemed determined for it not to happen anymore.

Although the information provided some insight into the type of person and teacher Clive is, Woods (1990) argued it crucial to examine teachers' range of commitments and their identities, if the origin and nature of their actions is to be understood. As such, the author utilised the work of Woods (1990) to structure the description of Clive's commitment and identity.

Commitment:

Clive adored contact time with the pupils, and his teaching commitment appeared one of 'vocation', or a calling to teach, and as 'profession' or a dedication to one's skill as a teacher (Woods, 1990). Clive wanted to improve his knowledge and his abilities, and to do the job really well. Hence, he was quite happy to implement the school's plans for 'colleague monitoring' whereby members of staff observed each others lessons and discussed whatever criteria they wanted to examine with the aim to improve teaching ability. The Physical Education Department members were unhappy with the idea of 'colleague monitoring' apart from Clive who seemed to appreciate being able to talk out some of his frustration with the author. He unleashed his views on how staff development programmes like 'colleague monitoring' would help to improve teaching, and that if teaching improved then the pupils would benefit, "and isn't that the point of teaching; I mean, what are we here for?" Clive was obviously feeling pressure regarding this issue as the other members of the Physical Education Department felt that the senior management, or 'Big Brother', was watching and he was stuck in the middle.

Nias (1989: cited in Woods, 1990) pointed out that when an individual has these two forms of commitment (vocation, profession) there is generally a willingness of the individual to give scarce personal resources, time, energy, money, to one's work. As Clive was a firm believer that extra-curricular activity is part of 'the job' for Physical
Education staff, Clive was keen to offer such activities and encourage the other members of the department to do so. It is worth noting that Clive was, until recently, very involved in the County schoolboys' Football team and obviously had much time tied up with this venture. However, within the last 18 months, after being forced to have time off due to illness, Clive eventually discovered that he had Crohn's disease, and was forced to cease physical activity initially, and he now fears the possibility of osteoporosis and other side effects of the disease. Indeed, he was awaiting results of bone scans to discover whether he can partake in certain activities or not. However, as a result of disease which left him continually tired, Clive decided to reduce his 'time' workload. However, like many people, when they remove a aspect of their life, such as participation in sport, Clive began to feel a void; he openly admitted that he missed the involvement. The author suggests that this added to Clive's keen involvement in extra-curricular activities and his enthusiasm for developing and teaching teams. This enthusiasm and desire for the 'Academy of Excellence' seemed to transfer into his every lesson; even the Year 9 option programme where most teachers quite openly 'just' set up a game or let the pupils have a 'free reign', Clive continued with his detailed lessons on the gameplay strategies or tactics of an activity. For Clive, the option programme allowed pupils to specialise and to gain specific knowledge for that activity; for the other members of the Physical Education Department, it appeared to be an 'easy lesson'.

Interestingly, Woods (1990) suggested that the more one puts into an organisation or activity, the greater, or the more single-minded one's commitment, the greater the frustration will be when aspirations are dashed. It appeared to author that the lonely battle for excellence that Clive felt he was having, was indeed beginning to frustrate him. However, the author is conscious not to create an image that Clive was not happy; far from it, he loved his work, but he wasn't completely satisfied that 'his' department was fulfilling its potential. His desire to achieve excellence, and his desire to keep trying to learn more about teaching was important to Clive and to his personal identity.

Identity:

Identity theory "begins with the notion that each of us has an interest in being or becoming somebody special, sufficiently different from his (sic) fellows to save him from anonymity, and different in ways that enable him to command some admiration, respect or affection. Our cultures provide us with a repertoire of possible selves...from this...each of us chooses or assembles a package and he gives people to understand that this is the sort of person he is...(These choices) constitute in effect, a set of claims
we make about ourselves. Having made these claims, our public reputations and our private satisfaction with ourselves depend on our success in fulfilling these claims” (Cohen, 1976: p49: cited in Woods, 1990). Personal identity is the image one has of oneself and social identity is the image others have. There is continuous interplay between the two performed through such symbols as language and mediated through interpretative frameworks (Woods, 1990).

It appeared that Clive wanted to believe that he was always striving to improve, and possibly that he had the ability to keep improving at his job, despite having Crohn’s disease and the fact that the department as a whole did not seem to be pushing for excellence. The very fact that Clive believed it was important to be motivated yourself if you wanted the pupils to be motivated, and that he believed that leading by example was the best policy as Head of Department, suggested that Clive was concerned with how others viewed him. Clive was proud that OFSTED had seen him as an 'enthusiastic and dedicated Head of Department' and he wanted to live up to this claim. Indeed, it may be the fact that OFSTED had commented on how the school and Physical Education Department were striving for excellence that cemented the 'Academy of Excellence' concept for Clive. Undoubtedly, Clive liked to be seen as a forward-looking Head of Department and teacher, and strived to achieve this. It could be argued that it was the image that he was so dedicated to improve his own abilities that led to the frustration when 'his' department were not welcoming the idea of staff development through teacher monitoring; Clive was frustrated because it could damage the department's social identity, which would reflect on his social identity and his personal identity.

Teaching styles and Teaching Strategies:

Clive claimed that pupils learn through interest and, therefore, teachers need to vary their teaching styles. The aim is to get pupils to "hang on to what you say", and for this you always need an element of surprise so the pupils cannot read what you will do; otherwise "you will lose them". Clive claimed that he tried to emphasise this immediately with year 7 pupils by refusing to 'spoon-feed' them and by encouraging experimentation within activities and asking them why they do certain tasks. As in the department ideals, Clive tried to offer 'breadth, balance and opportunity'; i.e. a variety of types of activity, competition and co-operative and opportunity to exercise. Interestingly, Clive seemed to defend the concept of competition within Physical Education, stating that the real world is not always co-operative and so we should teach pupils about competition as well as co-operation.
Strangely enough, although Clive argued for a variety of teaching styles, from the lessons observed there was almost uncanny similarities in how every activity was approached by him. Sternberg (1994) similarly noted, that although teachers probably know a variety of teaching methods, and have used them before, most teachers regularly only use a few. Clive was generally very didactic in his approach to teaching, providing very detailed and very analytic descriptions and explanations. All the lessons were very well organised and epitomised the teaching by objectives approach. He had set objectives and structured the lessons in detail to achieve those objectives. He may have been influenced by the fact that he realised he needed to do this for the OFSTED inspection. Often, the only 'real' responsibility placed on the pupils was in terms of establishing groups and group organisation, the idea of experimentation (as suggested by Clive) was often short and infrequent. Huber & Roth (1990) suggested that such direct teaching is aimed at creating a climate of 'certainty' for both teachers and pupils in order that conflicting ways of thinking, analysing tasks and solving problems can be avoided. This appeared true for Clive who wanted to ensure that his objectives were met in each lesson. Clive had stated that motivation and interest were key factors to pupil learning and, therefore, it was no surprise that he was generally active in the lesson, frequently shouting words of encouragement and giving various teaching cues. Yet these comments were general and vague in the sense that they were aimed at encouraging pupils more than informing them; for example, "Pace yourselves" was repeated and bellowed numerous times in a Health-Related Exercise lesson, and specific individual praise such as "Well done Stacey" occurred without any explanation of why the praise was awarded. It seemed clear that Clive believed motivating the pupils was one of, if not the, most important role of a teacher to develop the learning processes.

As well as teaching styles and teaching strategies, Woods (1990) noted that teachers often have 'survival strategies'. These are strategies that do not necessarily facilitate teaching, but often take the place of it, and even assume its guise. The aim of such strategies is to control or successfully deal with incidents which fracture the teacher's peace, or to establish one's power in a situation which pre-empts such an occurrence (Woods, 1990). The key concern with survival strategies is that Clive demonstrated only a few of the eight survival strategies that Woods (1990) suggested occur, and that he utilised them very differently to those used Caroline and Richard. For example, the 'domination' survival strategy was shown by Clive, but as Woods (1990) noted, it is often seen as a legitimate technique to create the momentum of effort and courage in Physical Education, e.g. 'Well done!...Come on! ...This is where it hurts...Push it! As previously stated, Clive indeed saw motivation of the teacher to be crucial to the learning processes and maybe this was seen as more of a teaching
strategy rather than a survival strategy for him. For Caroline and Richard, the same strategy was much more aggressive in terms of offering threats if work wasn't completed. Similarly, the 'fraternisation' survival strategy, which has the aim of working for good relations with the pupils, mellowing the inherent conflict, increasing the pupils sense of obligation and reducing their desire to cause trouble (Woods, 1990), was utilised by teachers differently. Whereas Richard would often flirt with female pupils as a fraternisation technique (Denscombe, 1980; Woods, 1990), Clive would just try to use examples or relate work to pupil interests, such as football teams. Furthermore, Richard would even abandon lessons to 'play unihoc' because the pupils enjoyed it more than the specified lesson but Clive would always focus on the objectives set. Woods (1990) noted how "Teachers often feel obliged to abandon their absolute standards and settle down for what they can get from a class, or from an individual." Thus, whereas other teachers in the department would happily accept that "some pupils can do Physical Education and some cannot" and they would also change activities or lesson structure to suit their own personal moods (Richard stated that he couldn't be bothered doing another Health-Related Exercise lesson so he played 'unihoc' instead), Clive would never do this as he would always strive for his 'Academy of Excellence'.

Interestingly, Woods (1990) hinted that school ethos and policies can often find objection by teachers due to their survival strategies. For example, Woods (1990) noted that while researching at Lowfield there was much latent objection among teachers to team teaching, open-plan schools, integrated teaching. This was because they threatened the privacy of the teachers in their classrooms; in other words, they threatened to destroy the whole basis on which their survival strategies had been constructed and on which they depended upon for continuance. Indeed, this would explain Caroline's and Richard's fear of having colleagues observe their lessons to help with ideas and suggestions. Both Caroline and Richard openly stated to the author that "there must be an ulterior motive behind it", and "where is it going to end", implying that they feared disruption to their normal lesson activities and, therefore, their survival strategies.

It is important to note that the author has not tried to provide a complete analysis of Clive or indeed any other teacher involved in the study. That would involve greater analysis not only of the areas touched on in the report, but into a deeper socio-historical dimension, into earlier socialisation, class and family background that would reveal more about the development of the self concept (Woods, 1990). Instead, the author has used the material that was available to him to try to provide some
greater detail regarding the context in which the main study had taken place and the potential influences upon the development of pupils' metacognitive ability.

Caroline

Caroline was a confident and experienced teacher who had been at Apple for over twenty years. She was comfortable and knowledgeable with the internal politics of Apple understanding 'how things worked'. For this reason, if anything threatened the status quo there was an instant and obvious reaction to it. For example, knowing what was happening in the school, knowing the pupils and knowing the teachers was critical to Caroline so she could remain comfortable. Hence, when Clive appeared as Head of Department Caroline apparently found herself in a slightly awkward position as her close friend and colleague (Richard) had been acting as Head of Department previously. Her reaction, according to Clive was that of caution and relative unease. Clive had disturbed the comfort within Caroline. The author experienced similar reactions from Caroline when she became very wary over the activity and purpose of the research. She was initially unhelpful and quite intimidating. Due to the length of time at the school Caroline and Richard were both firmly established at the school and, although not necessarily technically, they practically had the power to make any stay at the school uncomfortable for someone if they did not like that person. Therefore, the author was extremely concerned about the deliberately quiet treatment he was receiving. As the author became more established, and Caroline became comfortable with the new balance involving the author in the equation, Caroline changed considerably and, indeed, became very friendly and helpful.

Commitment and Identity:

Caroline enjoyed teaching and enjoyed mixing with the pupils. Initially, the author viewed the commitment of Caroline as 'profession'; a dedication to one's skill as a teacher, involving a continuous search to improve one's knowledge and abilities. Yet, if this were the case there is a contradiction with the detest that Caroline demonstrated for the idea of the school's plans for 'colleague monitoring' whereby members of staff observed each others lessons and discussed whatever criteria they wanted to examine with the aim to improve teaching ability. Caroline and Richard hated the idea, viewing it as a method by which the senior management could gain ammunition to fire at staff if they needed to. The author began, therefore, to view the commitment of Caroline as 'identity' whereby teaching offered her the opportunity to be the sort of person she wanted to be. Caroline needed to be comfortable in a school and this meant understanding and knowing everyone and everything. If this wasn't the case
she became very defensive, apprehensive and suspicious. Caroline liked to be viewed as an experienced teacher and enjoyed the respect that working in a school for twenty years develops. She was the only female member of staff and enjoyed the responsibility that brought. In the author's opinion teaching placed her in a central role of both the school and the community, it allowed her to take on a well-known and respected role. Notably, Woods (1990) suggested that the more single-minded one's commitment, the greater will be the frustration when aspirations are dashed. Indeed, if Caroline's 'identity' commitment was as strong as it appeared, it may explain her vigorous reaction to anyone or anything that threatened the status quo.

Teaching styles and Teaching Strategies:

Caroline demonstrated two major approaches to teaching, she was either very didactic and dominant in a lesson or the complete opposite leaving sole responsibility for almost every activity with the pupils. She appeared to believe that giving pupils responsibility in their learning was an important part of her teaching. Caroline demonstrated great trust of the pupils, probably coming from her detailed knowledge of each pupil and the background of each pupil, even to the extent of leaving them to use expensive video equipment to video rhythmic gymnastic routines. Caroline didn’t require the 'certainty' that didactic teaching can bring (Huber & Roth, 1990). However, Caroline struggled to hide her emotions. If something had worried her or had annoyed her from elsewhere it became very clear during the lessons, where she may demonstrate very little enthusiasm or demonstrate a degree of impatience with the pupils. Yet, if she was happy she was extremely motivated and enthusiastic in the lessons.

There was a firm belief that Physical Education should prepare pupils for life outside school and, therefore, Caroline enjoyed problem solving, gymnastics and competition which she seemed to consider as developing mental ability, kinaesthetic awareness and an attitude required outside school.

Notably, Woods (1990) suggested that as well as teaching styles and teaching strategies teachers often have 'survival strategies'; strategies that do not necessarily facilitate teaching, but often take the place of it, and even assume its guise. The aim of such strategies is to control or successfully deal with incidents which fractures the teacher's peace, or to establish one's power in a situation which pre-empts such an occurrence (Woods, 1990). Caroline demonstrated domination strategies where necessary being relatively aggressive in terms of offering threats if work wasn't completed. However, she tended towards the 'fraternisation' survival strategy, which
has the aim of working for good relations with the pupils, thus mellowing the inherent conflict, increasing the pupils sense of obligation, and reducing their desire to cause trouble (Woods, 1990). Yet, this strategy only emerged once the aggressive domination strategy had initially established her strength and authority, and once she 'knew' the pupils.

Selected Lessons

The summary of the lesson details are offered prior to the author's notes taken during the main study. In each Year the Control class, the Meta class and the Meta+ class were observed prior to the intervention and the notes from these three observed lessons are combined. However, the notes from each intervention lesson are presented separately, following the order in which the classes were taught by the author.

Apple Year 7 Observed Lessons

Teacher: Caroline  
Activity: Swimming  
Focus: Breaststroke leg action / Turns  
Time: 55 minutes  
Facility: Pool

Caroline was very structured in her approach to teaching the breaststroke leg action although regarding the 'grab turn' and 'tumble turn' the pupils were left much more to experiment. Each lesson began with a historical account of how the breaststroke leg kick emerged, followed by a clear demonstration of the leg kick while sitting on a chair at the side of the pool. Furthermore, once the pupils had attempted the leg kick two pupils were selected to demonstrate it to the rest of the class. A full explanation of the 'screw kick' and how it often appears was offered. Few teaching cues were offered although, with reference to the 'whip kick', an analogy with a standing jump was presented. Hence, a cognitive tactic was offered to the pupils without any explanation concerning it. The strong structure of this part of the lesson meant that there was very little difference between the classes. Each class followed a number of practices which were supported by a re-emphasis of technique from the teacher. With respect to the 'grab turn' and 'tumble turn' an explanation was offered, but pupils were encouraged to swim a few widths and 'try the turns out'. A forward roll analogy was suggested to pupils to help with the tumble turn. Clearly, with a chance to experiment there were slight differences between the classes. For example, the Control class and the Meta class appeared to be less concerned with experimentation but more with
enjoying themselves. The situation was made worse in the Control Class due to the large numbers and, therefore, the increase in the amount of noise and splashing that occurred. Caroline had noted how she thought that the Control Class had a poorer 'attitude' towards swimming compared to the other classes. However, pupils from all three classes did experiment to a large degree quite successfully as Caroline did 'step in' when necessary to ensure that experimentation continued.

Apple Year 7 Intervention Lessons

<table>
<thead>
<tr>
<th>Teacher:</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity:</td>
<td>Swimming</td>
</tr>
<tr>
<td>Focus:</td>
<td>Recapitulate Breaststroke Leg Action</td>
</tr>
<tr>
<td></td>
<td>Breaststroke arm action / Back crawl start</td>
</tr>
<tr>
<td>Time:</td>
<td>55 minutes</td>
</tr>
<tr>
<td>Facility:</td>
<td>Pool</td>
</tr>
</tbody>
</table>

Metacognitive Strategy Class (Meta):
Thursday, 7th March, 1996: Pupils responded well to the author, considering this was the first time they had been taught by him. Pupils sat, apparently attentively, to the author during the teacher modelling and use of metacognitive strategy. It was strange, but during the teacher modelling, and as the pupils sat looking at the metacognitive strategy poster and listening, the author started to think that one lesson using the metacognitive strategy would not be enough. Maybe it was because the pupils were too quiet, or maybe it was the look in their eyes, but whatever the cause, the author began to have doubts regarding the length of the intervention. One pupil could not see the metacognitive strategy posters very well as he was not wearing his glasses and, therefore, the author both re-emphasised the reading out of the metacognitive strategy and offered the pupil a hand-held laminated card.

Control Class (Control):
Thursday, 7th March, 1996: The class consisted of a lot more pupils compared to any other class and this increased the difficulty of acoustics in the pool area. The similarity with the Meta class was excellent regarding the time of the lesson and also the basic content. However, to reduce congestion in the pool there was a slight difference in that the a pupil's partner sat on the side of the pool as they swam rather than waiting in the water. To ensure that all pupils were spoken to during the lesson the author felt more worn out due to the size of the class than in any other lesson. Caroline had made the comment the previous week that she always felt so tired after this lesson because there were so many pupils.
Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class (Meta+):

Monday, 11th March, 1996: The lesson went very well although there appeared to be a slightly greater range in pupil ability in this class compared to any other. The teacher modelling progressed smoothly, possibly as a result of the author's increasing comfort with the approach. The author did check pupils' understanding of the cognitive strategies briefly through some question and answers, although this was not planned. The pupils appeared to grasp how to use analogies and mnemonics, although whether they remembered or utilised the specific cognitive strategies offered was difficult to assess.

Year 9 Observed Lessons

Teacher: Clive
Activity: Health-Related Exercise
Focus: Pacing
Time: 45 - 55 minutes
Facility: Gymnasium

Each lesson followed a very similar pattern with Clive recapitulating the previous lesson regarding pupils' maximum heart rate, how they must pace themselves during activities and the structure (time and frequency) that the pupils' exercise should take. The class was then asked to split up into two's or three's and get ready to start exercising on one of the stations in the circuit. The circuit consisted of twelve stations, each of which involved a simple activity such as step-ups. Pupils participated in an activity for a minute and rested for thirty seconds before moving to the next activity station. The lessons were very didactic in nature and Clive, as ever, was enthusiastic throughout. The strong structure of a circuit meant that very little difference was evident between the classes or, indeed, how the lesson was approached by Clive. However, it was interesting that with the Control class, Clive appeared to offer more encouragement throughout the lesson, raising the volume of his voice quite clearly in comparison to the other classes. Furthermore, during the explanation, Clive appeared more irritable with pupils from the Control class, compared to pupils from the other classes, who were not listening. Clive later mentioned that he thought the Control class were 'sharper' than any of the other Year 9 classes. Considering Clive's search for an 'Academy of Excellence' he may have become more irritated with pupils who, in his eyes, were wasting their potential. Humour was utilised very slightly in each lesson and Clive maintained a regular pattern in each lesson of
walking around all of the class and offering words of encouragement such as 'Pace yourself' and 'Pace it'.

Apple Year 9 Intervention Lessons

Teacher: Author
Activity: Health Related Exercise
Focus: Heart Target Zones
Time: 45 - 55 minutes
Facility: Gymnasium

Metacognitive Strategy Class (Meta):
Friday, 8th March, 1996: The author knew the lessons were shorter on Fridays but with forty-five minutes, the author felt pressurised and, therefore, possibly went through the teacher modelling and the metacognitive strategy too quickly. Clive's comment that 'no matter what good intentions you have on a Friday, you can't really teach them anything' echoed around the author's head. The author had a feeling that, if possible, he should have taught the pupils previously to ensure that the intervention lesson was not viewed as a novelty lesson with a new teacher. Pupils had seen the author for nearly one month prior to the lesson but this was the first time that the class had been taught by the author. The pupils seemed 'hyper' and the music and the activities encouraged this further. There was a slight tension between the author and two male pupils as they began teasing other pupils, which briefly dampened the excited atmosphere. However, in general, all of the pupils appeared to participate well.

Control Class (Control):
Friday, 8th March, 1996: The lesson, as far as the author could gauge, was very consistent with the previous lesson regarding the content covered and how the pupils participated. Clearly, without the extensive teacher modelling and explanations of a metacognitive strategy, time was not as great an issue.

Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class (Meta+):
Wednesday, 20th March, 1996: This final Health-Related Exercise lesson appeared to progress very smoothly which may have been the result of the author's confidence of teaching the lesson and the slightly greater lesson length. However, pupils appeared more willing to 'have a go' at the activities compared to the other classes. Furthermore, the author recognised a girl from a previous school that he had taught;
this appeared to break down any potential barriers between the author and the class and, therefore, aided in the development of a pleasant lesson climate.

Yard School

Socio-Demographic Statistical Data

- Yard had a higher than average proportion of pupils that were eligible for free school meals, having 28% eligible compared with the county figure of 13%. Indeed this percentage was higher than 68 of the 79 secondary schools in the area. Shuttleworth (1995) argued that free school meal eligibility at the pupil level is an adequate indicator of deprivation which, therefore, suggested that Yard pupils could possibly be considered deprived.

- Yard only had four feeder schools. 617 of 1089 of pupils aged 11+ to 17+ (57%) in the catchment area attend Yard, and 416 pupils from outside the catchment area also attend.

- The ethnic breakdown within Yard area was 61% Indian, 27% White, 3% Pakistani, 2% Black Caribbean, 2% Other Asian, 2% Other, 1% Black Africa, 1% Black Other and 1% Bangladeshi.

- Within the catchment area, there were approximately 58% of people aged 16+ who were 'economically active'. Of these people, 17.9% were unemployed on the census date. Such an unemployment rate was higher than the Local Authority (60% economically active and 13.61% unemployed) and the County (64% economically active and 7.54% unemployed). Indeed, the unemployment rate for the Yard catchment area was higher than 19 of the 21 11-16 and 11-18 secondary school catchment areas within the county.

- 79.9% of the permanent dwellings within the Yard catchment area were owner occupied. This is higher than the equivalent figure within the Local Authority (57.5%) it is higher than the equivalent figure for the County (72.48%).

- Statistics concerning overcrowding with households (percentage of dwellings over 1.5 persons per room), the percentage of households lacking or sharing the use of bath/shower and/or inside WC, and percentage of households without the use of a car, show Yard catchment area comparing unfavourably with the Local Authority and County averages.
The most popular male occupation within the Yard catchment area was Craft and Related Occupation, and the most popular female occupation was Craft and Related Occupation.

The statistical analysis suggests that Yard has one of the most deprived catchment areas in the County, as confirmed by the ranking of the Local Authorities in which the Authority including Yard is the most deprived in the County and was low-ranked (deprived) in England.

**Yard School Ethos**

The school prospectus repeatedly emphasised the theme of collaboration and cooperation with reference to 'our aims', 'our values', 'our staff' but, strangely, it appeared to the author that the relationships and communication within the school were far from cohesive. During briefing, 8th May, 1996, the author noted how it seemed that the senior management viewed themselves as above the teaching staff, or to paraphrase George Orwell in 'Animal Farm', 'everyone is equal but some are more equal than others'. Of course, this is a subjective view but the author's impressions were strengthened when a member of the senior management began to ask whether anyone knew where he could hire a Dinner Jacket. Normally, such a comment would suggest a friendly staffroom, yet the staff were rarely allowed to make any announcements let alone such an unimportant one; they had a white board in the corner which they had to write messages on as not to waste time during briefing. Staff had to write all their messages on the board including tutor or year notices to save time, but senior management could talk about Dinner Jackets and, apparently, not waste time! It could be argued that the author had misinterpreted these signs but from comments made in the staffroom the senior management were, indeed, deemed to be isolated from the teaching staff. An example of this isolation between the senior management and the teaching staff became apparent at the end of briefing, 9th May, 1996. The Physical Education Department were requested to stay behind for a discussion with the senior management. The discussion dealt with the fact that a pupil had stolen £43.50 from another pupil's bag in the Physical Education changing rooms. The parents of the 'thief' blamed the Physical Education staff for sending the boy into the changing rooms where he had the chance to steal, and the senior management partly agreed with the parents. According to John (a male Physical Education teacher) the boy had began to behave dangerously with a javelin and was, therefore, as stated in the Physical Education policies, sent in to undertake some written work. During this time he had stole the money. Denise (Head of the Physical Education
Department and John were extremely annoyed as they felt they had not been supported by the senior management.

The staffroom itself also further decreased the communal atmosphere as it was long and thin forcing the senior management to stand at one end, and encouraging groupings of staff. For example, the female staff and young male staff established groupings at one end of the room while the older men established groupings at the other end. Both the Head of Expressive Arts and Elizabeth stated that these men had isolated themselves for several years and frequently make sexist remarks.

Interestingly, the headteacher was never seen in briefing, and, in fact, the author never saw him at all. The author dealt solely with the Physical Education Department upon the request of the school secretary. Obviously the headteacher had more important matters to deal with than briefings and remaining knowledgeable of the events in various departments. From the frequent references made to 'the interests of economy' in the prospectus it is not difficult to establish the headteacher's main interests at that present time.

Materially, the Physical Education Department had a relatively large and varied supply of equipment. Three halls were used for indoor activities and the playing fields were vast. Notably, all the equipment was stored in a room adjoining the Physical Education staff room, with the express purpose of reducing theft of the equipment. Socially, the school appeared to be encouraging pupils to gain hope as well as success in any activity. The prospectus dedicated a considerable amount of space to a collage of newspaper cuttings highlighting events and successes of the school.

Discipline was viewed as important within the school and the school prospectus was both detailed and specific in its discipline procedures, and it emphasised that there was a further 'Behaviour Policy' document. Discipline did not seem a major problem during the author's times at the school although upon leaving the school, 2nd May, 1996, a pupil had ran behind him shouting 'Sir, he is going to hit me'. If this was not bad enough, the author had his hands full of questionnaires and was suddenly confronted by a large pupil and approximately twelve spectators. The author was left standing there for three minutes as the large pupil gradually calmed down and agreed to leave the other pupil alone. Upon mentioning the incident to the Physical Education staff they instantly described the large pupil, which suggests that it was a relatively regular occurrence with him. However, it appeared that the teachers were not struggling to teach and the focus was firmly upon teaching rather than
maintaining discipline or directed towards increasing the opportunities to teach (Woods, 1990).

_Yard Physical Education Department_

Physical Education appeared to have a varied status in the school and the interest people had in the department seemed to be strongly influenced by specific members of the Physical Education teaching staff. Brian (a male Physical Education teacher) had been at the school for over twenty years ever since he had completed his teacher training. Brian's enjoyment of the traditional games such as cricket meant there was always a school team which other teachers, often older males, enquired about. Brian was the teacher that many of the older staff approached with respect to Physical Education if they had any questions. John was a much younger teacher and had only qualified three years previously. John was very passionate and open concerning his views on how Physical Education 'should be', for example, all classes had to be mixed gender and had to be mixed ability. The frankness John demonstrated in any discussion concerning these views gained him friends from elements of the staff but distanced him from other members of staff who preferred the 'traditional approach' to schooling. Elizabeth (Second in Department) enjoyed responsibility, she enjoyed showing that she had responsibility. Elizabeth was a very forthcoming teacher who wanted to be involved in all elements of schooling and was willing to offer her views. However, these views seemed to change depending on who she was with, and, as the staff appeared aware of this, her views seemed to lack practical strength. Denise was a strong lady; friendly, open, but strong. She had strong views on Physical Education and was willing to fight passionately for them in the wider arena of school politics. It was battle necessitated by the seemingly poor interest that was shown in Physical Education, but a battle that she was gradually winning. Nevertheless, Physical Education was far from a focus point of school life, there were seemingly no House systems and, therefore, no house sporting activities. As Physical Education came under the Expressive Arts Faculty there was considerable trouble in gaining the budgetary requirements for G.C.S.E.\textsuperscript{12} books for the course starting in the next year. In principle, the G.C.S.E. was viewed favourably as it gave the impression that the school was expanding and developing, but practically, little support was being shown to the Physical Education Department. Furthermore, in the school prospectus there was only a single, short paragraph referring to Physical Education.

\textsuperscript{12} G.S.C.E. is an acronym for General Certificate of Secondary Education.
The ideologies of the Physical Education staff differed. Brian and Elizabeth were both long serving teachers and, on 2nd May, 1996, John suggested that Brian and Elizabeth were more 'traditional' and would "go back to single sex Physical Education if they had the option", whereas Denise and himself were more 'progressive' (John's terminology). Interestingly, John claimed, "usually me and Denise get our own way so it's okay." Strangely, the same discussion of balancing 'traditional teaching' and 'progressive teaching' re-occurred with Brian and Elizabeth as, upon the insistence of John having mixed gender groups, problems had emerged with respect to group sizing in the G.C.S.E course for the following year. The suggestion was that there was a certain degree of unity lacking in the department. However, this lack of unity was not purely the result of ideological differences. For example, Elizabeth frequently seemed to demonstrate survival strategies that were, in animal terms, equivalent to a chameleon or an octopus. She would either change her views depending upon the audience or would release a 'screen' to cover herself from any potential accusations of fault. For example, her views on mixed gender and mixed ability groupings altered during a single discussion with the author as she appreciated that the author had a slightly different views. With respect to her 'screening' herself, two instances illustrate this effect. Firstly, in reference to the theft of £43.50 Elizabeth not only did she fail to stand up for the actions of John, the member of staff concerned, but she also stated to the author and later a University tutor that, although she didn't blame John, she personally would have keep the pupil outside with her. Secondly, while the pupils were filling in a questionnaire, John noted and interest hat the one of the pupils had commented on the difficulty of listening due to the windy day. Elizabeth immediately became defensive claiming that she always considered the position in which she stood and where the pupils were and where the sun was coming from or the wind was coming from, the 'screen' had been released.

Nevertheless, to suggest that the department was filled with tension would be inaccurate and unfair. All of the staff were extremely friendly and helpful. Elizabeth enjoyed the responsibility of helping in the study, Brian offered the author advice on his sore throat and the usually stern John often greeted the author with "hello mate" even in front of classes. Every teacher was willing to help each other, such as 'covering' extra-curricular activities. The staff held no resentment towards each other, and while there were significant differences between them, everybody was accepted as an individual working towards developing the status of Physical Education in the school. Indeed, it may have been the lack of status of Physical Education in the school that kept the seemingly different characters amicable and as a unit.
Yard Physical Education Department Ethos:

Far from establishing a 'middle ground' whereby the divisions and power imbalances between the teachers and the pupils were disguised (Woods, 1990), Yard Physical Education Department emphasised the divisions. The department had strict regimes and routines and utilised strategies to highlight the teachers' authority.

(1) not tolerating modified appearances

With respect to the Physical Education kit it was the colours that were strictly adhered to. The rich variety of pupil religion within the school meant that specifying exact kit for every activity proved difficult, but it was imperative that the pupils could be identified as being a pupil and, more importantly, a pupil from Yard. As such, the simple colours of red and white were strictly enforced. Jogging bottoms and sweatshirts would be provided for forgotten kit, although a stern reprimand would preempt any such handing out of the spare kit. Teachers, however, were allowed to wear any clothing they wished to.

(2) language

There was no use of nicknames by the teachers in general. It appeared that the teachers felt they should demand respect and interest. There were some excellent examples of technical feedback to pupils during lessons but, notably, negative reinforcement was clearly evident. Whether positive or negative, the teachers' comments were always strong, there was no mistaking the teachers' thoughts at any time.

(3) humour

Humour was scarce within all of the observed lessons, although it was common place within the department staffroom. However, Brian, more than the other teachers, utilised humour as a way to relate to the pupils; joking about football teams for example. It may have been because the humour was so scarce that it was relatively common for any attempts at humour to fall flat, as was commonly the case with Elizabeth. As Woods (1990) noted, only certain teachers are 'approved' to utilise humour or can carry it off.
Whereas Goffman (1961: cited in Woods, 1990) suggested that teachers can distance themselves from the traditional teacher role, the Physical Education teachers at Yard seemed to emphasise their role. There was no real willingness for teachers to open up there private life and interests to the pupils, apart from talking about general and common topics such as football. Pupils always seemed wary of talking to the teachers especially when they had to knock on the Physical Education staffroom. Pupils were not allowed to enter the Physical Education Department staff room, partly because of the amount of equipment that was stored in it, but also to maintain the strong separation between staff and pupils. Any pupil entering the room was quickly and firmly reprimanded. Similarly, pupils were not allowed into the changing before a teacher was present, the rooms were locked up and the pupils had to queue outside. The teachers' authority was further emphasised by maintaining a relatively stern image at all times. Even the 'progressive' John often overtly emphasised the need to maintain a forceful image; for example he became annoyed that a P.G.C.E. student was eating in the changing rooms in front of pupils.

In summary, unlike the middle ground noted by Woods (1990) which was open and friendly, Yard was much more closed and firm. However, both had the same effect; most pupils knew where they stood with respect to the Physical Education Department and very few 'crossed the line' resulting in disciplinary action.

Yard Selected Teacher

Elizabeth

Elizabeth appeared to be a teacher who was always doing something, complaining that she had to do it but underneath it all wanted it no other way. She appeared to strive on responsibility, enjoying the fact that she could tell people how much she had to do. At the time of the study Elizabeth was about to become acting Head of the Physical Education Department as Denise was going on maternity leave in the near future. The enthusiasm Elizabeth was demonstrating at that time was clearly visible.

Commitment:

Elizabeth viewed teaching commitment as 'identity'; offering her an opportunity to be the sort of person she wanted to be (Woods, 1990); and as 'career-continuance' (Nias, 1983).

13 P.G.C.E. is an acronym for Post Graduate Certificate of Education.
1989: cited in Woods, 1990). Elizabeth was concerned about certain pupils and, indeed, demonstrated this by suggesting a boy for interview who she believed needed his self-esteem bolstering. The boy apparently was incredibly happy to be selected for interview and proved very helpful in the lesson led by the author. However, the author had reservations about whether Elizabeth was willing to sacrifice personal resources such as time, energy and money in pursuit of teaching. Extra-curricular activities were offered but there did not appear to be great joy taken from encouraging and developing the pupils' abilities. Possibly the author is doing Elizabeth an injustice because, as stated, she often complained about work but always seemed to want it as well. Were the complaints about the extra-curricular activities a extrapolation of this phenomenon or were they genuine because the work did not benefit her standing in school where responsibility, such as being the Head of Department, in her eyes, would?

Identity:

Woods (1990) suggested that personal identity is the image one has of oneself while social identity is the image that others have. It is argued that there is interplay between the two forms of identity, often demonstrated through symbols such as language and appearance, which is mediated through interpretative frameworks (Woods, 1990).

Elizabeth believed she was a good teacher and rarely suggested that she made mistakes. It was possibly this belief that led her to search for extra responsibility. She was an experienced teacher and had been at the school for a long time. As such, she appeared to struggle with the fact that there was a younger, less experienced Head of Department and a teacher who had only worked for three years who would sometimes question her. Elizabeth wanted to be viewed by others as knowledgeable which, maybe, led to the development of her two survival strategies or defensive mechanisms mentioned earlier, when she was faced with possible comments about her teaching. The image Elizabeth had of herself as an accomplished teacher meant that she was more than willing to offer advice to the other staff, the P.G.C.E. students at the school and the author. She was a loud character, both physically and verbally. She had a loud and distinctive voice and did not have any fears about using it. However, she struggled to take advice from any source.
Teaching Styles and Teaching Strategies:

Elizabeth was consistent in how she approached, structured and taught lessons. Elizabeth was generally very didactic in how she approached lessons and generally very authoritarian. Pupils were frequently reprimanded and Elizabeth was frequently shouting. Respect, attention and interest was expected from the pupils without condition. Very little responsibility was placed upon the pupils and, even with setting up the equipment, Elizabeth organised what the pupils should be doing and when they should be doing it. Huber & Roth (1990) suggested that the aim of direct teaching is often to create a climate of 'certainty' for teachers. Elizabeth desired this 'certainty', she felt comfortable when she had tight control of what the pupils should be doing. However, Elizabeth provided good questioning of the pupils and was always specific in any feedback offered to them. Interestingly, Elizabeth suggested to the author that unless a concept or topic was specifically mentioned to pupils they would not think about it. It appeared that Elizabeth viewed pupils as sponges and if they were told, and they could remember, learning would occur. If pupils were not told or they could not remember the stated facts then learning would not occur. As such, lessons were structured around providing facts to the pupils and very little was explained about how the pupils should utilise these facts. Even how to remember the facts, which Elizabeth viewed as a critical part of learning, remained unexplored as if the pupils would already know.

As well as teaching styles and teaching strategies, Woods (1990) suggested that teachers often have 'survival strategies'; strategies that do not necessarily facilitate teaching, but often take the place of it, and even assume its guise. Elizabeth demonstrated very aggressive survival strategies focusing strongly on 'domination', 'ritual' and 'morale-boosting' strategies (Woods, 1990). Considering 'domination', Elizabeth often became, verbally, very aggressive in a lesson by shouting instructions, shouting feedback and bellowing reprimands. Elizabeth had no concerns about removing pupils from the class if there had been repeated trouble with those pupils. 'Ritual' provided extra rigidity for Elizabeth which she seemed to enjoy. The lesson was structured in terms of warm-up, practice, game, pupils had to queue up outside the changing rooms and by the door at the end of a lesson and they always had to have a shower. These 'rituals' established a degree of control which Elizabeth required. With respect to morale boosting, Elizabeth was very willing to offer her thoughts about certain pupils to the author and the Physical Education staff, suggesting they were useless, stupid, thick and assuming that these were the reasons for any lack of improvement on the pupils' part.
Selected Lessons

The summary of the lesson details are offered prior to the author's notes taken during the main study. In each Year the Control class, the Meta class and the Meta+ class were observed prior to the intervention and the notes from these three observed lessons are combined. However, the notes from each intervention lesson are presented separately, following the order in which the classes were taught by the author.

Yard Year 7 Observed Lessons

<table>
<thead>
<tr>
<th>Teacher:</th>
<th>Elizabeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity:</td>
<td>Athletics</td>
</tr>
<tr>
<td>Focus:</td>
<td>Discus</td>
</tr>
<tr>
<td>Time:</td>
<td>One hour</td>
</tr>
<tr>
<td>Facility:</td>
<td>Field</td>
</tr>
</tbody>
</table>

Elizabeth followed a strict, safety structure in her teaching of the discus. There was a large explanation of the safety procedures involved in discus throwing and these were emphasised throughout each lesson. The technique was then explained which made reference to the grasp, the arms action, the body action and the leg action. The organisation of the lesson was similarly structured with pupils in three's, one behind the other, and each trio of pupils parallel along a single line on the field. As such, the first person in each trio threw the discus and, once everyone had thrown it, these first pupils would walk to collect the discus and then walk back to pass it the next pupil in their trio. After each set of the throws, Elizabeth would again emphasise one of the points of techniques, firstly, the grasp, secondly, the arm actions, thirdly the body actions and finally the leg actions. Each pupil then had a throw measured; they threw the discus in front of the rest of the class while Elizabeth measured it. As such, it was possible that pupils considered performance strategies rather than learning strategies (Singer & Chen, 1994). There was very little chance for there to be variety between the lessons. Even with respect to pupils' behaviour, very little difference between the lessons was evident because, due to the strong safety focus in the lesson, any pupils who were not appearing to concentrate were threatened with being sent in.

14 "Performance strategies are associated with being able to do what one is capable of doing at a designed time and place and usually under evaluative conditions...Performance may or may not indicate what has been learned, depending on many personal and situational factors, such as whether an appropriate level of motivation, attention, and arousal is present" (Singer & Chen, 1994: p147).
Yard Year 7 Intervention Lessons

Teacher: Author
Activity: Athletics
Focus: Long Jump (Stride)
Time: One hour
Facility: Gymnasium

Metacognitive Strategy Class (Meta):
Thursday, 9th May, 1996: The author was conscious of his bad eye and throat throughout the whole lesson. The lesson was taken indoors as the ground outside was wet. However, by being indoors the author could ensure that there was consistency between all three classes. The lesson appeared to go very well, with the pupils having clearly enjoyed themselves. Only one discipline occurrence during the whole lesson. Most of the pupils appeared to keep looking at the hand-held metacognitive strategy card during their attempts but some seemed a little less than interested. The timing of the lesson worked well.

Control Class (Control):
Monday, 13th May, 1996: There were two 'jokers' in the lesson who kept putting markers on head and trying to trip a pupil up as he was about to start running. However, the pupils soon calmed down and the lesson progressed smoothly. Prior to the lesson Elizabeth had asked if the author could look for pupils who showed some potential for the District Athletics Tournament. Unfortunately, the author found that his focus sometimes drifted towards this focus as he felt obliged to do so and, therefore, the author had to be very careful to offer the same teaching cues and offer the same structure that was in the lesson plan. Again, the timing of the lesson went well, although the pupils in this Control Class had slightly longer practising the split position.

Metacognitive Strategy, Metacognitive Knowledge of Person and Strategy Variables and Cognitive Strategy Class (Meta+):
Wednesday, 15th May, 1996: The author's sore throat combined with the awful acoustics in the gymnasium made the lesson difficult to teach. However, the lesson remained consistent with the other classes, although pupils were slightly more quiet and, apparently, attentive, than in any other class. The class appeared to be interested during the teacher modelling phases although this could have been bewilderment at what the author was doing. There was clearly a lot involved in the metacognitive strategy, metacognitive knowledge of person and strategy variables and cognitive
strategy (Meta+) intervention setting, and, while the pupils kept nodding, this does not mean that they understood.

Yard Year 9 Observed Lessons

Teacher: Elizabeth
Activity: Volleyball
Focus: Dig / Serve
Time: One hour
Facility: Gymnasium

Interestingly, in Yard, the pupils were separated from the rest of their tutor classes in Physical Education. Thus, some pupils from each Physical Education class only meet in Physical Education. The lack of bond between the pupils appeared evident in all of the observed classes. For example, there appeared to be more non-supportive comments made between pupils than there had been in Apple or in Yard Year 7. The lesson was extremely simple in its structure. The dig and serve were recapitulated and then Elizabeth simply initiated two games; one for the boys and one for the girls. Elizabeth visited both games and talked about dig and serve techniques as and when it was necessary. Although the structure of each lesson remained very similar, as did the pupils relatively boisterous approach to each game, there was clearly going to have been some differences in how Elizabeth talked to and corrected pupils. However, the author was unable to note these differences without following Elizabeth around as she taught. Interestingly, the overt nature of each pupils serve suggests that pupils may have been more concerned with performance strategies rather than learning strategies (Singer & Chen, 1994).
Appendix 14: The Content Analysis Categories of Pupils' Responses to the Metacognitive Ability Questionnaire (Pre- and Post- Intervention Questionnaire)

Within the framework of the relevant General Areas and Themes, each category that was utilised in the content analysis of pupils' responses to the pre-intervention and post-intervention questionnaires is explained. To clarify each category further, examples of pupils' responses are offered. To maintain consistency with the specific focus of the results upon School 5 (MSt) 'Apple' Year 7 classes, the example responses were taken, where possible, from pupils who were involved in those classes.

Pupils' Metacognitive Knowledge and Metacognitive Strategies

General Area: Metacognitive Knowledge of Task Variables

Theme: The Desired Outcomes and Purpose of the Task (based on Question 1)

Categories:

- **Activity Description**
  An answer was categorised as an activity description if it simply named or described the tasks without considering the purpose behind the tasks.
  e.g. "When you have reached the wall you bring your legs up towards the wall then you turn round and push off with your feet."

- **Physical Skills**
  An answer was categorised as physical skills if it referred to the involvement or the development of physical factors that were not part of an activity description.
  e.g. "Skills and...strength."

- **Mental Skills**
  An answer was categorised as mental skills if it referred to either the theory involved in the tasks or specifically to mental activities.
  e.g. "...push in a streamline position."
       "concentration."

- **Stock Responses / Unaware**
  An answer was categorised as a stock response / unaware if it was very general in nature and offered no insight into the purpose of the task, if it stated that the pupil was unaware, or was irrelevant to the task.
  e.g. "I could have done a better turn".
• Blank
If there was no answer offered it was categorised as blank.

Theme: The Influences Upon the Task
(based on Questions 2 and 5)

Categories:
• Intrinsic Physical
An answer was categorised as intrinsic physical if it referred to physical factors relevant to the specific pupil. As such, it was categorised as intrinsic physical if it referred to the pupil's physical technique, injuries or physical ability.
e.g. "I might have had my hands out of the water when I pushed."

• Extrinsic Physical
An answer was categorised as extrinsic physical if it referred to physical factors external to the specific pupil. Thus, it was categorised as extrinsic physical if it referred to Physical Education kit, the organisation of the sporting area or other pupils getting in the way.
e.g. "A person swimming so close to me so I don't have enough space to do the move properly."

• Intrinsic Mental
An answer was categorised as intrinsic mental if it referred to mental factors internal to the specific pupil such as considering the theory behind the tasks, concentration or confidence.
e.g. "How much attention I was giving to the kick."

• Extrinsic Mental
An answer was categorised as extrinsic mental if it suggested that external factors influenced the specific pupil's mental activity. As such, it was categorised as extrinsic mental if it suggested that the teacher, OFSTED or an audience may have influenced a specific pupil's thoughts.
e.g. "How well the teacher explained it."
"they could intimidate you and put you under pressure."

• Stock Responses / Unaware
An answer was categorised as a stock response / unaware if it was very general in nature and offered no insight into the influences upon the tasks, if it stated that the pupil was unaware, or was irrelevant to the task.
e.g. "I did a few things wrong."

• Nothing
An answer was categorised as nothing if it suggested or claimed that nothing could influence a specific pupil's actions.
e.g. "Nothing."
• Blank
  If there was no answer offered it was categorised as blank.

Theme: The Abundancy and Organisation of the Information
  (based on Question 3)

Abundancy Categories:
• Enough
  An answer was categorised as Enough if a pupil suggested that there was enough information provided.
• Not Enough
  An answer was categorised as Not Enough if a pupil suggested that there was not enough information provided.
• Unsure
  An answer was categorised as Unsure if a pupil was uncertain whether there was enough information provided.
• Blank
  If there was no answer offered it was categorised as blank.

Organisation (Priority) Categories:
• Physical Technique
  An answer was categorised as Physical Technique if a pupil suggested that the most important piece of information to be prioritised referred to physical factors.
  e.g.  "The position of your body just before you did the turn."
         "To pull yourself in close to the wall then turn and then push."
• Mental Technique
  An answer was categorised as Mental Technique if a pupil suggested that the most important piece of information to be prioritised referred to mental factors that were not underlying theoretical principles of the activity or tasks.
  e.g.  "to concentrate." (sic)
         "keeping a rhythm" (sic)
• Activity Principle
  An answer was categorised as Activity Principle if a pupil suggested that the most important piece of information to be prioritised referred to the underlying theoretical principles of the activity or tasks.
  e.g.  "Pushing off the wall underwater if I pushed off the top of the water I wouldn't go as far." (with regard to streamlining and resistance)
• General Lesson Issues (GLI)
An answer was categorised as General Lesson Issues (GLI) if a pupil suggested that the most important piece of information to be prioritised referred to the issues involved in every Physical Education lesson such as safety and organisation.
e.g. "have to turn round and go back."

• Encouragement
An answer was categorised as Encouragement if a pupil suggested that the most important piece of information to be prioritised were the general 'hints' or words of encouragement offered by the teacher such 'try your best'.
e.g. "It's not a race."

• Unspecified
An answer was categorised as Unspecified if a pupil failed to specify the most important piece of information in the lesson.
e.g. "How to do it."

• Blank
If there was no answer offered it was categorised as blank.

Theme: The Demands of the Task
(based on Question 4)

Categories:
• General Processes
An answer was categorised as General Processes if it referred to actions or processes that the pupil would have been able to change or possibly alter within a lesson, although the response did not specify whether they were physical or mental.
e.g. "You need to know how to spring off the wall."

• Physical Properties
An answer was categorised as Physical Properties if it referred to physical factors that the pupil would not have been able to change dramatically or possibly alter within a lesson.
e.g. "Strength to push off."

• Physical Processes
An answer was categorised as Physical Processes if it referred to physical factors that the pupil would have been able to change or possibly alter within a lesson.
e.g. "Good leg kick..."
• Mental Properties
An answer was categorised as Mental Properties if it referred to mental factors that the pupil would not have been able to change dramatically or possibly alter within a lesson.
e.g. "a memory to remember what to do."

• Mental Processes
An answer was categorised as Mental Processes if it referred to mental factors that a pupil would have been able to change or possibly alter within a lesson.
e.g. "Concentrate and pay attention." (sic)

• None Required
An answer was categorised as None Required if the specific pupil claimed that there was no skill or ability required to undertake the task successfully.
e.g. "None."

• Stock Responses / Unaware
An answer was categorised as a stock response / unaware if it was very general in nature and offered no insight into the demands of the task, if it stated that the pupil was unaware, or was irrelevant to the task.
e.g. "I don't know."

• Blank
If there was no answer offered it was categorised as blank.

Theme: The Pupils' Feelings During the Task
(based on Question 6)

Categories:
• Positive Feelings
An answer was categorised as Positive Feelings if it suggested that the specific pupil was thinking and feeling positive.
e.g. "I was feeling quite confident about it."

• Neutral Feelings
An answer was categorised as Neutral if it offered no insight into whether the pupil was feeling positive or negative.
e.g. "I didn't mind."

• Negative Feelings
An answer was categorised as Negative Feelings if it suggested that the specific pupil was thinking and feeling negative.
e.g. "The feeling I had was scared that I would do it wrong."
• No Feelings
An answer was categorised as No Feelings if it stated that the pupil had no feelings during the activity.
e.g. "None."

• Blank
If there was no answer offered it was categorised as blank.

General Area: Metacognitive Knowledge of Person Variables

Theme: Intra-Individual Variables
(based on Questions 7, 10, 11 and 12)

Categories:
• Physical Properties
An answer was categorised as Physical Properties if it referred to physical factors that the pupil would not have been able to change dramatically or possibly alter within a lesson. As such, the response referred to a relatively stable physical factor with regard to the pupil.
e.g. "I could push off the wall well because I have strong legs."

• Physical Processes
An answer was categorised as Physical Processes if it referred to physical factors with regard to the pupil but only within the context of a lesson. As such, the response referred to a relatively unstable physical factor with regard to the pupil.
e.g. "Not being able to get in the right position."

• Mental Properties
An answer was categorised as Mental Properties if it referred to mental factors that the pupil would not have been able to change dramatically or possibly alter within a lesson. As such, the response referred to a relatively stable mental factor with regard to the pupil.
e.g. "I have experience doing a turn."

• Mental Processes
An answer was categorised as Mental Processes if it referred to mental factors with regard to the pupil but only within the context of a lesson. As such, the response referred to a relatively unstable mental factor with regard to the pupil.
e.g. "...the build up to the wall I was worried I would hit my head."

• General Factors
An answer was categorised as General Factors if it referred to factors that the pupil would have been able to change or possibly alter within a lesson although the response did not specify whether they were physical or mental.
e.g. "I knew how to do the leg and arm actions."
• Practical Factors
An answer was categorised as Practical Factors if it referred to external physical factors possibly inherent in the activity tasks or the facilities that affected the pupil.
e.g. "Lack of space."
• Unaware
An answer was categorised as unaware if it offered no insight into a specific pupil's knowledge of their intra-individual variables, if it stated that the pupil was unaware, or the answer was irrelevant to the individual.
e.g. "I didn't know anything."
• Blank
If there was no answer offered it was categorised as blank.

Theme: Intra-Individual and Inter-Individual Variables
(Cognitive Style Dimensions; based on Questions 13-17)

The questions concerning the two cognitive style dimensions were structured differently to any other questions. It is suggested in the literature that pupils can often inadvertently indicate what cognitive style preferences they naturally tend towards. As such, both cognitive style dimensions were assessed by two questions.

The wholist-analytic cognitive style dimension was assessed by questioning pupils whether they had enough time before commencing with a task, and they were asked to explanation why this was the case. It has been argued that wholists appear to have a greater tolerance for uncertainty than analytics with regard to the 'correctness' of their thoughts and ideas, and they tend to be impulsive (Pask, 1988; Schmeck, 1988). As such, they are more likely to willing to commence an activity without great reflection and thought. The wholist-analytic dimension was assessed secondly by questioning pupils on the differences and similarities between two activities. Pupils were required to explain two differences and two similarities within or between tasks. It was acknowledged that analytics can spot differences within and between tasks (Riding, Glass & Douglas, 1993), whereas wholists struggle to, as they often gain a simplistic (Miller, 1987) and overall perspective (Riding & Mathias, 1992). As such, wholists may be able to spot simplistic similarities within and between tasks whereas analytics are more likely to appreciate any differences within and between tasks. It is argued that if pupils have an awareness of their cognitive style and the effects of their cognitive style they are more likely to be able to adapt, and have greater versatility, in a task, rather than rigidly using their natural cognitive strategies even when they are inappropriate (McCarthy & Schmeck, 1988: cited in Guild, 1994; Nisbet &
Shucksmith, 1986). As such, an awareness was suggested in the questionnaire if the pupil could at least answer a question that, according to literature, pupils of that specific cognitive style would often struggle with. For example, as a wholist struggles with identifying differences within and between tasks, if a pupil offered to similarities and at least one difference between the specified tasks, that pupil was categorised as having awareness of their style. In short, three out of four differences similarities and differences had to be noted for a pupil to have been categorised as having awareness of their wholist-analytic cognitive style preferences.

Categories:

- **Wholist - Awareness**
  An answer was categorised as Wholist - Awareness if,
  - it was stated that the pupil had enough time to consider the task and if the pupil provided an explanation why this was the case.
  e.g. "Because I think cuekly." (sic)
  - both similarities and one difference were noted by the pupil.

- **Wholist - No Awareness**
  An answer was categorised as Wholist - No Awareness if,
  - it was stated that the pupil had enough time to consider the task but offered no explanation why this was the case.
  - one or both similarities and no differences were noted by the pupil.

- **Analytic - Awareness**
  An answer was categorised as Analytic - Awareness if,
  - it was stated that the pupil did not have enough time to consider the task and if the pupil provided an explanation why this was the case.
  e.g. "We had to try strait away." (sic)
  - both differences and one similarity were noted by the pupil.

- **Analytic - No Awareness**
  An answer was categorised as Analytic - No Awareness if,
  - it was stated that the pupil did not have enough time to consider the task but offered no explanation why this was the case.
  - one or both differences and no similarities were noted by the pupil.

- **Wholist Analytic - Awareness**
  An answer was categorised as Wholist Analytic - Awareness if,
  - both differences and both similarities were noted by the pupil.

- **Wholist Analytic - No Awareness**
  An answer was categorised as Wholist Analytic - No Awareness if,
  - only one difference and one similarity were noted by the pupil.
• Neither - No Awareness
  An answer was categorised as Neither - No Awareness if,
  - the similarities and differences were incorrectly noted by the pupil.
  - the pupil stated that he or she had no awareness.
• Blank
  If there was no answer offered it was categorised as blank.

The verbaliser/imager cognitive style dimension was assessed by questioning pupils whether they preferred to have demonstrations or descriptions and asking them to explain why they had such a preference.

Categories:
• Verbaliser - Awareness
  An answer was categorised as Verbaliser - Awareness if it stated that the pupil prefers descriptions to demonstrations and if the pupil provided an explanation why this was the case.
  e.g. "some people understand descriptions better..."
• Verbaliser - No Awareness
  An answer was categorised as Verbaliser - No Awareness if it stated that the pupil prefers descriptions to demonstrations but the pupil offered no explanation why this was the case.
• Imager - Awareness
  An answer was categorised as Imager - Awareness if it stated that the pupil prefers demonstrations to descriptions and if the pupil provided an explanation why this was the case.
  e.g. "because its easier to understand."
• Imager - No Awareness
  An answer was categorised as Imager - No Awareness if it stated that the pupil prefers demonstrations to descriptions but the pupil offered no explanation why this was the case.
• Verbaliser Imager - Awareness
  An answer was categorised as Verbaliser Imager - Awareness if it stated that the pupil likes both descriptions and demonstrations and if the pupil provided an explanation why this was the case.
  e.g. "because we might not understand the description or we might not understand just the demonstration."
• Verbaliser Imager - No Awareness
  An answer was categorised as Verbaliser Imager - No Awareness if it stated that
  the pupil likes both descriptions and demonstrations but the pupil offered no
  explanation why this was the case.
• Neither - No Awareness
  An answer was categorised as Neither - No Awareness if it suggested the pupil
  did not like either descriptions or demonstrations and the pupil offered no
  explanation why this was the case.
• Blank
  If there was no answer offered it was categorised as blank.

Theme: Inter-Individual Variables
(based on Question 8)

The pupils were questioned on whether a specific task suited everybody in the class.
The task selected did not suit everybody and, therefore, it was suggested that if a
pupil claimed it did then they lacked awareness of inter-individual variables.

Categories:
• Awareness
  An answer was categorised as Awareness if it stated that the task did not suit
everybody in the class
• No Awareness
  An answer was categorised as No Awareness if it stated that the task suited
everybody in the class.
• Unsure
  An answer was categorised as Unsure if it suggested an uncertainty whether the
task suited everybody in the class.
• Don't Know
  An answer was categorised as Don't Know if it stated that the pupil was unaware
  of whether the task suited everybody in the class or the answer was irrelevant to
  question.
• Blank
  If there was no answer offered it was categorised as blank.
The pupils were asked to explain why they believed, or did not believe, the task suited everybody in the class.

- **Gender**
  An answer was categorised as Gender if it focused upon gender issues.
  e.g. "It suited the boys more than the girls, boys are better at sports than girls."

- **Physical Factors**
  An answer was categorised as Physical Factors if it focused upon physical factors.
  e.g. "It suited smaller people the most because they can get closer to the wall and therefore will get a better push off. (sic)"

- **Mental Factors**
  An answer was categorised as Mental Factors if it focused upon mental factors.
  e.g. "It suited people who weren't afraid if they hit the wall with their hand. If they're afraid then they will just turn without grabbing the wall."

- **General Ability**
  An answer was categorised as General Ability if it why focused upon general ability issues.
  e.g. "because some people are better than others."

- **None**
  An answer was categorised as None if no explanation was offered concerning the suitability of the task for the class.

- **Don't Know**
  An answer was categorised as Don't Know if it stated that the pupil was unaware of why the task was, or was not, suitable for the whole class, or the answer was irrelevant to question.
  e.g. "I don't know."

- **Blank**
  If there was no answer offered it was categorised as blank.

**Theme:** Universals of Cognition
(based on Question 9)

**Categories:**
- **Enough - Additional**
  An answer was categorised as Enough - Additional if it stated that enough information had been provided about the task but there was still additional information that the pupil desired.
  e.g. "The way the hands are."
• Enough - No Ideas
An answer was categorised as Enough - No Ideas if it stated that enough information had been provided about the task and the pupil had no ideas about possible additional information.

• Not Enough - Additional
An answer was categorised as Not Enough - Additional if it stated that there was not enough information provided about the task and there was still additional information that the pupil desired.
  e.g.  "How quickly your hand has to push away because your feet and hands can be muddled up easily."

• Not Enough - No Ideas
An answer was categorised as Not Enough - No Ideas if it stated that there was not enough information provided about the task but the pupil had no ideas about possible additional information.

• Don't Know
An answer was categorised as Don't Know if it stated that the pupil was unaware of whether there was enough information provided about the task, or the answer was irrelevant to question.
  e.g.  "I don't know."

• Blank
If there was no answer offered it was categorised as blank.

General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?
(based on Questions 18, 20 and 21)

Categories:
• Physical Factors
An answer was categorised as Physical Factors if it stated that the pupil was thinking about anything physically related either prior to or during the tasks.
  e.g.  "to get my arms around my body more."

• General Mental Techniques
An answer was categorised as General Mental Techniques if it stated that the pupil was thinking about mental factors general to all tasks either prior to or during those tasks.
  e.g.  "I was trying to concentrate ato."
Specific Mental Techniques
An answer was categorised as Specific Mental Techniques if it stated that the pupil was thinking about mental factors specific to the task either prior to or during the task; this may have included either the theoretical elements of the task or specific cognitive strategies to complete the tasks.
e.g. Analogy for a tumble turn, "I thought about doing a half roll."

External Factors
An answer was categorised as External Factors if it stated that the pupil was thinking about any factors that were irrelevant to the successful completion of the task.
e.g. "What was I doing that night."

Nothing
An answer was categorised as Nothing if it stated that the pupil was thinking about nothing at all or something that was very general and vague in nature, either prior to or during the task.
e.g. "I didn't think of anything."
"Getting it right."

Blank
If there was no answer offered it was categorised as blank.

Theme: Why Use the Strategy?
(based on Questions 18, 19 and 21)

Categories:
• Others
An answer was categorised as Others if it stated that the reason the pupil was thinking about a specific factor was due to other people.
e.g. "trying to do what the teacher said because thats the right way." (sic)

• Conscious Decision (Cognitive)
An answer was categorised as Conscious Decision (Cognitive) if it stated that the pupil was thinking about a specific factor because they had made a conscious decision to do so prior to attempting the tasks.
e.g. "so the water would not slow you down when you glide."

• Conscious Decision (Practical)
An answer was categorised as Conscious Decision (Practical) if it stated that the pupil was thinking about a specific factor because of what had happened during a practical attempt at the tasks or similar tasks.
e.g. "The action was done too quickly."
- **Unconscious Decision**
  An answer was categorised as Unconscious Decision if it stated that the pupil was
  had automatically or unconsciously considered a specific factor.
  e.g. "Its straiht forward." (sic)
- **No Reason**
  An answer was categorised as No Reason if it did not offer any reason at all, or
  only a very general and vague reason, why the pupil was thinking about a specific
  factor.
  e.g. "I wanted to succeed."
- **Blank**
  If there was no answer offered it was categorised as blank.

**Theme:**

**Categories:**

- **In Context**
  An answer was categorised as In Context if it suggested that the pupil was aware
  of the benefits of thinking about a specific factor either prior to, during or after the
  specific tasks or tasks in the same activity area.
  e.g. "...do the same when you do a front crawl, this gives you a better
  start."
- **Near Transfer**
  An answer was categorised as Near Transfer if it suggested that the pupil was
  aware of the benefits of thinking about a specific factor in other tasks very similar,
  even on a superficial level, to the specific task.
  e.g. Considering factors relating to a benchball activity in an exercise
  circuit, a pupil noted, "Netball, basketball, you have to throw the ball
  fast in both of the above."
- **Wider Transfer**
  An answer was categorised as Wider Transfer if it suggested that the pupil was
  aware of the benefits of thinking about a specific factor in other tasks which
  appear, on a superficial level, relatively dissimilar to the specific task.
  e.g. "For a forward roll because you do the same actions."
- **No Context**
  An answer was categorised as No Context if it suggested that the pupil was
  unaware of the benefits of thinking about a specific factor either prior to, during
  or after the specific task.
  e.g. "I don't think they would be useful."
• Not Applicable
An answer was categorised as Not Applicable if it was rendered irrelevant due to a previous answer. For example, if the pupil claimed not to be thinking about a specific factor prior to, during or after a task they should be unable to answer when such thoughts would be beneficial.

• Don't Know
An answer was categorised as Don't Know if it stated that the pupil did not know in what context their thoughts about a specific factor would be beneficial, or the answer was irrelevant to question.
  e.g. "I don't know."

• Blank
If there was no answer offered it was categorised as blank.

Theme: Pupils' Monitoring of the Strategy and the Task
(based on Question 23)

Categories:

• Change· Want
An answer was categorised as Change· Want if it stated the pupil had changed the specific strategy or tactic for approaching the specific task because they wanted to experiment, test an idea or try something new.
  e.g. "I tried to approach the turn more slowly so that I could go through the routine properly."

• Change· Need
An answer was categorised as Change· Need if it stated the pupil had changed the specific strategy or tactic for approaching the specific task because they needed to.
  e.g. "I found I went of course if I kicked my legs too hard." (sic)

• Change· Informed
An answer was categorised as Change· Informed if it stated the pupil had changed the specific strategy or tactic for approaching the specific task because they were informed to.
  e.g. "I changed it when being told..."

• Change· No Reason
An answer was categorised as Change· No Reason if it stated the pupil had changed the specific strategy or tactic for approaching the specific task but the pupil offered no explanation why this was the case.
• No Change - Want
An answer was categorised as No Change - Want if it stated the pupil had not changed the specific strategy or tactic for approaching the specific task because they did not want to experiment, test an idea or try something new.
e.g. "I think you should keep trying the same thing to improve."

• No Change - Need
An answer was categorised as No Change - Need if it stated the pupil had not changed the specific strategy or tactic for approaching the specific task because they did not need to.
e.g. "Because I was doing it right."

• No Change - Informed
An answer was categorised as No Change - Informed if it stated the pupil had not changed the specific strategy or tactic for approaching the specific task because they had not been informed to do so.
e.g. "No one said that I was doing it wrong."

• No Change - No Reason
An answer was categorised as No Change - No Reason if it stated the pupil had not changed the specific strategy or tactic for approaching the specific task but the pupil offered no explanation why this was the case.
e.g. "I haven't got one." (sic)

• No Change - Couldn't
An answer was categorised as No Change - Couldn't if it stated the pupil had not changed the specific strategy or tactic for approaching the specific task because they were unable to.
e.g. "because I couldn't...I didn't know what I was doing."

• Don't Know
An answer was categorised as Don't Know if it stated that the pupil did not know if they had changed the specific strategy or tactic for approaching the specific task.
e.g. "I don't know."

• Blank
If there was no answer offered it was categorised as blank.
Theme: Pupils' Feelings During their Strategic Action and the Task (based on Question 24)

Categories:

• Positive Feelings
  An answer was categorised as Positive Feelings if it suggested that the specific pupil was thinking and feeling positive.
  e.g.  "I like starts...so I enjoyed it."

• Neutral Feelings
  An answer was categorised as Neutral if it offered no insight into whether the pupil was feeling positive or negative.
  e.g.  "It's difficult."

• Negative Feelings
  An answer was categorised as Negative Feelings if it suggested that the specific pupil was thinking and feeling negative.
  e.g.  "I felt a little scared jumping back."

• Physical
  An answer was categorised as Physical if it suggested that the specific pupil was concerned about physical feelings.
  e.g.  "Hitting my partner."

• None
  An answer was categorised as None if it stated that the pupil had no feelings during the activity.
  e.g.  "I didn't feel anything having done this start before."

• Blank
  If there was no answer offered it was categorised as blank.

General Area: Interactional Variables

Theme: Pupils' Volitional Control (based on Questions 25 to 27)

Categories:

• Volitional
  An answer was categorised as Volitional if it suggested that the pupil had the control and, therefore, the choice of whether to concentrate and complete the task.
  e.g.  "Concentrate more...keep focused"
• No Volitional
An answer was categorised as No Volitional if it suggested that the pupil did not have the control and, therefore, the choice of whether to concentrate and complete the task.
e.g. "their weren't any distractions." (sic)

• Don't Know
An answer was categorised as Don't Know if it stated that the pupil did not know whether they had the control and, therefore, the choice of whether to concentrate and complete the task.
e.g. "I don't know."

• Blank
If there was no answer offered it was categorised as blank.

Theme: The Wider Purpose of Physical Education
(based on Questions 28 and 29)

Categories:
• Health and Fitness
An answer was categorised as Health and Fitness if it stated that the purpose of Physical Education and the specific tasks was to develop general, physical and/or mental health and fitness.
e.g. "staying healthy."
"keeps you fit."

• Physical Skills
An answer was categorised as Physical Skills if it stated that the purpose of Physical Education and the specific tasks was to develop physical skills.
e.g. "climbing, running etc." (sic)

• Mental Skills
An answer was categorised as Mental Skills if it stated that the purpose of Physical Education and the specific tasks was to develop mental skills and/or the basic underlying theoretical element of the tasks.
e.g. "to learn new ways to exercise."

• Social
An answer was categorised as Social if it stated that the purpose of Physical Education and the specific tasks was to develop social relations and teamwork.
e.g. "to help each other."

• Enjoyment
An answer was categorised as Enjoyment if it stated that the purpose of Physical Education and the specific tasks was to ensure that the pupils enjoyed themselves.
e.g. "to make them enjoy something."
• Satisfy Others
  An answer was categorised as Satisfy Others if it stated that the purpose of Physical Education and the specific tasks was to satisfy criteria established by other people such as OFSTED or the National Curriculum.
  e.g. "It's part of the National Curriculum."

• Experience
  An answer was categorised as Experience if it stated that the purpose of Physical Education and the specific tasks was simply to experience a variety of physical activities.
  e.g. "to show us sports and...exercises."

• Future
  An answer was categorised as Future if it stated that the purpose of Physical Education and the specific tasks was to help pupils in the future in competing activities, recreational activities and/or employment.
  e.g. "For future jobs like lifesaving, lifeguard."

• No Purpose
  An answer was categorised as No Purpose if it stated that Physical Education and the specific tasks had no purpose.
  e.g. "it doesn't." (sic)

• Stock Response / Unaware
  An answer was categorised as Stock Response / Unaware if it offered no insight into the purpose of Physical Education and the specific tasks, or if it stated that the pupil was unaware.
  e.g. "so we learn."
  "For a break from writing."

• Blank
  If there was no answer offered it was categorised as blank.

Theme: Pupils' Motivational Orientation
(based on Questions 30 to 33, 43 and 44)

Categories:
• Task
  An answer was categorised as Task if it suggested that the pupil's motivation was oriented towards task mastery, personal development and/or personal improvement.
  e.g. "When I have achieved something I haven't done before."
Ego
An answer was categorised as Ego if it suggested that the pupil's motivation was oriented towards competition, comparison and seeking external praise.
e.g. "When I do something better than other people."

Social
An answer was categorised as Social if it stated that the pupil's motivation was oriented towards social relationships, either to the development of them or as a reaction to them.
e.g. "To save someone if they're in trouble."

None
An answer was categorised as None if it offered no insight into the pupil's motivational orientation, or if it stated that the pupil was unaware.
e.g. "the water has too much chlorine and it makes my eyes water for the rest of the day." (sic)
"I don't know."

Blank
If there was no answer offered it was categorised as blank.

Theme: Pupils' Locus of Control
(based on Questions 34 and 35)

Categories:

Intrinsic
An answer was categorised as Intrinsic if it stated that the pupil was responsible for, and, therefore, had control over, the outcome of the task.
e.g. "I concentrated."
"I didn't try."

Extrinsic
An answer was categorised as Extrinsic if it stated that the pupil was not responsible for, and, therefore, did not have control over, the outcome of the task.
e.g. "Luck"
"People were shouting and were getting in peoples way." (sic)

Unaware
An answer was categorised as Unaware if it offered no insight into whether the pupil perceived himself or herself as being responsible for, and, therefore, having control over the outcome of the task, or if it stated that the pupil was unaware.
e.g. "I don't know"

Blank
If there was no answer offered it was categorised as blank.
Theme: Self-Efficacy (perceived competence)
(based on Questions 36 and 39 to 41)

Categories:
- **Positive Physical**
  An answer was categorised as Positive Physical if it stated that the pupil had a degree of physical competence in Physical Education and the specific tasks.
  e.g. "Strong push off the wall, strong legs."
- **Positive Mental**
  An answer was categorised as Positive Mental if it stated that the pupil had a degree of mental competence in Physical Education and the specific tasks.
  e.g. "Always try my best."
- **Positive General**
  An answer was categorised as Positive General if it stated that the pupil had a degree of general competence in Physical Education and the specific tasks but did not specify whether this was physical or mental in nature.
  e.g. "Because I'm good at PE."
- **Negative Physical**
  An answer was categorised as Negative Physical if it stated that the pupil lacked a degree of physical competence in Physical Education and the specific tasks.
  e.g. "I'm not very fast."
- **Negative Mental**
  An answer was categorised as Negative Mental if it stated that the pupil lacked a degree of mental competence in Physical Education and the specific tasks.
  e.g. "because I feel left out..."
- **Negative General**
  An answer was categorised as Negative General if it stated that the pupil lacked a degree of general competence in Physical Education and the specific tasks and did not specify whether this was physical or mental in nature.
  e.g. "I can't do a back crawl start very well."
- **Unaware**
  An answer was categorised as Unaware if it offered no insight into the pupil's perceived competence in Physical Education and the specific tasks, if it stated that the pupil was unaware, or if it was irrelevant to the task.
  e.g. "I don't know what he would think of my abilities."
- **Blank**
  If there was no answer offered it was categorised as blank.
Theme: Self-Efficacy (strength)  
(based on Question 37)

Categories:
• Positive Strength  
An answer was categorised as a Positive Strength if it stated that the pupil's perceived competence was strong enough to complete the specific tasks well.  
e.g. "How strong you are the better you are."
• Negative Strength  
An answer was categorised as a Negative Strength if it stated that the pupil's perceived competence was not strong enough to complete the specific tasks well.  
e.g. "Because its in different parts." (sic)
• Unaware  
An answer was categorised as Unaware if it offered no insight into whether the pupil's perceived competence was strong enough to complete the specific tasks well, or if it stated that the pupil was unaware.  
e.g. "I don't know."
• Not Applicable  
An answer was categorised as Not Applicable if it was rendered irrelevant due to a previous answer. For example, if the pupil's answer with respect to perceived competence was categorised as Unaware, a further answer concerning the strength of this perceived competence was not applicable.
• Blank  
If there was no answer offered it was categorised as blank.

Theme: Self-Efficacy (generality)  
(based on Question 38)

Categories:
• Positive Generality  
An answer was categorised as a Positive Generality if it stated that the pupil's perceived competence was always useful in the specific Physical Education activity.  
e.g. "Because you use your legs in most ways of swimming."
• Negative Generality  
An answer was categorised as a Negative Generality if it stated that the pupil's perceived competence was not always useful in the specific Physical Education activity.  
e.g. "Doing different things needs different abilities."
• Unaware
An answer was categorised as Unaware if it offered no insight into whether the pupil's perceived competence was always useful in the specific Physical Education activity, or if it stated that the pupil was unaware.
e.g. "I don't know."

• Not Applicable
An answer was categorised as Not Applicable if it was rendered irrelevant due to a previous answer. For example, if the pupil's answer with respect to perceived competence was categorised as Unaware, a further answer concerning the generality of this perceived competence was not applicable.

• Blank
If there was no answer offered it was categorised as blank.

Theme: General Self-Worth
(based on Question 42)

Categories:
• Positive Self-Worth
An answer was categorised as Positive Self-Worth if it stated that the pupil would not like to change anything about himself or herself with respect to Physical Education.
e.g. "I like the way I am."

• Negative but Aware Self-Worth
An answer was categorised as Negative Self-Worth if it stated that the pupil would like to change something about himself or herself with respect to Physical Education and it stated what the change would be.
e.g. "I wish I wasn't fat"
"Like to be more athletic, I'm not very good."

• Negative Self-Worth
An answer was categorised as Negative Self-Worth if it stated that the pupil would like to change something about himself or herself with respect to Physical Education but it failed to state what the change would be.
e.g. "Probably [but] can't think of any changes] at the minute."

• Unaware
An answer was categorised as Unaware if it offered no insight into whether the pupil would like to change anything about himself or herself with respect to Physical Education, or if it stated that the pupil was unaware.
e.g. "I don't know."

• Blank
If there was no answer offered it was categorised as blank.
Theme: Motivational Climate
(based on Questions 45-50)

Categories:

• Task
  An answer was categorised as Task if it suggested that the pupil perceived the lesson climate to be oriented towards task mastery, personal development and/or personal improvement.
  e.g. "...try your best well if you try your best it does not matter what anybody else thinks."

• Ego
  An answer was categorised as Ego if it suggested that the pupil perceived the lesson climate to be oriented towards competition and comparison.
  e.g. "When we get compliments."

• Neutral
  An answer was categorised as Neutral if it suggested that the pupil did not perceive the lesson climate to be either task oriented or ego oriented.
  e.g. To be successful, "don't hold any body up." (sic)

• Unaware
  An answer was categorised as Unaware if it offered no insight into the pupil's perception of the motivational climate, or if it stated that the pupil was unaware.
  e.g. "I don't know."

• Blank
  If there was no answer offered it was categorised as blank.
Appendix 15: The Ideal Categories and Category Scales Utilised in the Overall Focus of the Content Analysis

The selection of 'ideal' categories and category scales utilised in the part one and part two overall focus of the content analysis was based on literature, the teachers and tasks involved in the study, the pupils' responses and the cognitive bias of the study. For example,

- literature has suggested that pupils should have awareness of their cognitive style combinations (general area 'Metacognitive Knowledge of Person Variables', theme 'Intra-Individual and Inter-Individual Variables; Cognitive Style Dimensions', category ' Awareness'),
- the teachers suggested that the purpose of most tasks was to develop specific physical and mental skills (general area 'Metacognitive Knowledge of Task Variables, theme, 'The Desired Outcomes and Purpose of the Task', categories 'Physical Skills' and 'Mental Skills', category scales 'specific; S'),
- the pupils' responses emphasised that the independent monitoring of their strategic action was a response to their 'needs' or 'wants' (general area 'Metacognitive Knowledge of Strategy Variables', theme 'Pupils' Monitoring of the Strategy and the Task', category 'Need + Want'), and
- the cognitive bias of the study meant that positive mental self-efficacy should be considered (general area 'Interactional Variables', theme 'Self-Efficacy', category 'Positive Mental', category scale, 'strong; St').

In general, the category scale often selected as ideal was specific (S), good (Gd) or strong (St) depending upon the theme, as opposed to general (G), poor (P or Pr) or weak (Wk). It has been suggested that general, poor, weak or stock responses may imply that there is some pupil misunderstanding of the information (Perkins & Simmons, 1988).

To identify and clarify why specific categories and category scales were classified as ideal, each selected category and category scale will be explained under the headings of the relevant general area and theme.

**General Area:** Metacognitive Knowledge of Task Variables

**Theme:** The Desired Outcomes and the Purpose of the Task

Utilising the teachers' and author's objectives it was possible to identify what the desired outcomes and the purpose were for each lesson. These proved to be,
Categories:
• Physical Skills (S)
and
• Mental Skills (S)

Theme: The Influences Upon the Task

The author suggested that pupils should appreciate most all of the categories under the task influences theme, both the intrinsic and extrinsic focus on both the physical and mental influences. The specific category scale was selected for each.

Categories:
• Intrinsic Physical (S)
• Extrinsic Physical (S)
• Intrinsic Mental (S)
and
• Extrinsic Mental (S)

Theme: The Abundancy and Organisation of the Information

It was suggested that each lesson had enough information available with respect to the desired outcomes and the purpose of the task. Therefore, ideally, the pupil would appreciate there was enough information to complete the task successfully. However, whether the pupils' stated there was enough information or not they should understand that the most important piece of information to be prioritised concerned the underlying theoretical principles of the activity. Hence, the selected categories and category scales were,

Categories:
• Enough
and
• Activity Principle (S)

Theme: The Demands of the Task

When faced with a task the demands will be physical and mental, calling upon both long term properties and short term processes. As such, the selection was thus,
Categories:
- Physical Properties (S)
- Physical Processes (S)
- Mental Properties (S)
and
- Mental Processes (S)

Theme: The Pupils' Feelings During the Task

The consideration of pupils' feelings was directed at establishing whether they were undergoing affective metacognitive experiences which, if utilised correctly, could develop metacognitive ability. These feelings could be either positive or negative and, therefore, the author combined the categories of Positive Feelings and Negative Feelings to highlight those pupils who may have had affective metacognitive experiences. However, the author also maintained the independent Positive Feelings category as, ideally, if the pupil had, or developed, efficient metacognitive ability then the cognitive control this requires should mean the pupil had positive feelings about approaching any task.

Categories:
- Positive and Negative Feelings
and
- Positive Feelings

General Area: Metacognitive Knowledge of Person Variables

Theme: Intra-Individual Variables

Under the intra-individual theme, although pupils referred to short-term processes as strengths and weaknesses, an ideal appreciation of intra-individual variables lay with their physical and mental properties. For example, while a pupil stated that 'I found it difficult to hold the discus' there was no explanation of why this physical process was a difficulty. However, a different pupil noted a similar difficulty and suggested that this was due to the physical property that 'my hands are small'. As such, the ideal categories seemed those that referred to properties rather than processes.
Categories:
- Physical Properties (S)
and
- Mental Properties (S)

Theme: Intra-Individual and Inter-Individual Variables
(Cognitive style dimensions)

Whatever the cognitive style dimension and whatever the pupils' natural stylistic tendencies, if they have effective metacognitive ability there should be an awareness of their preferences. However, the author also acknowledged that, ideally, pupils may demonstrate tendencies from both ends of the cognitive style continua in both the wholist-analytic and the verbaliser-imager dimensions. Such tendencies may be encouraged by the development of metacognitive ability. For the purpose of the overall focus, category scales were eliminated with respect to the cognitive style dimensions, although it should be noted that when pupils were aware of their natural tendencies this awareness was often general in nature, with little appreciation of any underpinning cognitive influences.

(Wholist-Analytic Cognitive Style Dimension)
Categories:
- Awareness
and
- Wholist Analytic - Awareness

(Verbaliser-Imager Cognitive Style Dimension)
Categories:
- Awareness
and
- Verbaliser Imager - Awareness

Theme: Inter-Individual Variables

Pupils should appreciate that a task will suit certain pupils more than others even if every pupil can complete it successfully. As such, pupils' awareness that inter-individual variables exist was assessed. The questionnaire results suggested that gender, general ability, physical factors and mental factors were behind such differences in task suitability. Clearly, the reasons such as gender and general ability implied that there were limitations in the pupils' appreciation of differences between
them. Therefore, the ideal categories were viewed to be physical and mental factors with the category scale, once again, being specific.

Categories:
- Awareness
- Physical Factors (S)
and
- Mental Factors (S)

Theme: Universals of Cognition

As suggested earlier, every lesson was deemed to have enough information for the pupils to appreciate the desired outcomes of the tasks, the purpose of the tasks and how to tackle the tasks. However, if any pupils wanted to advance the tasks, or their knowledge further, they may require additional information. Ideally, the pupils wanting some extra information would be specific about the nature of this information. As such, the selected categories were,

Categories:
- Enough
and
- Additional (S)

General Area: Metacognitive Knowledge of Strategy Variables

Theme: What Strategy?

The purpose behind the metacognitive strategy and the specific strategies and tactics involved in the study was to help highlight the principles involved in a task and, therefore, the relationship between the theoretical and the practical. As such, physical factors was a selected category. The pupils may have transferred their focus from the theoretical to the practical, but if this was the case it was argued that the pupils' responses would be specific in nature. However, the strong cognitive bias in the study meant that the categories, as suggested by the questionnaire results, referring to general and specific mental techniques should be assessed within the overall focus. The nature of these mental techniques pre-selected the ideal category scales, as general mental techniques would tend to be general in description and specific mental techniques would tend to be specific in description.
Categories:
• Physical Factors (S)
• General Mental Techniques (G)
and
• Specific Mental Techniques (S)

Theme: Why Use the Strategy?

Metacognitive knowledge and metacognitive strategies may be either consciously or unconsciously utilised. Clearly, by emphasising an overt metacognitive strategy the intervention study was attempting to encourage conscious utilisation. However, metacognitive ability does not necessarily need to be conscious and, as such, both conscious and unconscious decisions were selected as categories in the overall focus.

Categories:
• Conscious Decision (Cognitive.S)
• Conscious Decision (Practical.S)
and
• Unconscious Decision

Theme: When to Use the Strategy

If pupils have effective metacognitive ability they may appreciate when specific cognitive strategies and physical actions can be transferred to other activities (Brown, Bransford, Ferrarra & Campione, 1983; Pask, 1976). All of the lessons involved in the study utilised specific cognitive strategies and physical actions that could be transferred to other activities. Therefore, it was argued that if the pupils fully realised the opportunities to transfer the information, that transfer would be wide in nature and have a category scale 'good' (Gd).

Categories:
• Wider Transfer (Gd)

Theme: Pupils' Monitoring of the Strategy and the Task

Whether pupils changed their specific cognitive strategies and tactics or not, it is argued that if pupils have effective metacognitive ability they will be continually monitoring them. Indeed, the metacognitive strategy highlighted in the intervention study aimed to directly encourage such monitoring of specific cognitive strategies and
tactics. Those categories that suggested independent pupil monitoring were 'want' and 'need', either wanting to change strategies and tactics or not wanting to, either needing to change strategies and tactics or not needing to. As such, these categories were combined for the purpose of the overall focus.

Categories:
• Need and Want

Theme: Pupils' Feelings During their Strategic Action and the Task

The consideration of pupils' feelings was directed at establishing whether they were undergoing affective metacognitive experiences which, if utilised correctly, could develop metacognitive ability. These feelings could be either positive or negative and, therefore, the author combined the categories of Positive Feelings and Negative Feelings to highlight those pupils who may have had affective metacognitive experiences. However, the author also maintained the independent Positive Feelings category as, ideally, if the pupil has, or develops, metacognitive ability then the cognitive control this requires should mean the pupil has positive feelings about utilising any specific strategy or tactic and approaching any task.

Categories:
• Positive and Negative Feelings
and
• Positive Feelings

General Area: Interactional Variables

Theme: Pupils' Volitional Control

It is suggested that when pupils have developed effective metacognitive ability they are likely to develop a positive self-control (McCombs, 1988). As such, volitional control may be enhanced and, therefore, volitional control was selected as an ideal category.
Categories:
• Volitional

Theme: The Wider Purpose of Physical Education

Pupils' perceptions of the wider purpose of Physical Education may influence, and be influenced by, the development of metacognitive ability. The strong cognitive element of the study meant, with respect to the overall focus, the mental skills category was highlighted from the wider purpose of Physical Education theme.

Categories:
• Mental Skills

Theme: Pupils' Motivational Orientation

Within Physical Education, it has been implied that task-oriented motivation may be positively related to aspects of metacognitive ability, such as the selection of specific cognitive strategies and the monitoring of practice tasks. Thus, a strong (St) task-oriented motivation was viewed as ideal and assessed.

Categories:
• Task (St)

Theme: Pupils' Locus of Control

It has been implied that there is a strong interaction between metacognitive ability and an internal locus of control. As such, with respect to the overall focus, pupils' intrinsic locus of control was assessed.

Categories:
• Intrinsic

Theme: Self-Efficacy (perceived competence)

The cognitive control that metacognitive ability is assumed to enhance may increase judgements of self-efficacy (Bandura, 1982). Therefore, ideally, pupils will have a positive self-efficacy. However, from the questionnaire results pupils were more specific in what they saw as positive and negative about themselves. As the study has
a cognitive bias, the positive mental category was selected, along with a strong, definite (St) category scale.

Categories:
- Positive Mental (St)

Theme: Self-Efficacy (strength) and Self-Efficacy (generality)

Bandura (1977: cited in Feltz, 1992) suggested that with respect to investigating self-efficacy, the strength and generality of individuals' self-efficacy should also be assessed. It is argued that ideally any positive perceived competence will also be viewed as having a positive strength and a positive generality. As such, the selected categories were,

Categories:
- Positive Strength
- Positive Generality

Theme: General Self-Worth

Harter (1982) argued that any degree of perceived competence should be examined by inquiring how much individuals like themselves as people. Therefore, if there is an interaction between metacognitive ability and perceived competence it is assumed that pupils would identify a positive self-worth.

Categories:
- Positive Self-Worth

Theme: Motivational Climate

Treasure (1993: cited in Treasure & Roberts, 1995) noted that the motivational climate of a lesson may override pupils' dispositional goal orientation. Therefore, assuming that a task-oriented motivational climate interacts positively with the development of pupils' metacognitive ability, ideally, pupils would have perceived there to have been strong (St) elements of a task-oriented motivational climate during the lessons.

Categories:
- Task (St)
Appendix 16: Content Knowledge Data Sets Utilised for Non-Parametric Kruskal-Wallis Statistical Analysis

Table App.01: School 5 (MSI) 'Apple' Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Control Pre</th>
<th>Control Post</th>
<th>Meta Pre</th>
<th>Meta Post</th>
<th>Meta+ Pre</th>
<th>Meta+ Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points Available</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Pupil 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>12</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Pupil 3</td>
<td>20</td>
<td>2</td>
<td>16</td>
<td>-</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>1</td>
<td>0</td>
<td>14</td>
<td>11</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>12</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>18</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 7</td>
<td>17</td>
<td>16</td>
<td>13</td>
<td>-</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Pupil 8</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Pupil 9</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>13</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Pupil 10</td>
<td>8</td>
<td>0</td>
<td>12</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 11</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Pupil 12</td>
<td>15</td>
<td>0</td>
<td>14</td>
<td>8</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 13</td>
<td>7</td>
<td>0</td>
<td>16</td>
<td>11</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Pupil 14</td>
<td>18</td>
<td>0</td>
<td>13</td>
<td>13</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Pupil 15</td>
<td>8</td>
<td>-</td>
<td>13</td>
<td>7</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Pupil 16</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 17</td>
<td>18</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Pupil 18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 19</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Pupil 20</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Pupil 21</td>
<td>17</td>
<td>0</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 23</td>
<td>21</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 24</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 25</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 26</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 28</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>4</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Pupil 29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Metacognitive Strategy Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta+</td>
<td>Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variable and Cognitive Strategy Class</td>
</tr>
<tr>
<td>Pre</td>
<td>Pre-Intervention Questionnaire</td>
</tr>
<tr>
<td>Post</td>
<td>Post (Intervention Questionnaire)</td>
</tr>
<tr>
<td>(Shaded)</td>
<td>Blank</td>
</tr>
</tbody>
</table>
Table Ap.02: School 6 (MSI) 'Yard' Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis

| Questionnaire | Control | | Meta | | Meta+ | |
|---------------|---------|---|-----|---|-----|
|               | Pre | Post | Pre | Post | Pre | Post |
| Points Available | 20 | 18 | 20 | 18 | 20 | 18 |
| Pupil 1 | 2 | - | 0 | - | 5 | - |
| Pupil 2 | 6 | 1 | 3 | 6 | 12 | 12 |
| Pupil 3 | 4 | - | 0 | - | 10 | 5 |
| Pupil 4 | 4 | 2 | 0 | - | 0 | - |
| Pupil 5 | 10 | 12 | 0 | 3 | 10 | 8 |
| Pupil 6 | 4 | - | 0 | 3 | 4 | 0 |
| Pupil 7 | 5 | 0 | 0 | 8 | 0 | - |
| Pupil 8 | 2 | 1 | 0 | - | 14 | - |
| Pupil 9 | 12 | 7 | 10 | - | 5 | - |
| Pupil 10 | 9 | 8 | 10 | 8 | 1 | - |
| Pupil 11 | 3 | 3 | 7 | 7 | 5 | 5 |
| Pupil 12 | 9 | 6 | 0 | 0 | 0 | - |
| Pupil 13 | 10 | 4 | 0 | - | 0 | 0 |
| Pupil 14 | 3 | 8 | 6 | - | 0 | 0 |
| Pupil 15 | 5 | 6 | 0 | 7 | 0 | - |
| Pupil 16 | 9 | - | 3 | 4 | - | - |
| Pupil 17 | 0 | 0 | 5 | 5 | 5 | 4 |
| Pupil 18 | 0 | - | - | 0 | 3 | - |
| Pupil 19 | 0 | - | 7 | 5 | 5 | 5 |
| Pupil 20 | - | 0 | - | 5 | - | - |
| Pupil 21 | - | 3 | - | 10 | 9 | |
| Pupil 22 | - | 7 | - | 0 | 0 | |
| Pupil 23 | - | 0 | - | - | 0 | |

Legend:
- **Meta**: Metacognitive Strategy Cluster
- **Meta+**: Metacognitive Knowledge of Process and Strategy Variable and Cognitive Strategy Cluster
- **Pre**: Pre-intervention Questionnaire
- **Post**: Post-intervention Questionnaire
- **Grade-0**: Blank
Table Ap.03: School 3 (MSiQ) Year 7 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Control Pre</th>
<th>Control Post</th>
<th>Meta Pre</th>
<th>Meta Post</th>
<th>Meta+ Pre</th>
<th>Meta+ Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points Available</td>
<td>16</td>
<td>19</td>
<td>16</td>
<td>19</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>Pupil 1</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>12</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Pupil 3</td>
<td>9</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>8</td>
<td>14</td>
<td>10</td>
<td>7</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>11</td>
<td>15</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Pupil 7</td>
<td>13</td>
<td>11</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 8</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Pupil 9</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Pupil 10</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 11</td>
<td>13</td>
<td>11</td>
<td></td>
<td></td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Pupil 12</td>
<td>8</td>
<td>11</td>
<td></td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Pupil 13</td>
<td>14</td>
<td>15</td>
<td></td>
<td></td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 14</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 15</td>
<td>13</td>
<td>13</td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Pupil 16</td>
<td>11</td>
<td>13</td>
<td></td>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 17</td>
<td>11</td>
<td>13</td>
<td></td>
<td></td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 18</td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 19</td>
<td>10</td>
<td>7</td>
<td></td>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 20</td>
<td>8</td>
<td>4</td>
<td></td>
<td></td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 21</td>
<td>11</td>
<td>10</td>
<td></td>
<td></td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

Legend:

- Meta: Metacognitive Strategy Class
- Meta+: Metacognitive Strategy, Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class
- Pre: Pre-Intervention Questionnaire
- Post: Post-Intervention Questionnaire
Table Ap.04: School 5 (MSi) 'Apple' Year 9 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Control</th>
<th>Meta</th>
<th>Meta+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Points Available</td>
<td>25 26</td>
<td>25 26</td>
<td>25 26</td>
</tr>
<tr>
<td>Pupil 1</td>
<td>15 12</td>
<td>1 -</td>
<td>13 0</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>11 1</td>
<td>12 11</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 3</td>
<td>0 16</td>
<td>21 22</td>
<td>1 -</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>0 0</td>
<td>16 15</td>
<td>19 0</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>4 2</td>
<td>8 18</td>
<td>15 13</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>11 0</td>
<td>12 16</td>
<td>13 0</td>
</tr>
<tr>
<td>Pupil 7</td>
<td>1 3</td>
<td>0 0</td>
<td>17 0</td>
</tr>
<tr>
<td>Pupil 8</td>
<td>0 0</td>
<td>0 4</td>
<td>14 -</td>
</tr>
<tr>
<td>Pupil 9</td>
<td>16 1</td>
<td>13 16</td>
<td>12 17</td>
</tr>
<tr>
<td>Pupil 10</td>
<td>14 0</td>
<td>8 15</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 11</td>
<td>0 0</td>
<td>10 22</td>
<td>6 11</td>
</tr>
<tr>
<td>Pupil 12</td>
<td>0 -</td>
<td>10 0</td>
<td>11 11</td>
</tr>
<tr>
<td>Pupil 13</td>
<td>0 0</td>
<td>2 16</td>
<td>15 -</td>
</tr>
<tr>
<td>Pupil 14</td>
<td>19 12</td>
<td>0 0</td>
<td>15 0</td>
</tr>
<tr>
<td>Pupil 15</td>
<td>0 0</td>
<td>0 15</td>
<td>3 0</td>
</tr>
<tr>
<td>Pupil 16</td>
<td>16 11</td>
<td>15 15</td>
<td>10 8</td>
</tr>
<tr>
<td>Pupil 17</td>
<td>15 7</td>
<td>12 0</td>
<td>12 9</td>
</tr>
<tr>
<td>Pupil 18</td>
<td>14 14</td>
<td>7 0</td>
<td>13 14</td>
</tr>
<tr>
<td>Pupil 19</td>
<td>12 10</td>
<td>4 15</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 20</td>
<td>19 15</td>
<td>18 17</td>
<td>18 -</td>
</tr>
<tr>
<td>Pupil 21</td>
<td>4 12</td>
<td>8 7</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 22</td>
<td>17 12</td>
<td>12 1</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 23</td>
<td>14 0</td>
<td>10 22</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 24</td>
<td>0 0</td>
<td>4 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Pupil 25</td>
<td>20 18</td>
<td>14 8</td>
<td>0 1</td>
</tr>
<tr>
<td>Pupil 26</td>
<td>13 6</td>
<td>13 19</td>
<td>17 0</td>
</tr>
<tr>
<td>Pupil 27</td>
<td>16 0</td>
<td>16 12</td>
<td>7 -</td>
</tr>
<tr>
<td>Pupil 28</td>
<td>- 0</td>
<td>18 18</td>
<td>0 -</td>
</tr>
<tr>
<td>Pupil 29</td>
<td>- 5</td>
<td>- 9</td>
<td>0 0</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th>Meta</th>
<th>Meta+</th>
<th>Pre</th>
<th>Post</th>
<th>(Shaded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metacognitive Strategy Class</td>
<td>Metacognitive Strategy Class; Metacognitive Knowledge of Process and Strategy Variables and Cognitive Strategy Class</td>
<td>Pre-Intervention Questionnaire</td>
<td>Pre-Intervention Questionnaire</td>
<td>Base</td>
</tr>
</tbody>
</table>
Table Ap.05: School 3 (MStQ) Year 9 content knowledge data set utilised for non-parametric Kruskal-Wallis statistical analysis

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Control</th>
<th>Meta</th>
<th>Meta+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Points Available</td>
<td>19</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>Pupil 1</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>6</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Pupil 3</td>
<td>15</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>12</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Pupil 7</td>
<td>14</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Pupil 8</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 9</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 10</td>
<td>5</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 11</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Pupil 12</td>
<td>16</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 13</td>
<td>14</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Pupil 14</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Pupil 15</td>
<td>7</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Pupil 16</td>
<td>12</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 17</td>
<td>6</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Pupil 18</td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Pupil 19</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Pupil 20</td>
<td>19</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Pupil 21</td>
<td>6</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Pupil 22</td>
<td>13</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Pupil 23</td>
<td>17</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>

Legend:
- Meta: Metacognitive Strategy Change
- Meta+: Metacognitive Strategy, Metacognitive Knowledge of Texts and Reading Strategy Variable and Cognitive Strategy Change
- Pre: Pre-Intervention Questionnaire
- Post: Post-Intervention Questionnaire
Appendix 17: Preliminary Study: Foundation Lesson Questions

(01) In the lesson you were asked to play Stick in the Mud. Why do you think the teacher asked you to do that? Did you ask yourself 'why?' in the lesson?

(02) During the lesson, you were asked to make up a game. The teacher gave you lots of instructions and help. Yet, he didn't give you any demonstrations. Did you understand what was being asked of you?

(03) Do you prefer descriptions or demonstrations? Why?

(04) Within the game, you had to make decisions about goals and how you would score. Do you treat these as separate decisions? Did you have to make one or two decisions?

(05) Do you think you were given enough information to perform the challenge properly?

(06) Did you check at any stage that you understood what was wanted? How would you check what was wanted if you did not have enough information?

(07) Do you believe that you followed the instructions exactly? Did you change the tasks in any way? e.g. stick in the mud people went under arms rather than through legs.

(08) During the game you made, or stick in the mud, did you ask yourself or anyone else how you were doing?

(09) Do you think it is best to have a go at a game straight away to find out what you have to do, or do you think it's best to stop and think about it first before you do it?

(10) Think about the game that you made up. What information would I need to know before I could play it, if I'd never seen it before?

(11) Did you enjoy the lesson, or any parts of it? Why?
(12) In the game you were not given any freedom about rules. Do you prefer to make up your own rules or to be given them by your teacher? Why?

(13) What do you think was the aim of the lesson? What was the teacher trying to get you to achieve?

(14) Considering what you think the aim of the lesson was, would you have changed the lesson in any way, possibly through the instructions or the tasks that you did, so that you could have learned even more.