Special educational needs in design and technology

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Special educational needs in Design and Technology

Thompson I H
Colnecote School, Tamworth.

Abstract
As a teacher of Design and Technology, I was concerned by the very wide range of ability of pupils I taught, and the frequency of learning difficulties. I suspected that some learning difficulties might be common across the curriculum. I was also interested in what training teachers had had to help them cope with learning difficulties, and what further training teachers felt might be useful.

I devised a questionnaire, designed to try to answer these questions, and used it to conduct a survey of teachers working at the high schools in the Tamworth and Lichfield area of Staffordshire.

This paper reports the analysis of the data produced by the questionnaire and discusses some of the issues raised.

Introduction

Discussions were held with colleagues teaching Design and Technology to try to ascertain if learning difficulties were perceived to be totally random, or whether there was some sort of pattern to them. The consensus of opinion was that there were certain areas of classroom activity with which pupils commonly had difficulty and colleagues were of the opinion that difficulties associated with them were more likely than not common across all subject disciplines. These classroom activities, and their associated difficulties, can be indicated thus:

Understanding written instructions
Understanding verbal instructions
Concentration
Written expression
Verbal expression
Calculations
Measuring
Personal organisation

It was realised that categorisation in this way could have several possible disadvantages. The unfortunate parallel with a medical model could not be ignored, and the possibility of errors and confusion due to abbreviations was also important. However, some initial categorisation was needed to make the future coding of data for computer analysis a simpler matter.

The decision was made to focus the research on the following objectives:

To explore the possibility that the above areas of difficulty might be common across the curriculum and to try to discover if teachers felt that other areas of difficulty were also common, and what they might be.

To try to discover where the main areas of difficulty lie, for teachers, in coping with pupils’ learning difficulties and, if training or assistance were to be provided, what issues should be addressed.
Methodology

In a brainstorming session with colleagues factors which might influence perceptions of learning difficulties were noted. Those which were felt to be of a peripheral nature, perhaps only having a slight influence on teachers’ perceptions were ignored, and the following list was produced:

- Initial professional training
- Supplementary training
- Subject taught
- Size of school (i.e., number of pupils)
- Number of pupils in a teaching group
- Method of grouping, (i.e., sets, mixed ability etc)
- Amount and type of special needs support, if any
- Age of teacher
- Experience of teacher
- Sex of teacher
- Age group taught

After some consideration it was decided to use an anonymous questionnaire to collect the data. Questions which were felt to be appropriate to collecting the information were drafted and placed on a sample form in an order which it was considered would produce both an attractive layout and a format which would make the document easy to understand and complete. Since a computer program was to be used for data analysis a sample coding was then applied to the form, to ensure that coding was possible. The draft of the questionnaire was then passed to colleagues for discussion and comment. In the light of colleagues’ comments and influenced by the ease of coding the next draft was completed. This process was repeated several times until the final pilot document evolved.

The questionnaire was piloted in the Faculty of Design and Technology at Sneyd High School, Walsall. After analysis of the completed forms, three of the teachers were interviewed, to try to establish the clarity of presentation and unambiguity of question format. The final questionnaire evolved from the pilot, having taken into account the teachers’ comments.

The questionnaire, which had a personalised letter explaining the purpose of the study, was circulated to teachers at the nine comprehensive schools in the Lichfield and Tamworth areas of Staffordshire. One school did not return any forms, and so was removed from the study.

Global return

The average number of teaching staff at these schools was 61. The number of completed forms was 164, giving a return figure of 34 percent. The completion rates were very disappointing and very small numbers across subject disciplines were returned. Statistical analysis of small numbers is likely to be unreliable, and since some of the schools were employing a faculty system, subjects were re-grouped using the approach that the majority of schools had adopted. CDT, HE, Art and IT were all grouped as Technology; Geography, History, Economics, Business Studies, RE and Music were all grouped as Humanities. Although analysis of the frequency of response by schools showed that returns were not necessarily representative of each individual school, the analysis of responses by subject did show that the number of responses are to some extent in line with the number of teachers in school departments and thus the study might be considered to form a representative sample.
Pupil grouping

Teachers were asked to indicate the average number of pupils in each of the groups they taught, and the method of grouping for each year.

The information on pupil grouping showed that by far the most popular methods of grouping was by sets and mixed ability. In years seven and eight mixed ability was most prevalent, whilst in years nine, ten and eleven sets were more numerous. Numbers of pupils in a group calculated as a mean for each year, taken across all subjects were:

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>26.293</td>
</tr>
<tr>
<td>8</td>
<td>26.344</td>
</tr>
<tr>
<td>9</td>
<td>25.659</td>
</tr>
<tr>
<td>10&amp;11</td>
<td>23.488</td>
</tr>
</tbody>
</table>

Closer examination of the data reveals a different number of returns in upper school groups compared with lower school groups there being almost ten times the number of groups with fifteen pupils or less in years ten and eleven, than in year seven. This, perhaps, reflects the general school trend, of a reduction in numbers in a group due to subject setting for GCSE.

Analysis of pupil numbers when cross-tabulated with subjects produced some interesting results. The statistics showed a strong relationship between pupil grouping and certain subjects, but no clear relationship at all between others. Of special interest was Design and Technology. Historically, practical subjects have been taught to groups of pupils consisting of a lower number of pupils than would have been considered to be acceptable for classroom teaching. In most instances this might be expected to produce a maximum size teaching group in the order of fifteen pupils. To a very large extent this grouping was borne out by the statistics. However, there were some instances in the lower school where the group size had up to twenty-five pupils, and a few instances where groups of up to thirty existed. Perhaps the trend towards larger numbers of pupils in teaching groups is a reflection of the changing nature of Design and Technology.

Frequency of support

It was expected that support might be subject dependent, and that schools would have an established policy relating to support. Teachers were asked to indicate if they had support in their classroom.

Cross-tabulation between support and subject was carried out across all years. This seemed to show a significant relationship in year seven but, in later years, the incidence of support become progressively less, and there seemed to be no correlation, which tended to suggested that support took place in a more structured way in the lower school.

There were no reported incidences of support in Design and Technology. Further examination of the data revealed that levels of support were highest in Maths, English and Science, across all age groups, with some schools apparently providing over three times more support than others. Closer scrutiny of the data showed that this was not simply due to the frequency of returns. Some schools were perhaps simply devoting more resources to
support, and special needs departmental staff numbers did range from one to three at the schools studied. What was perhaps a little surprising though was that the highest reported levels of support were not achieved at the schools with the most support staff, presumably simply a coincidence, although some subjects could have been organising their own support, either as part of a whole school policy, or as isolated units. One possible explanation was that some schools were using a system of small teaching groups, instead of supporting larger groups, and that this had been masked by the method of sampling.

Crosstabulation of numbers in groups, by levels of support, by schools was tried, but no evidence could be found to support the supposition.

It had been expected that some schools would have a policy of support across the curriculum, and in fact some may have, but no evidence of this was demonstrated by this study. It would be interesting to make a more detailed study of classroom support, at the schools surveyed, especially since it is now almost ten years since more integration of pupils with special needs should have taken place, as a result of the Warnock report and the 1981 Education Act.

**Teachers perceptions of learning difficulties**

The categories of learning difficulty (see page 1) were enumerated on the questionnaire, with provision for respondents to add extra categories of their own. Respondents were asked to rank all categories as very common, common, uncommon or very uncommon. The additional categories, listed below, were extracted from the questionnaires by grouping on the basis that two or more would form a category, the remainder being classified as "others".

- Personal relationships.
- Graphicacy.
- Co-ordination.
- Transfer of skills.
- Manual skills.
- Others

There were only a very small number of returns in these additional categories, the average being between four and five. The responses were re-coded, for presentation and more simple analysis. Very common and common were taken as one group and the remaining responses were taken as the other group. After analysis the rank order of the top eight common categories, based on a percentage return, was:

1. Personal organisation 81%
2. Concentration 74%
3. Written expressio 73%
4. Calculations 48%
5. Understanding written instructions 48%
6. Measuring 36%
7. Understanding verbal instructions 29%
8. Verbal expression 18%

There was no correlation between perceived learning difficulties and any one subject discipline, even though some areas of difficulty were felt to be more common than others. Very few other categories of learning difficulty had been added by respondents and there would seem to be many possible conclusions which could be drawn from this. It may have been the case that important areas of difficulty were already listed on the questionnaire, or that respondents
were not sufficiently concerned by other difficulties to add categories of their own. Catagories that were added, however, tended to be subject specific, as they were not, in the main, re-enforced by returns from other subjects.

In the field of Design and Technology, "Graphicacy" was the only category added, and then only by 10 percent of all the teachers of Design and Technology that made a return.

Supplementary research could be undertaken to clarify the situation, as the study did seem to indicate that there were some learning difficulties which were subject specific, but there was insufficient data in this study to determine with any degree of accuracy the extent of the problem.

Training

The frequency of responses indicated that 70 percent of respondents had received no initial training connected with learning difficulties, though some may have received subsequent supplementary training, whilst 65 percent had received no supplementary training though they may have received some initial training connected with learning difficulties. Crosstabulation of initial training by supplementary training revealed no strong relationship, but the figures did show that 46 percent of respondents had received no initial or supplementary training, and 10 percent had received both initial and supplementary training.

Crosstabulation of supplementary training by age and by experience revealed no detectable relationship.

It was thought likely that teachers who had received professional training since the 1981 Education Act came into force, would all have had some training concerned specifically with learning difficulties. The data did show that there was a strong correlation between experience and initial training, but also revealed that not all of these teachers had received initial training connected with learning difficulties.

Of the 21 teachers who had been teaching less than five years twelve had received training connected with learning difficulties, but nine had not. Of the 35 teachers who had been teaching between six and ten years, twelve had received training connected with learning difficulties, and twenty-three had not.

No statistical relationship could be established to confirm that perceptions of learning difficulty were influenced by training or experience.

Issues future training might address

Teachers were asked, "If training were to be organised to help teachers cope with pupil's learning difficulties, what area of difficulties should it cover."

The questionnaires were processed and similar responses were recorded, these were then grouped on the basis that two or more would form a category and the remaining were classified as "others".

The result of this procedure, not in rank order, is listed below.

All areas mentioned
Assessment
Attention seekers
Better feedback of children's problems to all staff
Classroom management/organisation/teaching strategies
Common difficulties and how to overcome them
Cooperative teaching strategies/team teaching
Dealing with HI children
Designing and preparing worksheets/resources
Identifying different difficulties
Information on levels of pupil prior knowledge
Keeping up morale of failing pupils
Literacy
Motivation techniques
Numeracy
Preparing and setting appropriate levels of work
Physical defects (more knowledge about)
Raising interest levels
Review teaching aids available
Smaller teaching groups
Use of computers as a learning tool
Personal organisation
Understanding written instructions
Understanding verbal instructions
Concentration
Written expression
Verbal expression
Calculations
Measuring
Social and personal relationships
Graphicacy
Hand/eye coordination
Manipulative skills
Transfer of skills
Others

The frequency of returns for these classifications, expressed as a percentage of the return were:-

- Preparing worksheets: 30%
- Classroom management: 20%
- Setting appropriate levels of work: 19%
- Understanding written instructions: 12%
- Overcoming common difficulties: 10%
- Transfer of skills: 9%
- Literacy: 8%
- Team teaching strategies: 7%
- Verbal instruction: 7%
- Written expression: 6%
- All others less than: 5%
- No reply to this question: 23%

It had been expected that teacher's views of issues that might be raised during further training might show a correlation with such factors as experience or training. Crosstabulations were carried out with all other areas, but no relationship could be established.

Strangely, there was no apparent correlation between teacher's perceptions of pupils difficulties, and the areas that teachers considered additional training might concentrate on. In effect the training issues raised by respondents appeared to be the perceptions of their own need as teachers. Perhaps a diagnosis of pupils difficulties had taken place. Teachers had already decided...
how best to help pupils overcome their difficulties and had decided what issues training might address to help them do that.

Future research

The study has raised several interesting issues which could all be the subject of further research. Of particular interest though, is the fact that almost half of the teachers across all subjects felt that difficulty understanding written instructions was common, and 30% felt that training to help them prepare worksheets would be useful. Although no direct correlation could be established, it did seem likely that was a link between the preparation of worksheets and the understanding of written instructions (ie. worksheets).

Post study interviews have indicated that many teachers now use word processors to prepare teaching materials. These teachers report that pupils cope better with typed worksheets than they did with hand written materials though no documentary evidence of any testing was available.

Further research is being undertaken to clarify what aspects of the preparation of worksheets are most important, and to assess the possibility of writing an "expert" computer program for use by teachers as a tool to assist in the preparation of teaching materials.