Strategies for planning and monitoring design and technology: the ‘toolkit’

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STRATEGIES FOR PLANNING AND MONITORING

DESIGN AND TECHNOLOGY: THE ‘TOOLKIT’

M. BATCHELOR

THE BACKGROUND

HISTORY

The TVEI Consultancy in Science and Technology Education was set up in 1987 to provide advice and assistance to the TVEI Unit and to EA’s on aspects of Science and Technology Education in the then emerging extension phase of the TVEI Programme.

The diversity of approaches to Technology Education at that time was considerable. This was deliberate and, as such, created an interesting problem of how to co-ordinate, manage and report such activity.

Considerable work at this time had been undertaken to develop academic models and also operational or practical models for delivery. A need to bring this work together in a coherent form was well overdue. To facilitate this the TVEI Unit agreed to host a conference attended by practitioners, academics and other interested parties with the intention of not producing one answer, definition etc. but to provide a means of relating the various models/definitions to each other.

The three-day conference was divided into workshop groups of about eight and a rolling programme of group membership was employed to encourage the seeding of ideas between groups.

The outcome of the conference was a sharing of ideas, models, definitions, strategies and plans and a rather large chart of models.

The Consultancy worked on the output and produced the “Mega-framework” which has been used as a comprehensive basis for the development of further work.

RESPONSES FROM EDUCATIONAL ADVISERS OF TVEI

The opportunities presented by such a framework became a source of interest with the TVEI Education Advisers and much use was made of it in discussions with projects on the understanding of Technology Education in the preparation of Education Authority Extension Proposals to the extent that a formal presentation of the “Mega-framework” was made to TVEI Advisers in July 1988.

Further development has taken place in the area of planning, particularly in the light of the reports from the National Curriculum Working Group on Design and Technology.

A ‘TOOLKIT’ FOR MONITORING AND PLANNING

Responses from a range of educationalists confirmed our thoughts that a consistent and repeatable structure on which to plan and monitor developments in the field of Technology Education was essential. To this end the ‘Toolkit’ was developed along two similar lines; a) the monitoring approach which is fundamentally reactive, and b) the planning approach which is proactive. There may be tension between these two approaches over which precedes the other. In a National Curriculum sense it might be right to assume a clean sheet, look at what has been set out in statutory orders and proceed to plan. However it might also be right to monitor and assess the existing provision, its methods, techniques, practices and resourcing, and seek to address any shortfall between that provision and the requirements of the National Curriculum.
MONITORING AND PLANNING - REACTIVE AND PROACTIVE

REACTIVE

A reactive approach is inevitably a retrospective technique or at best provides an opportunity to monitor those activities or policies which are current.

Observation of existing work and provision to determine baselines

The TVEI Unit has for some time sought to disseminate 'good' or 'interesting' practice. To do this effectively a means of analysing what goes on in schools, clusters and EA’s is essential. The range of observed material covers pupils’ work, pupils’ learning experiences, teaching styles, management strategies and techniques, subject disciplines and their boundaries, school links, types of school, accreditation, assessment and associated aims and objectives.

Consistency of approach to all monitoring

The items listed in the paragraph above are variable and subject to influences outside the scope of the classroom environment. It is therefore vital to have a method of analysis which, while being consistent in its structure and approach, is nevertheless accommodating to the diverse conditions prevailing in the school situation.

Clarification of the practice and policy In project (LEA) proposals to TVEI

The extension proposals of EA’s reveal several characteristics about the management of schools in a local authority. Some offer a very tight structure and others a more liberal and flexible structure, both of which can deliver Technology in a realistic and satisfying way for the pupil.

It is, I suppose, not surprising that the differences between policy and practice reveal the extent of the fact and fiction of an EA’s activities.

The ability to put into practice the theoretical or academic aspects of Technology Education is probably the fundamental activity in which practitioners and managers must engage to ensure children’s learning experiences are relevant.

Understanding and addressing the key characteristics of Technology Education

Technology Education, albeit a discipline fairly new on the educational scene, has developed its own language/jargon. This is not intended to confuse, but to reveal the very special characteristics of activities which draw on knowledge, skills and values and interrelate these to other areas of the curriculum and world outside school. The importance of an understanding and working relationship with all these characteristics is crucial to underpin any form of analysis or appraisal of what students receive as Technology Education.

From policy to practice

Educational activity at all levels is primarily concerned with what the student actually does. There is then a requirement for aims and objective which provide a sound basis on which this activity takes place, whether prescribed, student initiated, teacher initiated or activity stemming from another source. The capability to monitor such aims and objectives and to observe their realisation in the classroom has been an important facet of the work of the TVEI Consultancy which has led to the development of the ‘Toolkit’.

Theoretical and Conceptual Models

Theoretical and conceptual models are those models that attempt to clarify/quantify such aspects of Technology Education as contexts, resources, capability, awareness, processes, content, etc. The use of a consistent method of locating such aspects and their underlying models on a broad Technology Education base has been very useful in identifying strengths and weaknesses in the policy for the
provision of Technology Education. There seems to be some agreement amongst those involved with Technology Education on the basic terminology and meaning of these key aspects. Unfortunately for such a potentially dispersed discipline (i.e. through cross-curricular means), the acceptance and understanding of the importance of Technology Education does not appear to penetrate many traditional subject boundaries.

Operational Monitoring Tools or Models

Models that seek to provide a method of analysing the delivery of Technology Education through particular pupil experiences may be considered operational. These models may seek to determine the nature and quality of pupils’ learning experiences; didactic, personal, modular programmes, project based work or enhancements and additions to more traditional forms of delivery.

A Potential Anomaly

There are opportunities for confusion and frustration to occur when there is not a clear and unambiguous method of transfer from policy to practice. The ‘Toolkit’ seeks to identify both policy and practice in such a way as to reconcile any misunderstanding or confusion, and, furthermore, to reassess any discrepancies at a later stage in a comparative way.

PROACTIVE

The monitoring of any activity or system is most effective when it assists in formulating new policy/action, or in modifying and enhancing existing policy/action. In this section we look at the way in which the ‘Toolkit’ is used proactively.

Ensuring provision addresses key characteristics of Design and Technology

Judging by the experience of the National Curriculum Orders for Science, Mathematics and English there is little doubt that in Design and Technology there will be a need to carefully plan what the “...pupils should be taught” and through what activities. This planning is going to be uppermost in the minds of those practitioners and curriculum planners responsible for the implementation of Design and Technology in the National Curriculum. The integrative nature of pupil activities in Design and Technology across the curriculum requires a thorough understanding of the key aspects of this subject area and an ability to incorporate these in to pupil experiences.

The bringing together of knowledge, skills, values and opportunities ...

The Interim Report of the Design and Technology Working Group clearly stated the importance of activities which brought knowledge skills and values together - “... knowledge becomes active in the...” (paragraph 2.19) - and the Final Report states, “... it is the integration of knowledge, skills and values through activities which leads to design and technological capability” (2.14). Both statements imply carefull preparation is needed to ensure the desired outcome, Design and Technological Capability (i.e. the profile component).

... from a variety of sources

There is clear indication in the Final Report of the Working Party on Design and Technology that the contribution from subjects like “…art and design, business studies, CDT, home economics and information technology” will need to be the result of collaboration. Furthermore, the special relationship D&T has with mathematics and science will require closer scrutiny as a result of those links mentioned in the statements of attainment and, particularly, the programmes of study. Clearly, co-ordination is required in statements like; “...pupils will ...draw on knowledge and skills from other foundation subjects”.

... in a variety of contexts

Design and Technological activity does not take place in a vacuum but in a variety of contexts or situations which are “…broad, balanced and relevant” (1.2) “...covering home, school, recreation,
community, business and industry”. For example, in the context of home Economics, or is the home used as a context to stimulate other Design and Technological activities? The organisation of a variety of contexts will be essential “...to engage pupils’ interest and sustain their motivation for learning...” and provide accessibility “...to all girls and boys” (1.7). There is a bi-directional quality of contexts which should be considered. Each context can contribute to Design and Technological activity and Design and Technological activity can contribute to the context. It is important to recognise this bi-directional quality and employ a systematic approach when considering and planning those contexts for such activity.

The need to plan for ...

Many references in the Final Report state clearly the need for planning:-

“...carefully chosen...activities...to extend...capability progressively and enhance confidence” (1.7)

“...sustain motivation” (1.7)

“...to be able to carry over to new situations” (2.8)

“...reflect critically upon their practice and draw conclusions about how to undertake...tasks in the future” (2.9)

“...pupils...progress to...new contexts” (2.17)

“...not simply a matter of expanding knowledge and skills incrementally” (2.7)

“...increasing the interplay of knowledge and skills, value judgements and personal qualities” (2.7)

“...increased complexity...and later...reflect critically” (2.9)

“...categorising under sub-headings...knowledge and skills...to assist teachers to plan schemes of work” (2.14)

“...programmes of study...include:- knowledge, skills, contexts, values and activities through which capability is developed” (2.11)

“...pupils will...draw on knowledge and skills of other foundation subjects” (2.15)

... Progression, Balance, Breadth, Coherence, Continuity

The 'Technology Education Project' report of May 1988 recommended a seven point plan for Technology Education in the National Curriculum. This plan recognised the importance of the planning activities of students and related these to the "In Place of Confusion" model by Black and Harrison:-

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Resources ← Tasks ← Capability
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The use of such a model to assist the planning for progression, balance, breadth, coherence and continuity in tasks, skills, concepts and learning strategies provided points of reference for teachers and pupils.
THE STRUCTURE OF THE ‘TOOLKIT’

The structure of the ‘Toolkit’ is based on the six levels from the Mega-framework, namely:-

1. Content or Nature of the Theme (e.g. Design and Technology)
2. Educational Aims
3. The Learning Experiences
4. Course Structure
5. Curriculum Location
6. Management

The Management level is addressed in six ways:-

1. Nationally
2. Education Authority
3. School
4. Curriculum
5. Classroom
6. Student.

This produces a “Bland Matrix” (Figure 1).

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THEMATIC APPROACH TO WHOLE CURRICULUM PLANNING
(The Bland Matrix)

<table>
<thead>
<tr>
<th>A</th>
<th>Content &amp; Nature of Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Educational Aims</td>
</tr>
<tr>
<td>C</td>
<td>Learning Experiences</td>
</tr>
<tr>
<td>D</td>
<td>Course Structure</td>
</tr>
<tr>
<td>E</td>
<td>Curriculum Location</td>
</tr>
<tr>
<td>F</td>
<td>Management</td>
</tr>
</tbody>
</table>

1. LEA - planning, delivery, INSET, External
2. SCHOOL - planning, delivery, monitoring, INSET
3. CURRICULUM - planning, delivery, monitoring
4. CLASSROOM - planning, delivery, monitoring
5. Pupil / Other

This pro-forma can be modified for different purposes. It can be organised into a readily accessible checklist of the major issues to be borne in mind in any kind of auditing or constructive approach, for instance, technology in a course. When used for reporting, it can both draw attention to what the school regards as its prime management objective and show how the objective is being met in terms of the school’s concept of Technology, its educational aims, its learning experiences and where it appears in the curriculum.

Different schools will have different priorities, and the mapping will reflect this.

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THE BLAND MATRIX

The way in which the inner part of the matrix is handled is dependent upon whether one is planning or monitoring the theme or subject one is working with and the curriculum structure in which the theme or subject operates.
THE 'TOOLKIT' STRUCTURE FOR DESIGN AND TECHNOLOGY

In the structure of the 'Toolkit' for Design and Technology the levels take on the key issues of Design and Technology. Figure 2 shows this structure.

It is important not to seek vertical connections between boxes in Design and Technology 'Toolkit' except down the headings on the left. Each level (e.g. Educational Aims) should be treated in its detail going across the page. The number of sub-divisions horizontally is arbitrary, the key feature being the spinal discipline of the left hand column.

<table>
<thead>
<tr>
<th>ASPECTS OF DESIGN AND TECHNOLOGY IN THE CURRICULUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Content &amp; Nature of Design and Technology</td>
</tr>
<tr>
<td>B Educational Aims</td>
</tr>
<tr>
<td>C Learning Experiences</td>
</tr>
<tr>
<td>D Course Structure</td>
</tr>
<tr>
<td>E Curriculum Location</td>
</tr>
<tr>
<td>F Management</td>
</tr>
</tbody>
</table>

DESIGN AND TECHNOLOGY TOOLKIT

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Interpretation</td>
<td>Model</td>
<td>Purpose/Contexts</td>
<td>Processes</td>
<td>Resources</td>
<td>Audit/ Monitoring</td>
</tr>
<tr>
<td>B General Educational Aims for Design and Technology</td>
<td>Awareness</td>
<td>Capability</td>
<td>Resources</td>
<td>Audit / Assessment / Other</td>
<td></td>
</tr>
<tr>
<td>C General Statement</td>
<td>Direct Acquisition (didactic)</td>
<td>Personal Experience (task-based core)</td>
<td>Case Studies of Technological Contexts</td>
<td>Other (resources, etc)</td>
<td>Audit / Assessment / Other</td>
</tr>
<tr>
<td>D General Statement</td>
<td>Experience</td>
<td>depth, balance, relevance, coherence</td>
<td>Content</td>
<td>depth, balance, relevance, coherence</td>
<td>Audit / Assessment / Other</td>
</tr>
<tr>
<td>E General Statement</td>
<td>Where in the Curriculum?</td>
<td>Inter-discipline Relationships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F General Statement</td>
<td>LEA - planning, delivery, monitoring, INSET, External</td>
<td>SCHOOL - planning, delivery, monitoring, INSET</td>
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<td>Pupil / Other</td>
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</table>

KEY ISSUES FOR EACH ASPECT OF DESIGN AND TECHNOLOGY IN THE CURRICULUM

FURTHER DEVELOPMENT

The 'Toolkit' has most recently been used to make an analysis of the Final Report of the Design and Technology Working Group.

Further details of the 'Toolkit' and exemplification of its use for monitoring and planning will be given at the presentation of this paper.

BIBLIOGRAPHY