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TECHNOLOGY IN THE LEICESTERSHIRE MODULAR FRAMEWORK

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BACKGROUND

During the past five years or so there has been a country wide interest in the development of a modular curriculum. A way of changing the way in which children learn by offering them short duration packages of learning experiences, which when combined result in the award of a GCSE. The reason for modules has been well rehearsed (1) but the main points are (2):

1) Flexibility for students
2) Regular assessment
3) Negotiation
4) Development of equal opportunities
5) Development of active styles of learning
6) Personal development of students
7) Produces a manageable structure for change
8) Professional staff development
9) Curriculum protection for minority subjects
10) Stimulus for staff

The notion of the Leicestershire Modular Framework arose from a meeting of school TVEL coordinators in June 1984, at the end of the first year of the TVEL pilot scheme. At this meeting a common curriculum assessment framework was suggested. It was recognised that a common element of many subjects was problem solving and from this idea a set of five assessment objectives were produced:

1) Recognise a problem and respond to it
2) Locate and/or recall appropriate information, concepts, processes and skills
3) Apply appropriate information, concepts, processes and skills
4) Communicate the outcome of their learning
5) Evaluate and reflect upon the outcome of their learning

For each of these assessment objectives there are a set of attainment descriptors, the relationships between the assessment objectives and the attainment descriptors together with the marks awarded are shown in Figure 11.

An LMF module is defined as a freestanding unit of learning of at least 20 hours duration which may be combined with other
<table>
<thead>
<tr>
<th>Mark range</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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</thead>
<tbody>
<tr>
<td>A RECOGNITION</td>
<td>Can decide on a way to proceed.</td>
<td>Can identify a number of alternative ways of proceeding.</td>
<td>Can choose and develop an overall plan.</td>
<td>Can develop an effective plan, working through a range of alternatives and anticipating.</td>
<td></td>
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<tr>
<td>B LOCATION</td>
<td>Can identify appropriate information</td>
<td>Can select appropriate information concepts processes or skills.</td>
<td>Can compare different concepts, processes and skills.</td>
<td>Can gather and synthesise a selection of concepts processes and skills.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C APPLICATION</td>
<td>Can use straightforward information</td>
<td>Can apply appropriate information concepts processes or skills.</td>
<td>Can apply in a co-ordinated way, a range of concepts processes and skills.</td>
<td>Can synthesise a range of concepts, processes and skills with purpose and precision.</td>
<td></td>
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<tr>
<td>E EVALUATION</td>
<td>Can describe the task and the way it was done; and can draw conclusions from content.</td>
<td>Can identify the strengths and weaknesses of the methods used in the task and draw conclusions from content.</td>
<td>Can evaluate alternative methodologies applicable to the task and draw inferences from content.</td>
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modules to form a programme. A minimum of five modules is required for each GCSE.

In the current scheme for assessment in 1990 there are about 250 module titles. These modules cover a vast array of areas with titles such as "Healthy Eating", "Race and Racism", "Business Organisation", "Theatre Arts", "Microprocessor Control" and "Ergonomics". If a student chooses a programme of five related modules then it is possible to gain a specific GCSE title from:-

1) Beliefs and Values
2) Business and Information Studies
3) Communication Studies
4) Creative Design
5) Expressive Arts
6) Information Systems
7) People and Environment
8) Society Past and Present
9) Technology
10) Technical Services
11) Services to People

The various individual module titles may occur in more than one specific title list.

If a student chooses an apparently unrelated programme of modules that does not fit a specific list for a title (4) then a "General Studies" GCSE can be awarded.

Although a student must complete and have assessed 5 modules for a GCSE title only three marks for each assessment objective are considered for the final grade of award (5).

The LMF is a wide ranging scheme covering many curriculum areas but all assessed on a common, criterion referenced, process based and problem solving framework. The process based and problem solving nature of LMF makes it particularly suited to current thinking for technology and design.

TECHNOLOGY WITHIN THE LMF

The TVEi pilot report on Technology (5) puts forward a number of interesting observations. It identifies technology has a process component and that it is essentially a problem solving process. This view, luckily, considering the LMF parentage, is wholly compatible to the LMF assessment scheme.

A close look at the assessment objectives and the attainment descriptors shown in Fig. 1 represent four hierarchically linked models of problem solving. The simplest linear model lies within the mark range 1 - 2: to decide on a way to proceed, identify information and use this information to produce a recognisable outcome, the student describes the task and the way it was done.
A more complicated cyclical model lies within the marks range 7-8, starting with developing an effective plan, working through a range of alternatives anticipating outcomes to evaluate alternative methodologies applicable to the task and draw inferences from content.

Some of the first modules put forward were for Technology. They have such titles as "Electronics", "Pneumatic Control", "Control Technology Project" and "Electronic Systems", they were hurriedly put together before the full implications of the assessment scheme was understood. The early modules were taught in the traditional manner of the Control Technology courses they had come to replace. For most of these modules the vital element of true problem solving was missing. New approaches had to be used in the modules were to be assessed fairly to the assessment grid. The modules were re-written to make them more understandable and new modules were added to the list so that virtually every area of the 'new technologies' were covered, many were similar, especially the electronics type modules of "Electronics", "Electronics Systems", "Microelectronics" and "Digital Electronics". These had to be re-written to ensure they were sufficiently different to be free standing.

A similar proliferation of modules was taking place within the creative design family of modules, with modules such as "Craft: Jewellery", "Craft: Metal", "Craft: Paper Card Balsa" and other very specific titles were being put forward and still exist for 1990 certification. The problem with these and the technology modules were that they were biased towards knowledge and skills of a specific narrow era of study, and unless they were carefully delivered and assessment tasks carefully chosen the students could not produce assessable work that displayed the full range of assessment criteria. To overcome this a range of new modules were written that aimed to be very wide ranging in terms of the knowledge, skills, concepts, techniques and processes used. The titles include "Technology in Design", "Visual Communication", "Product Design" and "Ergonomics". These modules and a small number of others were seen to embrace all of the other creative design modules and will replace them for assessment in 1991.

The typical pattern for delivering a 12 week module (about 30 hours) is 4 - 5 weeks allowing the students to gain a knowledge base through a combination of experiments, worksheets and lectures followed by 7 - 8 weeks working on a practical project which will form the assessment evidence.

The project or task set is crucial to the success of evidence for assessment, a poorly thought out task will prevent able students from obtaining good marks. The task needs to be sufficiently broad to allow the elements of original thought and research needed, but must not be so putting by being too broad. A vital statement of the scheme is that "differentiation will be by outcome" all students should be set comparable tasks and allowed
using all available resources including teachers and other adults to achieve their best in terms of the assessment grid.

The idea of pre-moderation is important, before the students embark on the module the teachers, working collaboratively, discuss the task or tasks, explore possible outcomes and see if the task is sufficiently broad to achieve all levels of attainment and have sufficient motivation for less able students.

CRITICISMS OF LMF

A number of criticisms have been raised against the scheme these include lack of time for students to complete work and gain an understanding of the module. Students and staff are put under considerable pressure to complete on time. This was often true early on when teachers tried to deliver a module in the minimum time of 20 hours, so that more modules, as many as 6, could be taken in a programme for a specific title. Two reasons were given for this approach, one was to let students gain a wider range of experiences within a specific title the other was to allow students to fail without jeopardizing their GCSE chances. This problem is overcome by the aggregation procedure which automatically ignores two sets of the lowest marks, by reducing the number of modules taken to 5 per programme the time on average can be extended to 50 hours per module.

Students do not gain an in-depth knowledge of a particular title because of the assessment procedures. This is true, if students need to gain a rigorous knowledge of a subject, say electronics, then this modular approach will not provide it. It is better to consider a module as a problem solving exercise using the module title and content as the vehicle for the process.

The amount of time spent by teachers in assessment is too great. This is a very difficult problem to solve and needs to be addressed by the whole school to provide sufficient time for assessment and moderation. It is a personal belief that this is probably the most difficult and expensive problem to solve. One approach is to enhance the timetable to free-up staff at the end of a module to carry-out assessment.

Leicestershire County Schools have a particular problem, the county (excluding the city) has a system of high schools and upper schools. Students move from high schools to upper schools at the beginning of their fourth year. Students embark upon their modular programmes almost from week one. Teachers with the responsibility for fourth and fifth years end up with large numbers of students all producing work that needs careful assessment and moderation at regular intervals without the "relief"or lower school groups to reduce the work load.

Already this problem has caused some schools to reconsider the value of modules. one school intends to revert to a two
year design and technology course using unassessed modules to deliver the course. To prevent more schools from following this lead schools and the local authority need to consider strategies to allow teachers the time required to carry out proper assessments.

One major problem has been to move staff away from the traditional, structured GCE and GCSE courses to the more open ended, experiential approach required by the LMF. This has had to be done carefully through INSET and user groups meetings for the particular module family. the success of the modular scheme depends upon the staff developing an ownership of it and this has been very difficult to achieve.

FUTURE DEVELOPMENTS OF LMF

The Midlands Examinations Group has approved the LMF submission for assessment in 1991. For this MEG has carefully studied the modules and the scheme and recommended changes. All of the technology modules have now been completely re-written or abandoned where they have been found to be similar to other modules. The content has become more specific and more easily related to the assessment scheme. The relationship between the content statements and assessment had caused confusion in the past. All modules now include an example or a task with suggested outcomes and how these relate to the assessment grid, together with a specific assessment grid based on the general framework. Work is continuing on "banking" of modules to allow them to be collected over a longer period of time, say five years and then when five have been completed exchanged for a GCSE. With the present uncertainty surrounding the future of GCSE because of the introduction of standard assessment tasks at key stages 1 - 3 it is difficult to predict the LMF future beyond 1991.

LMF TECHNOLOGY AND DESIGN AND TECHNOLOGY IN THE NATIONAL CURRICULUM

The latest information from the Design and Technology Working Party suggest four inter-related attainment targets that comprise a process based assessment scheme. The attainment targets and programmes of study do not specify a particular set of content. They suggest that assessment should take place over a longer period of time and could possibly, take the form of an extended project (6). All these are compatible with the LMF scheme. A recent report in the "Times Educational Supplement" in the awarding of contracts for the standard assessment Tasks (7) also bears out this idea of an extended task.

For the many teachers who have contributed to and developed the Leicestershire Modular Framework for Technology and Design, it would appear that the proposals for the National Curriculum vindicate their efforts. The problems experienced during the LMF's development may parallel the introduction of the Design and Technology National Curriculum proposals and may be worth
considering as we move into this new phase of design and technology education.

REFERENCES


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