Technology across the curriculum - the Wigan project

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TECHNOLOGY ACROSS THE CURRICULUM - THE WIGAN PROJECT

Carolyn Yates
Advisory Teacher
Wigan Teacher's Centre
Mesnes Park Terrace
Wigan

The purpose of the project

There is a need for a Mode 1 GCSE Design and Technology as well as a coherent course in Design and Technology for many TVEI extension schemes and the implementation of the National Curriculum. At present there is not a GCSE Course available which would provide all the entitlement for design and technology indicated by the National Curriculum proposals. (1)

Wigan LEA was a first-round TVEI Authority and as such was deeply involved in the development of modular courses. In particular, Wigan was the co-ordinating LEA for the science group which produced the Modular science course and its Mode III course formed the basis for CDT Technology B.

As one of the architects of modular courses we have been addressing ways of delivering Design and Technology across the curriculum for 14 to 16 years old students.

The purpose of the Technology Across the Curriculum project (TAC) is to co-ordinate groups of practising teachers from a variety of curriculum areas so that they can write design and technology modules and supporting teaching materials. These modules will be trialled formally in five pilot schools and made freely available to other schools in the Authority. The North East Examinations Board have expressed a strong interest in the pilot phase and may assist the development of a Mode I GCSE.

A Rationale for developing a cross-curricular Modular course for Design and Technology

The National Curriculum proposals (1) state that design and technology must be seen as

"an activity which goes 'across the curriculum', drawing on a linking in with a wide range of subjects"

It makes sense then to consider a cross-curricular delivery mode which would fit in to existing curriculum structures without requiring major changes in resourcing or timetabling. The TVEI extension in Wigan ensures that each school will have a design and technology co-ordinator who could oversee the implementation of such a scheme.

A modular scheme has appeals to schools because it can be
"seen as a way in which schools can respond to the increasingly forceful and urgent criticisms made by HMI and others about the inflexibility of the curriculum, particularly for the 14 to 16 age group." (2) p.16.

In addition almost all TVEI schemes have made significant use of modules as a way of ensuring that general education continues alongside the technical and vocational elements in a student's programme.

"An already overfull course could only be enhanced if some elements were introduced as short courses. 'High Tech' areas such as computing, robotics and micro-electronics could be introduced as 10 week modules".

The alternative to a cross-curricular modular scheme delivered across the curriculum would be to devise a modular scheme made up of cross-curricular elements delivered in a timetable slot. These two alternative delivery modules can be shown in a simple diagram. (fig1 and fig 2)
**DELIVERING THE NATIONAL CURRICULUM**

**FIG. 1 - Across the Timetable**

<table>
<thead>
<tr>
<th>CORE</th>
<th></th>
<th>FOUNDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Maths</td>
<td>Science</td>
</tr>
<tr>
<td>10%</td>
<td>10%</td>
<td>20%</td>
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<td></td>
<td></td>
<td>History Geography</td>
</tr>
<tr>
<td></td>
<td>10%</td>
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</tr>
<tr>
<td></td>
<td>Expressive Arts</td>
<td>PSE RE PE</td>
</tr>
<tr>
<td>10%</td>
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<td>Language</td>
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<td>10%</td>
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<td>Option</td>
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<td>10%</td>
<td>10%</td>
<td>Option</td>
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</tbody>
</table>

**DESIGN AND TECHNOLOGY**

**ACROSS THE CURRICULUM**

**FIG. 2 - Within a Timetabled Slot**

<table>
<thead>
<tr>
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This assumes that, for the time being anyway, schools will continue to use the 10% time block for subject areas and that most students will follow a 20% Science.
This assumes that, for the time being anyway, schools will continue to use the 10% time block for subject areas and that most students will follow a 20% science course.

Adopting the mode of delivery shown in fig 2 narrows option choice, whereas the delivery mode outlined in fig 1 allows students more flexibility to pick up a second language, "top-up" expressive arts and humanities courses to give enough time allocation for the completion of GCSE syllabuses or follow a course not available through the National Curriculum such as food studies or Media Education.

Implementing the delivery mode in fig 2 will require massive in-service developments to ensure true cross-curricular input through a central team of design and technology teachers who will probably have expertise in only one curriculum area e.g. CDT, Home Economics, Business Studies or Art and Design. The National Curriculum proposals are rather vague as to how a broad range of cross-curricular skills and knowledge can be brought in to a course based mainly on CDT, Home Economics, Business Studies, Art and Design and Information Technology (1) 2.15 p 10. The TAC project draws on cross-curricular strands from the outset and aims to provide a rich design and technology experience to students whilst allowing them the freedom to select the contexts in which this is obtained in the light of the preferences and aptitudes.

"Too much reliance on any particular technological or design method, often imposed on reality post hoc, can be delusory, premature and inhibiting. Technological education, above all, needs freedom of expression and a variety of opportunities for different approaches". (3)

Development of modules

To devise the modules we adopted the framework outline by the 'Technology for All' Working group, which represent 17 LEAs in the North-West. The TFA scheme proposes that Technology has no specific core of knowledge but that it is a process which can be experienced and realised through a range of different media. The scheme also proposes that a Technology Entitlement Curriculum consists of three elements: Awareness, Competence and Capability.

These can be summarised as follows:

RESOURCE ENTITLEMENT - the acquisition of knowledge and concepts about design, materials, energy and forms of control.

COMPETENCE ENTITLEMENT - ability to use and apply instruments equipment and systems. The opportunity to use materials and manufacturing processes.

AWARENESS ENTITLEMENT - opportunity to consider the impact of
of technology within a historical, environmental, social and economic context.

CAPABILITY ENTITLEMENT - opportunities to use the processes of design apply systematic ways of working and evaluating by testing and comparing with the original purpose and in doing so provide a context for applying the required Resources, Competences and Awareness. (4) section 5

In 1987 Stan Cooper, Senior Advisor for Wigan LEA, started two curriculum writing groups, Art and Home Economics. Now these Curriculum writing groups have been extended to involve over 60 teachers in 13 schools and 9 curriculum areas. These groups are co-ordinated by and Advisory Teacher, Carolyn Yates. There are writing groups in:-

Media Studies/English
Home Economics
Science
Visual Arts
Business Education/IT
History
Geography
Music
CDT

Their purpose is to devise module outlines and teacher guidelines. Teachers from these groups are involved in an informal trialling of the material.

In developing this scheme we have identified areas of technological experience within existing courses. This is usually by making explicit and elaborating what is presently implicit in such courses. We have tried not to alter the courses as such. They will continue to lead to existing GCSE examinations. The design and technology identified in these courses is being packaged to form modules that address specific areas of Design and Technology Entitlement.

Our modular pattern is based on the seven module scheme adopted by all the original TVEI developed modular courses. This is to ensure compatibility and provide flexibility in incorporating existing modules within the scheme.

FIG. 3

| ← COHERENCE → |
| 1 MODULE |
| 20-22 HOURS WORK |
| ← PROGRESSION → |

The Module

The Module addresses all the Criteria within a specified element of the Technology Entitlement (i.e. Capability, Competence and/or Awareness)
Figure 4

Model Used for Development of TAC Modules

- **Awareness**
  - AT.4
    - G. Knowledge and understanding of social, historical and economic impact of technology
  - AT.4
    - F. Evaluation of Design and Technology activities, economic, historical and social

- **Capability**
  - AT.1
    - A. Explore and investigate
  - AT.2
    - B. Generate solutions
  - AT.2
    - C. Develop design
  - AT.3
    - D. Make artifact, system or environment
  - AT.4
    - E. Evaluation of own Design and Technology activity

- **IT**
  - Use of data bases, spreadsheets and wordprocessing in a range of contexts

- **Competence**

Design skills = A, B, C
Making skills = D
Evaluation skills = E, F
Awareness skills = G

**AT** = Atainment Targets in National Curriculum proposals

[ ] = Assessment criteria for **Awareness** module

[ ] = Assessment criteria for **Capability** module

[ ] = Assessment criteria for **Information Technology**
The modules are now being brought in line with the National Curriculum Proposals.

Fig. 4 shows how the model used to underpin TAC can be related to the four Design and Technology Attainment targets and the IT Attainment target. The letters A to F correspond to draft criteria being trialled for assessment purposes and their wording will change to bring them in line with the National Curriculum proposal's wording.

At present the proposals relating the TAC Modules to a potential GCSE are that:-

- students will complete 7 modules

- no one subject area can offer more than two modules co-existing with the course they already offer. This ensures breadth

- each module will cover either Awareness of Capability and competence aspects of design and technology entitlement. Students will select between 4 and 5 capability modules and 2 and 3 awareness modules

- the criteria for assessment are those labelled A - G on Fig. 3

- Information Technology will be assessed within all modules.

A student's timetable might look like the one shown in Fig. 5. The shaded blocks represent design and technology modules embedded within the subject course on offer.

Accreditation of Modules

Long term it is hoped that the Northern Examination Association will help develop a GCSE Mode 1 course from the pilot work. The NEA have supported the developments so far.

Wigan LEA is also involved with the Credit Accumulation project, one of the TAC pilot schools is also piloting this so links between the two are being built.

In the short term many of the writing groups have developed smaller units of work within the modules that are being accredited under the Northern partnership for Records of Achievement.

Unit Scheme

Phase 2 of the TFA (4) work has also produced units which are accredited under this scheme and are appropriate to the TAC Modules.
FIG. 5 - Example Student Timetable

The modules available so far are listed in Appendix 1.

FIG. 6 - Timescale for the project.
In-Service

First Phase

The meetings of the writing groups served as an informal in-service tool for raising awareness about design and technology issues. They provided a "safe" forum for sometimes heated argument and debate. Because each group was committed to the production of modules and support materials, this task could act as a focus and defuser for unproductive and circular arguments. Having a specific task gave the groups motivation and a sense of purpose which general discussion groups or lectures about the nature of design and technology would not have done.

There is now a "shared" language describing design and technology between teachers from different curriculum areas. The materials produced by the groups are "owned" by teachers, they contain examples of learning experiences used by teachers thus they have a high degree of credibility with other teachers who were not involved in writing them. This makes it more likely that the materials will be used. One pilot school has decided to set up its own school-based writing groups in a manner similar to the Authority-based groups.

Second Phase

The writing groups will continue to meet and respond to feedback from the trialling of the materials as well as come to grips with National Curriculum requirements. In addition more in-service meetings will be organised to service the needs of the pilot schools. There will be two types of meetings. Each pilot school will be encouraged to organise its own, internal meetings to discuss the rationale behind TAC and monitor the use and effectiveness of the modules. An advisory teacher will act as a consultant at these meetings if the schools request it. Link meetings will be set up for all the pilot schools so that good practice and problems of monitoring and assessing can be shared in a supportive environment. Both the internal schools meetings and the link meetings will provide feedback to the writing groups (see Fig. 6). There will be no in-service support offered to non-pilot school teachers although they will be able to attend writing group meetings. The frequency of all meetings will depend on demand from the teachers.

Evaluation

Informal feedback indicates that subject teachers find the prospect of using the TAC Materials less threatening than the prospect of a separately time-tabled design and technology "bolt-on" cross curricular additions. One measure of the TAC success will be the voluntary informal up-take of the modules. Each module has an
evaluation sheet attached to it. (Appendix 2)

The use of the materials will be more tightly monitored in the pilot schools by direct observation, questionnaires and interviews with both teachers and pupils. The Wigan monitoring instrument (Appendix 3) will also provide a means of assessing if students themselves can identify a coherent design and technology education.

The TAC project is answering a perceived need for teachers in Wigan. This can be inferred from the proliferation of curriculum writing groups. The writing groups for Home Economics, Science, Visual Art and Media Studies were set up under the direction of Stan Cooper, Senior Adviser. All the other curriculum writing groups have been formed in response to direct requests from teachers who heard about existing writing groups.

The Future

Obviously TAC Modules will have to be brought in line with National Curriculum requirements if they are to survive. There are two major concerns here. The first is that the National Curriculum proposals state that a GCSE in design and technology will involve one major and two minor "design and make" projects. The TAC project, at present, proposes that students complete four or five "mini-projects", each one attached as a design brief to the capability modules. The Awareness modules do not include a design and make element. It may be possible to link two TAC modules together to give a double module with one attached design brief, the equivalent of a major project.

The second area of concern is that the National Curriculum proposals include an understanding of Mechanisms, Structures and Energy in the "core". These concepts may have to form the basis of some compulsory core TAC modules, perhaps delivered by Science and/or CDT departments. All the other "core" aspects defined in the proposals can be found, to varying degrees, in the existing modules although these will need modifying to enhance or make these aspects explicit.

One thing is clear, the choice offered to students through the TAC project at fourteen years does depend on a comprehensive and balanced pre-14 years design and technology education. The curriculum model relating the TAC materials to pre-14 education may look like Fig.7 overleaf.
Compulsory D & T Course based on Home-Economics, CDT, Business Ed., Art and Design, IT.

Option choices GCSE's in designated subjects and Design and Technology.

Compulsory core modules (mechanisms, structures, energy)

11-13 years 14-16 years