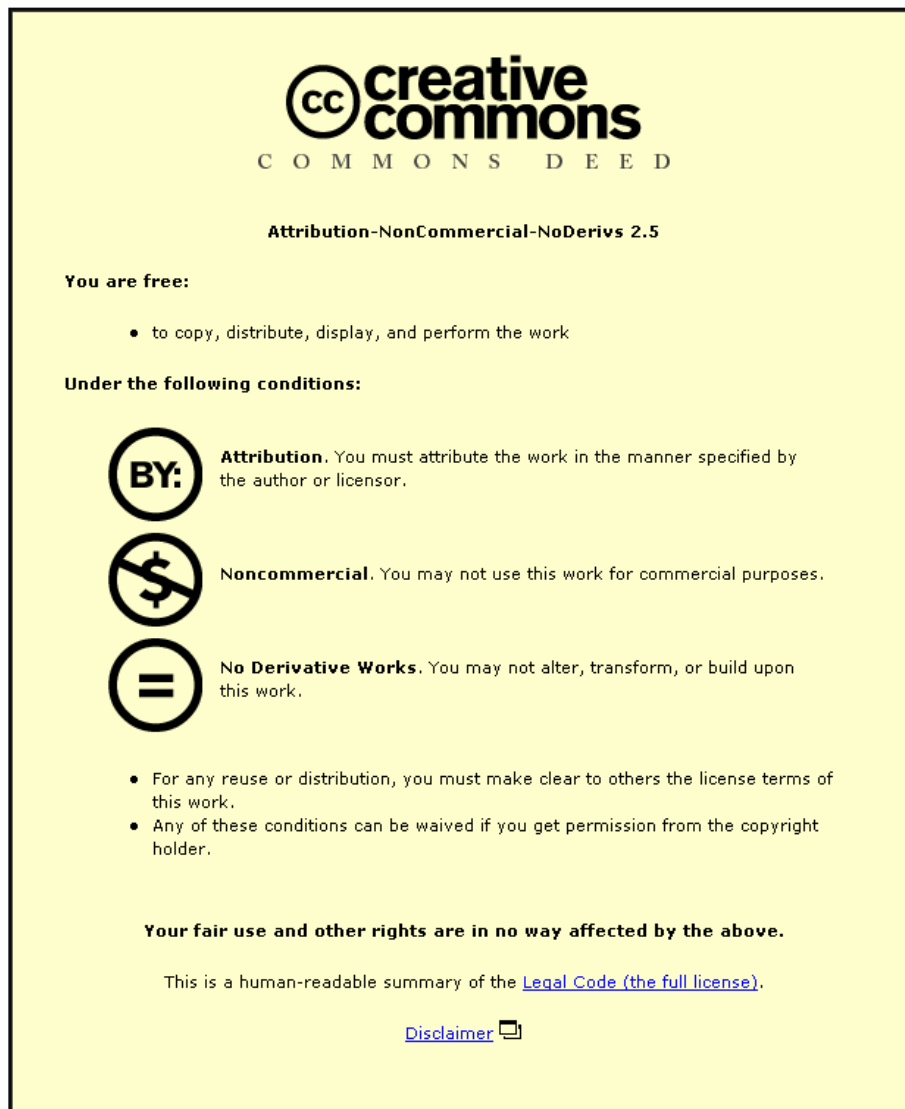




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Real contexts for Design and Technology: the “Six Counties Technology” Flexible Learning Project

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Abstract

The Six Counties Technology Flexible Learning Project, which, in conjunction with museum services and industry, is producing curriculum materials based around real contexts for design and technology, is described. The context of the project is set out in terms of the need to develop curriculum materials which are compatible with the changing educational environment. Some outcomes of trialing the materials are presented. Criteria for evaluating the project during its pilot phase are discussed and the intended outcomes of the project are described.

Introduction

In Britain we do not now have a good reputation for the production of certain consumer durables. We import German cars, Japanese electronic equipment and even Italian kettles because, in part, they look better than most home-produced items. It has never been enough simply to have items that do the job. Good design and the cost-efficiency of the product are bound together - there is an intricate linkage between design and technology.

Good design involves an awareness of people and their needs - aesthetic, social, environmental and political as well as practical. Too often in the classroom, students are given artificial design problems that do not stimulate and do not provide the scope to produce testable solutions. Students will gain more of a design sense if they are involved in ‘real’ problem-solving and have a perspective on how other people have solved similar problems. An example comes from Cooper School, Oxfordshire. When the M40 extension was being built, groups of students working with *Tarmac* engineers, surveyed a section of the route, constructed a scale model and discussed technical problems. They saw key aspects of a major engineering project and were able to relate the perspectives gained to a final outcome. They used images of the road building in work in photography art, music and drama.

The road has to work, clearly, but it also has to be reconciled with social and environmental stances within the community. This is where design comes in. Ideally, it enhances our enjoyment of the material world: at worst it is damage limitation. The implications for design and technology teaching are that teachers need to know how to make potential problems available for students to investigate. Those in industry and other agencies need to know what students are capable of and how they can help teachers and students in addition to accruing some benefit themselves. Such an approach

demands *flexibility* in the widest sense of the word and it is with this aim in mind that the Six Counties Technology Flexible Learning Project was launched as an extension of the Six Counties Technology Project.

Six counties technology

The Six Counties Technology Project was a three year project, 1987-90, funded by the (then) Manpower Services Commission to promote the development of technology within and across the curriculum. This was achieved by working with schools and colleges in Berkshire, Buckinghamshire, Leicestershire, Northamptonshire, Oxfordshire and Warwickshire. These schools and colleges were collectively boys, girls, mixed, 11-16, 11-18, 16-18, selective and non-selective, and represented the full range and experience of extent and type of provision of technological education (Davies, 1990; Davies, Gilbert and Dillon, 1991a). The outcomes of the project were managerial frameworks for technological education, the development of new curriculum materials for technological education and staff development and training strategies and materials.

An evaluation of the project was undertaken by staff of the Faculty of Education and Community Studies at the University of Reading (Davies, Gilbert and Dillon, 1991b). Eight major themes concerned with the management of technology and the way it was taught were identified and these were subsequently developed and published as curriculum materials (Davies, Gilbert and Dillon, 1991c).

In March 1991, the project was reconstituted as Six Counties Technology, a Company Limited by Guarantee with registered Charity Status. Six Counties Technology is concerned with the development of technological education in the widest sense and continues to work on the production of resources and the training of staff in schools and colleges.

The flexible learning project

This project is sponsored by Northamptonshire, Leicestershire and Oxfordshire LEAs, British Telecom and Nuclear Electric. Seven packs of flexible and interactive learning materials have been produced and were trialed in schools in the summer term, 1992. The themes and the collaborative agencies are:

- Leathercraft - Museum of Leathercraft, Northampton and Pearce Tandy Ltd, Northampton;
- Technology through archaeology - Northamptonshire Archaeology Unit;
- Domestic technology - Leicestershire Museum Services;
- Grain storage and production - Oxfordshire Museum Service and Pimlico Farm, Brackley;
- Animal care and control - Twycross Zoo and Faccenda Chickens, Brackley;
- Steel in the construction industry - British Steel;
- The logistics of moving commercial premises - Galmer Engineering, Bicester;

Each flexible learning pack, revised and refined after trialing, consists of the following (a full content specification is given in the appendix):

- stimulus material for teachers and students which raises an awareness of a range of 'contexts' including the problems, issues and constraints likely to be encountered in the real world and in the classroom;
- an ideas bank and guidance for teachers and students on activities and experiences. This includes suggestions about how external agencies can be used in support of learning;
- support materials for teachers and students on the teaching and learning of skills and knowledge;
- 'case study' illustrations of contrasting approaches to learning and methods adopted by the trial schools;
- National Curriculum cross-referencing;
- photographic illustrations and "handling packs" of materials where appropriate and where possible.

An example is provided by the leathercraft materials. The leather industry has a long history in the counties of the LEAs sponsoring the project. Companies and organisations whose interests are concerned with leather include manufacturing industries (shoes etc), tanneries, The Museum of Leathercraft, Northampton, The Central Museum and Art Gallery, Northampton, The Pitt Rivers Museum, Oxford, and The Leather Centre, Nene College, Northampton.

Leather is a medium that lends itself to the production of high quality artefacts because of its strength, suppleness, water-resistant properties and dyeing properties. Artefacts can be produced by students of wide age and ability ranges. By carefully planning teaching and learning styles, different targets and goals can be addressed for different students in a class. The flexible learning materials produced by Six Counties Technology aims to support teachers by suggesting approaches to using leather, including spelling out some of the problems and indicating constraints that need to operate in the classroom. The materials can stimulate and support students by pointing to places and possibilities where they can identify needs, evaluate outcomes and gain experience of leatherwork leading to achievement at appropriate National Curriculum Levels.

During trialing of the leathercraft materials, the following matters were identified as pertinent to developing the flexibility necessary for success in providing real contexts for design and technology:

- an identification of the organisations and individuals which exist locally to support the project;
- a policy of building on the interests and strengths of staff and of providing appropriate INSET, for example to enable staff to develop 'textile' type skills such as stitching and beadwork;
- the development of products which reflect school or personal needs for example, making Christmas presents and wallets, or producing products for an enterprise venture such as a school sale;
- an enablement of students to identify needs and observe a variety of situations where leather is used to serve a range of needs and solve problems.

Evidence of the success of the approach during trialing came from the following:

- schools were able to gain access to large numbers of items and displays of modern and historical products made from leather;
 - schools were able to track the use of leather across different cultures, for example, Native Americans, African tribes and nations;
 - teachers had access to INSET at museums and support from representatives of leather industries;
 - leather (much of it free) and tools were provided by industry who are exceptionally keen to promote the use of the material in schools;
 - schools were able to use local leatherwork stockists, tanneries, and individuals with craft and business expertise to provide students with a range of experiences. These included the development of skills, the celebration of cultural aspects of leatherwork, and an understanding of some of the processes involved in the mass production of leather artefacts.
- the increasing impact of media communications on everyday work and social life;

Within education they include:

- the development of a National Curriculum, where basic content is specified. This enables attention to be focused on improving the quality of the learning achieved;
- the expansion of interest in assessment methods, particularly when practical work and problem-solving is involved. This is taking place within the framework provided by profiling and records of achievement for the National Curriculum;
- the move towards redefining the boundaries between school and community, including the world of work, through which there is a corresponding search for new approaches to learning;
- new teaching technologies which are increasingly permeating the curriculum and providing opportunities for the introduction of more diverse approaches to learning.

Seven schools will be selected to pilot the flexible learning materials in the autumn term, 1992. Evaluation will be carried out simultaneously by staff of the Faculty of Education and Community Studies, University of Reading.

Flexible learning in real contexts and its evaluation

The Education Reform Act does not prescribe how pupils should be taught. It is the birthright of the teaching profession, and must always remain so, to decide on the best and most appropriate means of imparting education to pupils. If the whole curriculum is to mean anything then it must be imparted by the use of a wide range of teaching methods, formal and informal, class and group, didactic and practical. The wide range of skills which pupils must acquire must be reflected in an equally wide range of approaches to learning (NCC, 1990).

Within this guiding philosophy there is a recognition that teaching and learning methods should be adaptable to the rapid changes which now characterise society, the economy and education. Within society and the economy these changes include:

- the use of increasingly sophisticated technology, including information technology;
- changing patterns of employment and leisure;

In recent years the Technical and Vocational Education Initiative (TVEI) and similar initiatives have sought to promote approaches to teaching and learning which are compatible with the changing educational environment. The central premise here is that students learn most effectively, and their motivation to learn is greatest, when work is grounded in personal and first-hand experience. Above all, approaches to teaching and learning, in order to accommodate change, need to be flexible.

Flexibility in teaching and learning implies adaptability along a series of dimensions in terms of the joint and individual responsibilities taken by the teacher and students:

Curriculum

Teacher-decided ——— Student-decided

Fixed timing ——— Variable timing

Fixed context ——— Variable context

Teaching

Talk-based ——— Resource-based

Closely tutored ——— Lightly tutored

Learning

Separate working ——— Group working

Teacher dependent ——— Teacher independent

Assessment

Summative ——— Formative

End-of-course ——— Continuous

There is no universal formula for achieving flexibility in terms of these dimensions. There are occasions when, through necessity, the learning environment will be exclusively teacher-directed; on other occasions the learning will be heavily student-directed. A teacher who operates flexibly manages the learning environment to make the best use of his or her professional knowledge and skills, the classroom and resources available, and the needs and abilities of the students for the task in hand. There will be occasions when specific skills or elements of knowledge need to be introduced in a directed and formal manner although the long-term aim might be towards student autonomy.

The evaluation to be conducted by the University of Reading will be concerned with establishing the extent and ways in which the materials produced by Six Counties Technology promote teaching and learning which is both flexible and effective. In terms of learning this will involve investigating how students are:

- educated progressively and systematically to accept responsibility for their own learning;
- able to operate flexibly, calling on support as and when they need it particularly when adopting work patterns which lead to greater independence and self-sufficiency;
- able to practice and apply core skills as an integral part of their learning.

In terms of teaching this will involve investigating how teachers:

- are able to adapt learning tasks to the individual needs, both academic and personal, of the students and to provide them with the flexibility to progress at rates which are manageable;
- demonstrate a concern for enrichment with its implied additional input, in terms of quality and quantity, as a means of extending and developing ideas, interests and enthusiasm;
- are able to identify and organise resources within a framework of quantifiable constraints so that students use them effectively to develop a range of abilities and competencies. Resources include

any source of learning - people, places, materials, organisations;

- are able to promote circumstances in which skills and knowledge may be transferred from one situation to another, particularly in terms of different learning environments implied through the development of the flexible learning materials.

The evaluation will involve two visits to each of these schools to conduct the following interviews:

- with students, to establish how learning takes place, what has been learnt and their views on the approach to learning including some indication of the skills required;
- with teachers, to establish how the materials are used in the curriculum, the teaching skills and the classroom management required.

Some classroom observation in support of the above may also be necessary. The intention is to produce an evaluative report and a guide to good practice which can be published with the materials in 1993.

References

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- NCC, 1990 *Curriculum Guidance 3 The Whole Curriculum*, York: National Curriculum Council.

Appendix

Structure and content of the flexible learning packs.

Each pack consists of:

1. *An A4 folder* to hold the material (ring binder). The cover design, to be published in colour, uses simple illustrative graphics to reflect the theme title and objectives.
2. *A common introduction* (to be included in all packs).
3. *An A4 card* listing the pack contents and highlighting the purpose of the material. Teacher and student material is separately and clearly identified.
4. *An acknowledgements sheet* listing collaborative agency, trial schools etc.
5. *A forward* produced by a key, link figure from the collaborative agency.
6. *A teacher summary sheet* - An A4 sheet folded into three listing:
 - aims and objectives;
 - learning outcomes from the tasks;
 - cross-references with National Curriculum including:
 - contexts,
 - programmes of study;
 - levels of attainment;
 - resources.
7. *A teachers guide* - An A5 booklet sectioned as follows:
 - a. An illustrated cover.
 - b. Guidance on setting the context for activities, links that could be forged, local circumstances that could be exploited; teachers background information on the tasks.
 - c. Resourcing:
 - staff/materials/equipment/ accommodation/collaborative agency/ancillary support etc.
 - d. Management:
 - general organisation;
 - staff/timetable/accommodation/ resource/ storage
 - learning development progression/ differentiation/ assessment of skills and knowledge.
 8. *A pupil summary sheet*- An A4 sheet folded into three listing:
 - aims and objectives;
 - what may be achieved;
 - what may be experienced;
 - what may be done.
 9. *Pupil material* including:
 - a. Context material:
 - general background, circumstances relevant to tasks and problems;
 - photographs/slides/written articles/artefacts in plastic wallets.
 - b. Task sheets:
 - level related within the key stage (problems and activities cross-referenced with skills and knowledge);
 - areas for investigation and research.
 - c. Skill development sheets:
 - related directly to programmes of study;
 - exercises and activities to develop and assess skills required to realise tasks.
 - d. Knowledge and understanding related to programmes of study:
 - using information sheets/activities/ exercises, particularly in context of the collaborative agency and its ability to introduce new areas of knowledge and understanding required to address the tasks, including processes, methods, materials etc.
 - e. Information sheets and visual aids to support b; c and d.
 - f. Case studies of how similar tasks and problems were solved by the collaborative agency.
 - g. Assessment material and records of achievement not integrated into either b, c or d.