POSTGRADUATE CERTIFICATE in EDUCATION

TEACHING IN PRIMARY SCHOOLS
PRIMARY MODULE 11

TECHNOLOGY
School of Education

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DESIGN AND TECHNOLOGY

Prepared for the course team by Philip Poole
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Grateful acknowledgement is made to the following sources for permission to reproduce material in this Module.

Figures

Figure 5: The Assessment of Performance in Design and Technology, School Examinations and Assessment Council (1991); Figures 9 and 14: STEP Design and Technology Cards from Key Stage 2, Cambridge University Press (1992); Figure 11: Richards, R. (1990) An Early Start to Technology, reproduced by permission of Simon & Schuster Education, Hemel Hempstead, UK; Figure 12: Rowlands, D. and Holland, C. (1991) Problem-Solving in Primary Science and Technology, Stanley Thornes; Figure 15: Design and Technology Issues: Food Activities, National Council for Educational Technology (1991); Figure 16: Planning Design and Technology at Key Stages 1 and 2, National Curriculum Council (1991).
1 Design and technology in the curriculum

Professor David Layton described the importance of the introduction of design and technology (D&T) into the curriculum thus:

The emergence of technology as a component of general education is one of the most significant curriculum developments in recent years. In numerous countries throughout the world attempts are being made to incorporate technology into the education of all children ... never before has an attempt been made to teach D&T (design and technology) to all children throughout the 11 years of compulsory schooling ... Clearly, the attempt to incorporate D&T as a component of the general education of all pupils is ambitious. However, the contribution that the subject can make is both unique and of great personal and social significance today.

Too often in the past, academic knowledge, 'knowing that', has remained disconnected from practical action, 'knowing how' ... D&T capability empowers people to operate effectively, creatively and confidently in the made world ...

(Layton, 1991, pp. 1-3)

As Professor Layton indicates, design and technology is a recent development in the curriculum, particularly in primary education, and its unfamiliarity makes it a difficult subject area to deal with within teacher education. For many students the practical nature of the subject has been a variable, even neglected area of education. This Module will help you to understand the nature of design and technology in the primary curriculum through activities which include:

- reflection on your own experience;
- practical tasks;
- observing children at work on video;
- an exploration of some of the main areas of the subject.

We will encourage you to record your perceptions of what the subject is, the way it is set up in the classroom and the demands it will make of pupils and your practical capability.

1.1 What is technology?

The word technology is in everyday use but means many different things to different people. Before we begin to consider the demands of teaching D&T in the primary curriculum it is important that you consider your present understanding of what technology is. One useful strategy for exploring ideas is to brainstorm the concept.

ACTIVITY 1

- Brainstorm the word 'technology'. What associations come to mind? Write down phrases or sentences which contain the word, and any images or impressions you have about what technology means to you.

Don't worry yet about what it means in schools; what does it mean to you as a person, a citizen, a homemaker, a consumer?
Below are some PGCE students' ideas about technology. Did your brainstorming produce similar images?

- 'something ending in -ology such as biotechnology';
- 'pneumatics... can I spell it?';
- 'large chemical plants and power stations';
- 'men (and specifically men) in white coats testing new products in laboratories';
- 'microelectronics and telecommunications systems';
- 'getting a man on the moon';
- 'the mechanical production of objects made from metals, plastics and electronic components';
- 'damage to the environment due to thoughtless exploitation of natural resources'.

Many of these images are emotive and many teachers find that they have a natural antagonism towards some of the aspects of what they understand to be technology. As teachers, it is important to be aware of our own personal attitudes to technology, and to appreciate the views of others. 'Pictures' drawn by children of scientists produce similar images to the above and it is important to recognise that attitudes are formed at an early age. Children have little perception of what the word 'technology' means but you should explore attitudes to technology with them, and with your friends and other teachers, if you have the opportunity.

Whatever our feelings about technology, all of us use its outcomes in our everyday lives. At its most basic level technology allows us to avoid experiencing the world as it really is. Technology helps us survive more effectively, safely and comfortably. It provides food, water, warmth and shelter. It enables us to feel free from the threat of disease, to be able to relax and play, to keep in touch with friends and loved ones. Our view of the future often relies on the perceived prospects of changes in the way we live being made possible by technology.

1.2 Design and technology in the national curriculum

The national curriculum uses both 'design' and 'technology' to describe the area of the curriculum addressed by this Module. There are three sorts of pupil activities described in the D&T programme of study which we will be considering:

- assignments in which pupils design and make products;
- focused practical tasks in which pupils develop and practise particular skills and knowledge;
- activities in which pupils investigate, disassemble and evaluate simple products.

However, we will not be concerned here with information technology (IT), except in its impact on designing and making, as it has an impact on all subjects in the national curriculum. In Northern Ireland this area of the curriculum is called 'technology and design' (TAD).
**Activity 2**  
'Designer' is a very fashionable term at the moment. Make a list of all the designers you can think of.

From which fields did your designers come? Professional designers work in fields as diverse as town planning and fashion, engineering and ceramics. All designers are basically problem-solvers: they aim to match technological solutions to the needs of people who will use them. Indeed businesses have recognised that design can help sell their products, but the art of good design is elusive and difficult to categorise.

**Activity 3**  
A group of PGCE students undertook a short module that investigated the relationship between art and design. Here are their reactions when they were then asked 'What is design?' Do any of your designers engage in these types of activities?

Design is:
- planning how to make things;
- appraising;
- creating and exploring an idea;
- the initial stages of production of a commodity;
- drawing and deciding on what you want or need with specific criteria in mind;
- problem solving;
- putting ideas together.

Whether you think design is to do with how things look; a clever way of persuading people to buy products they don't need; or a problem-solving process which aims to meet people's needs, it is important to recognise that, as with 'technology', people have different attitudes towards the activity we call designing.

Design and technology in the national curriculum aims to link the creative elements associated with the concept of design and the more utilitarian interpretation of technology as 'making for a purpose'. This link is an essential one, since defining technology without reference to design is difficult. The National Curriculum Council described both elements as having a single aim:

Design and technology involves applying knowledge and skills when designing and making good quality products fit for their intended purpose.

(NCC, 1992, p. 13)
1.3 Your school experience

The meaning each of us attaches to the idea of design and technology comes from many different sources, at least part of which is our own educational experience. We would like you to reflect on your education in this subject area.

Look at the comments below made by PGCE students talking about their technological experiences in school, and then answer the questions that follow.

- 'In primary school I did very little technology, we made cards at times such as Christmas and Easter.'
- 'At secondary school, an all boys school, I did woodwork, metalwork, textiles and cooking. From the fourth year I did CDT and I opted to do O level electronics. I gave it up when I went into the sixth form.'
- 'I went to a girls' grammar school and we did very little practical work, some home economics, but not once we started on examinations.'

1. What factors appear to have influenced their experience?
2. Do home economics and textiles count as technology?
3. What factors influenced your school experience of technology?
4. What impact did the type of school you attended (selective, single or mixed-sex) have?

Summary

Some common patterns often emerge from reflective exercises such as those you have just done.

- Most people are confused by what constitutes a technological experience.
- Designing is an activity which most people think they understand, but its relationship with technology is difficult to categorise.
- Little of what most of us generally understand by the word technology was taught in primary school.
- Gender played a large part in determining types of experience at secondary level.
- Most people have a fairly poor all-round experience of design and technology.

1.4 A design and technology activity

To provide a focus for discussion about the nature of design and technology in education we would like you to engage in a short D&T activity. This light-hearted introduction requires you to design and make something but should not require specialist materials – just what you have at home. We are going to identify the situation in which you will undertake the task and then present you with a design brief.
This is the story of Reg who lives alone in a first-floor flat with access via stairs. He is healthy and agile enough to take a twice-weekly walk into town where he buys his food and other supplies. He carries his shopping in a soft bag that he finds far more convenient than a rigid basket. He has just one problem with this: he likes to buy just two, fresh free-range eggs from the local health shop each time he goes to town. He has tried using a conventional six-egg box but feels it is unnecessarily bulky. He has had several mishaps and, for various reasons, feels that an improved carrier for two eggs must be possible (see Figure 1).

FIGURE 1
Reg's problem
Source: The Open University, 1992a, p. 24
1. Undertake the following design brief:
   Design and make a prototype of a two-egg carrier that will satisfy Reg's need. We have built time into the Module to allow you to carry out this activity. Record your feelings about undertaking the task as well as recording the progress of your design and annotated sketches. It is important that you do this activity practically as well as sketching your ideas, as an aid to your reflection on the process involved, and a guide to children's perceptions of such tasks.

2. Next, take time to reflect on how you worked at the given task.

3. Now, relate the experience you have just had to the way you will need to set up learning experiences for the children you teach, that is, to your teaching strategy.

The groups of teachers who trialled this Module were very keen to see each other's egg-carriers and there was much exchange of practical ideas and hints. We will return to your experience of making later.

You will find that we subsequently concentrate in our analysis on the designing rather than the making aspects of your project, since within distance learning we can carry out an analysis of designing more effectively than we can an analysis of your making skills.

1.5 Initial responses

1. Look at your notebook record of your own initial response to the design brief.

2. Next, look at the responses below of some teachers who were involved in the early development of the Module, and decide which one you most identify with. They reported a range of initial responses to the task:
   - 'Am I going to be able to do this?'
   - 'Great, just the sort of activity I enjoy!'
   - 'Why should I do this?'
   - 'Eggs again!'
   - 'I've got a commercially produced egg-carrier I use for camping that is just what's needed.'

Such responses raise issues about the nature of the activity as well as how important the initial response is. Some teachers became immediately involved and absorbed in what they were asked to do. Others took more time, and one spent the best part of a week feeling that there was no better solution than the camping egg-carrier she owned. A few felt that the problem was so contrived that they couldn't believe in it enough to get to grips with it; while others felt that, despite this contrivance, it was an interesting and worthwhile task; others got thoroughly hooked and began
a wide-ranging exploration of what they felt to be the very real context of the problem. Any given task would always be likely to provoke a similar range of initial responses, from positive through to negative.

We deliberately adopted a particular strategy in presenting you with this task as a design brief. For a start, the activity was fairly closed and presented in a non-negotiable form. We expected you to have sufficient D&T capability to be able to carry out the task effectively. The task was to design and make something, so you were given fairly strong clues about what was expected. The diagram for Reg's problem set out a number of considerations or criteria that had to be addressed by the design of the egg carrier; and our presentation of that brief was clear and straightforward. Given your experience you were unlikely to be at a loss as to how to attempt the task.

Your response to the task will have depended on many different factors which govern how you saw the purpose and significance of giving time to it. Experiencing this for yourself should at least enable you to recognise the possibility of children responding to a given task in various ways. Another significant fact is that, although in our trials teachers responded in a range of ways, all found the subsequent discussion valuable, and a valuable insight into the nature of designing.

The way you set up D&T activities with your children will depend in part on how you view children as learners and in part on how you interpret curricular requirements. You may come to favour an approach that always gives children a major say in identifying their starting-points so that they have initial ownership of the activity and will engage with it. Alternatively, you may find that children respond to a challenge to do something. There is a whole range of relationships that you can establish with children that can support and encourage learning. With experience, you will set up D&T activities in a way consistent with your approach.

In England and Wales the national curriculum recognises that having a clear sense of purpose when engaging in D&T activity is important. Some negotiation around the nature of the tasks you set is appropriate, something we could not offer you with the egg-carrier. Ownership and motivation can be developed from a whole range of starting points: real and imaginary, teacher-originated and child-originated. There is a place for planned activity and for spontaneous responses. Children's ownership of the task and motivation are important issues, and the strategy you employ when setting tasks will be very influential on the children's performance.

**Summary**

Our view is that design and technology capability involves identifying, analysing and meeting human needs for products and for control systems. It requires a practical ability to apply knowledge and skills creatively, when designing and making good-quality products with materials and components in response to needs. A design brief should set out design criteria based on a perception of needs.
Teachers plan curricular activity to achieve many objectives, which may seem to make allowing for children's ideas difficult to achieve. In the next section you will observe children engaged in a D&T activity within a topic of 'houses'. Although the design brief is set by the teacher, encouragement is offered to engage individuals with the task and to allow a degree of self-expression and innovation.