

An MA students critical evaluation of D & T

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The assignment attempts to critically analyse the nature of Design and Technology and identify what makes it unique within the school curriculum. Consideration is then given to issues of concern related to Design and Technology in current practice.

There have been a number of conflicting definitions made regarding the nature of design and technology. In general educational terms Weston (1990, p.31) considers design and technology to be about 'the development of the individual'. He sees the framework within which this takes place as being the 'design process', a general area of activity or activities through which the development of the individual is ensured. An alternative and simple definition is that design and technology is about making things for a specific purpose' (NCC, 1991, p1). Yet Isaac (1986, p.62) sees signs of a dichotomy within design as the unifying factor necessary for the devising and forming of a total object or situation.

It is intended to examine separately the terms design and technology and then attempt to discover what is the true nature and essence of design and technology. It is important to note that the term technology in some texts referred to is interchangeable with the term design and technology. Finally problems regarding current practice in design and technology teaching will be considered.

■ What is 'design'?

When considering the term design a dictionary definition is 'to contrive, to formulate, to project' (Cassell's 1989). Yet this does not fully describe the activity of design. Successful design implies that the following criteria are met. For example, a product works well, is reliable, well made, safe, pleasing to look at, comfortable to use, easy to maintain, can be economically made and considers cost to the buyer. Bayes (1989, p.1) describes design knowledge as the task of creating 'the forms of something unknown. It involves determining how buildings, products and communications will be. It includes the ability to image, to see in the mind's eye, which is then linked to the rational and practical business of realising dreams in the real world of politics, economics, values and beliefs. The Royal Institute of British Architects (RIBA, 1992, p.7) see design as the core of the architecture and construction industry. It is required for the skilled and cost-sensitive allocation of physical resources, to solve immediate as well as long-term accommodation problems of users, clients and society at large. Design in this sense involves the combination of senses and intellect. Isaacs (1986, p.58) considers design to be about order, integration, balance, arrangement and unity. It involves the capacity to make decisions which

take into account a wide variety of related factors. What is technology? It can be argued that the term technology can be defined as the knowledge, understanding and technical skills necessary to make something. Fisher's (1990, p.227) simple definition of technology is 'the application of science to doing and making'. A clear and precise statement of the basic concept of technology is put by Steers (Thistlewood, 1990, p.3). He states that 'technology is built upon an understanding of the properties and characteristics of materials and systems and the related processes of making, forming, and manufacturing. Noughton (Cross, 1989, p.2-9) suggests technology is 'things' or machinery but also that technology is a 'social process'. he suggests that everyday use of the word is somewhere between the two with an example of the technology of crafts being the 'application of human skill and knowledge and simple machinery to practical tasks'.

■ What is 'technology'?

Within the field of education it was the document The Curriculum from 5-16 (DES, 1985, p.34) which first included technology as an area of experience and learning and stated that the essence of technology lies in the process of bringing about change or exercising control over the environment. It was a problem-solving process concerned with the provision of shelter, food, clothing, methods of maintaining health or communicating with others. The content broadly concerns the nature and characteristics of natural and manufactured materials, and the nature, control and transformation of energy. This was developed further in the Education Act of 1988. This included Technology as a new subject in the school curriculum for all children. It was to be divided into two profile components, design and technology capability and information technology capability, and emphasises that it requires pupils to apply knowledge and skills to solve practical problems. The reference to capability is intended to emphasise that technology is concerned with practical action, drawing on knowledge and understanding from a wide range of subjects (DES, 1990, A1 D&T).

The separate attainment target for the development of information technology (IT) capability is intended to guarantee a minimum entitlement to IT experience for all children. They will use it as a tool to enhance and extend learning and so gain confidence and the capability to use IT in later life. Information

technology capability is seen as a cross-curricular technological skill taught as an integral part of most foundation subjects, including design and technology (Non-Statutory Guidance for Information Technology Capability. 1990, A1 IT).

■ What is 'design and technology'?

When considering the term design and technology, Baynes (Thistlewood, 1990, p.51-55) considers that the primary aim of design in general education is to develop everybody's design awareness. A secondary aim is to provide a seed bed for future professional designers, including planners; architects; technologists; engineers; industrial, fashion and graphic designers. He considers it to be wrong to think of design and technology as a purely 'practical' utilitarian activity in contrast to literature, science or art which are considered to be about 'knowing and speculating'. It involves people shaping their environment through deductive reasoning or expressive work. Baynes sees technology and design as a pair with each element of equal importance.

The Assessment of Performance Unit (SEAC, 1991, pp.18-25) also attempted to create a different way of looking at design and technology. They wanted to emphasise the interactive process, rather than the products. They concentrated on thinking and decision making processes, highlighting why and how pupils chose to do things rather than what they choose to do. They saw the essence of design and technology as being the constant interaction of mind and hand, thinking and doing. Their model of design and technology emphasised this relationship and ruled out the traditional separation of conceptual learning or written assessments with expressive or practical assessment.

It is the National Curriculum which has attempted to include all the elements considered essential for successful design and technology activities. It has combined the creative elements of design with the more functional interpretation of technology. The Non-Statutory Guidance for Design and Technology (NCC, 1990, A1D&T) describes design and technology as a way of working in which pupils investigate a need or respond to an opportunity to make or modify something. It is the creative design process of identifying

needs, generating ideas, planning, making and testing to find the best solution, which makes the acquisition of design and technology capability unique. Nowhere else in the National Curriculum is there the emphasis on the practical activity of designing and planning in order to make.

■ Design and technology in practice

The introduction of design and technology within National Curriculum Technology two years ago, as a compulsory subject, has seen schools grapple with varying degrees of success to implement design and technology. Good practice in design and technology encourages pupils to learn and understand difficult concepts through practical first-hand experience. The needs of a real task provide a motive for acquiring new knowledge and skills or for consolidating those already learnt (Cross, 1989, p.134). One of the central aims of a teacher is to provide well-organised experiences to assist the process of learning (Child, 1976, p.94). However, the teaching of design and technology has raised a number of issues of concern. These include progression, the making activity, and manageability in the classroom.

■ Progression

There is a fundamental need for pupils to progressively develop more complex and sophisticated knowledge, understanding and skills throughout the four key stages of design and technology. It is also important that there is a balance between process and content. The process is only one aspect, and it is necessary to have clarity regarding the basic knowledge, understanding and technical skills that pupils require to achieve a successful design outcome. Effective schemes of assessment can only be devised when teachers can clearly define what the pupils are required to understand and do. A head of technology commented that the National Curriculum has not said what children should be able to do. The teachers were unable to assess the difference between the levels of skill expected of children between eight and eleven years, and that expected of fourteen and fifteen year olds (New Scientist, July 1992, p.13).

Problems related to progression have been noted by a number of groups. The NCC (1992, p.5) see a lack of precision in the Programmes

of Study in defining both the process concepts and the technological/practical skills required by the Order. Also that imprecise statements of attainment lead to poorly defined progression through the levels. Her Majesty's Inspectorate (DES, 1992, p.36-37) note that there is insufficient guidance on the knowledge and skills with some statements of attainment open to different interpretations, leading to uncertainty about how pupils' design and technology capability can be developed across the key stages. They also note that assessment and recording are poorly developed, and suggest 'teachers need simple, clear, authoritative guidance and exemplification to ensure that judgements about levels of attainment are consistent within and between schools'.

Using the term Technology rather than design and technology, The Engineering Council (1992, p.6-14) consider that it is in essence different from other subjects of the National Curriculum, in that it is not a 'form of knowledge' as defined by Hirst. They suggest that Technology is 'a practical organisation of knowledge', a class of problems informed by and potentially solvable through the application of 'the forms of knowledge' and 'skills'. They argue that the appropriate mix between solving problems and knowledge/skills is an important one. It is Technology which provides the problems associated with the specialist area of, for example mechanical engineering, but there is a need for a knowledge base from the 'forms of knowledge' such as science and maths. Their main concern regarding Technology is that the essential element of 'designing and making' have become generalised problem solving without a specific knowledge base.

■ Making activities

The essence of design and technology in the National Curriculum is that pupils are involved in a practical activity. Simply to design and plan on paper is not the complete process. The Programme of Study states that pupils design and make either an artefact, system or environment using a range of materials, including textiles, graphic media, construction materials or food (DES, 1990, p.19). However there is concern that the amount, quality and standard of design and technology work being produced is poor. Also that the range of materials and tools being used are inadequate. In an article in *The Times* (1992, p.7) it was

stated that 'Too much time was spent writing down ideas rather than doing practical work and for many pupils practical work was limited to activities involving light card and paper for model-making'

Her Majesty's Inspectorate (DES, 1992, pp.11-36) have noted a decline in making activities. Also that secondary school standards of design and technology were disappointingly low compared with non-National Curriculum work in Years 8-11. Primary schools were finding it difficult to deliver the full range of work specified and pupil work was constrained by the teachers limited technological capability. It was commented that additional provision, accommodation and resources, were needed in some schools to provide the required breadth and quality of pupil experience. Pupils were using IT successfully, but schools needed to develop all the strands of IT capability as outlined in the orders. It was also noted that successful design and technology lessons in secondary schools were frequently where staff planned their work together but the contributing subjects were taught by specialist teachers.

■ Manageability in the classroom

The introduction of design and technology has posed a number of problems concerning its manageability in the classroom. Teachers, in the past largely autonomous, have had to plan and work together towards a common approach. Many have found this difficult, as change is not comfortable and is frequently threatening. Problems related to classroom management have been noted by Her Majesty's Inspectorate (DES, 1992, p.9-12). It appears that all Key Stages rotational arrangements have caused teachers difficulties in providing progression. Also that there was a shortage of business education teachers available to take part in design and technology and 'many single-sex schools had limited facilities and were unable to offer access to the full range of media and materials'. A senior County Inspector commented that a school spent five weeks designing a fast food outlet but did not have the time to make. 'It was simply a paper exercise'. (TES, 1992).

Suggestions have been made in a DES News Sheet (1992, p.1-3) to improve the manageability of design and technology in the classroom. Included is the 'appointment of an

appropriate range of materials and contexts across and within the four key stages; giving particular attention to reducing the complexity and amount of work required at each key stage'.

It can be argued that clarification and some simplification is required. There is a clear need to identify the relevant knowledge and technical skills necessary for technological activities using all the materials. However care needs to be taken not to destroy the true essence and nature of design and technology in the school curriculum. Filer (Murray, 1990, p.1) considers the provision of a balanced and progressive experience to be an essential feature of this foundation subject. To limit or introduce an imbalance in the range of the materials and contexts offered would not provide a balanced design and technology experience. A view endorsed by Black and Harrison (Murray, 1990, p.11) who see a danger in a too narrow interpretation in schools. They consider there might be implications for the image it presents if it restricts its appeal to boys as a route to civil, electrical or mechanical engineering.

Changes need to be made but it is important to retain the complete essence of design and technology. Both aspects are equally important. The design element is essential as it is on innovative, creative process requiring thinking and decision-making skills. Yet design and technology is also a practical 'making' activity requiring the use of modern technological skills and knowledge in a range of materials and contexts.

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