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IS IT USEFUL TECHNOLOGY EDUCATION ?

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This article raises a number of fundamental questions in relation to the nature of technology education which I hope may be of value to your thinking during this conference.

I would like to begin by establishing criteria for deciding the nature of technology education and in particular Design and Technology. The Order for technology (1) provides a detailed specification for the subject but rather than attempt to restate the whole document I will pinpoint some key features and use these to illustrate possible implications.

> "Technology is a new subject, which requires pupils to apply knowledge and skills to solve practical problems."
>
> "Technology is a subject concerned with practical action, drawing on knowledge and understanding from a wide range of subjects."

These phrases taken from the opening section of the non-statutory guidance emphasise the practical problem solving nature of the subject and recognise the potential breadth of technology activity. But how will these phrases translate into classroom action and what value will the resulting activities be to children ?

The non-statutory guidance offers examples of activities and I would like to probe some of these in more detail:

producing a newspaper

This could encompass a range of activities including analysis of readers requirements, business economics, printing techniques and graphic layout, creative writing and story research and group management. But is this useful technology education?

snacks for a 16th birthday party, attended by people from a variety of cultures

This activity introduces opportunities for working with food and investigating cultural diets and tastes. But is it useful technology education?

a route for delivering Christmas cards to houses in the area

This type of activity illustrates the design of a system which may not involve practical making. It can take into account considerations of efficiency in relation to the use of time. But is it useful technology education?

It is possible to further question the popular image of technology education if we compare these examples with other related activities. For example would we regard a novelist as a technologist ? A novelist might well investigate reader preferences and background history to the story setting. It is also likely that business considerations would be taken into account in deciding the feasibility of the exercise. If you would not consider a novelist as a technologist then what is technological about producing a newspaper? The question may seem provocative; there are fundamental matters of principle under its surface.

Consider the situation of feeling thirsty. You identify the need. You consider alternative solutions: tea, coffee, water, wine. You prepare or make the drink and consume it. You reflect the quality of the

experience. Trivial as the example may seem does it reflect an holistic D&T experience and is it really any different to the exercise of preparing party snacks?

What about a general preparing for war? Would you consider this an example of a technological activity? It can involve complex decisions concerning the deployment of people and resources with serious consequences. Is this example any less technological than planning a route for delivering Christmas cards?

In establishing criteria for examples of technology education the previous examples might give the impression that any activity will qualify providing it is centred on satisfying human need and it involves children answering the need through problem solving activities. Such activities may be perfectly justifiable on general educational principles but the question remains: is this the best way of developing children's technological capability in preparation for their future roles in society?

If technological activity has its own distinctive characteristics then these need to be made explicit. The process defined by the attainment targets is not unique to technology but forms the basis for creative development in many fields, for example in science, politics, law, art, etc. However, the attainment targets read in conjunction with the programmes of study should define the nature of the subject. It is interesting to consider the activities of a largely non-technological occupation such as a solicitor and seeing how many of the statements from the programmes of study can be made to fit. If we consider the following statements from the programmes of study, key stage 4, "developing artefacts, systems and environments" (1):

i) "prepare a flow chart and detailed working plan to achieve the objective of the design".

This statement could be applied to a solicitor planning a course of action in relation to a court case.

ii) "recognise that forces of different types are involved in structures".

Statement ii) appears more specific but could structure refer to the administrative organisation within a court of law and forces relate to the influence of particular individuals within the organisation? In addition to these unhelpful semantic interpretations the statements do not give a clear indication of the levels of understanding expected. They could be used equally with children at the ages of 5 and 16 years.

The Technology Order obviously presents a wonderful opportunity for technology education but one which we hope will not be lost. It must be appreciated that the Order is not based on proven educational research and it is important to question and build on the existing ideas in the Order for the subject to evolve in an appropriate way.

In deciding what children should experience in technology education it may be worthwhile to reflect on technology in the world at large and come to some opinion about the knowledge, skills and attitudes we most value.

Food and drink are vital and most of us rely on highly developed technological systems to supply our needs. The systems include the development of high yield, disease resistant crops, chemical fertilizers, animal foodstuffs and machinery to harvest, process and pack foods. Should technology education involve children in these various aspects of food technology?

A friend of mine would now be dead if it were not for the technology of heart by-pass surgery. One of his main arteries had become blocked by the build-up of tissue, similar in principle to the deposits of chemicals in a water pipe. Remedial options included the use of miniature "Dyno-rod" catheter to bore out the blockage, use of a laser catheter to burn through the blockage or artery by-pass surgery. Should technology education encompass medical technology?

Another area of growing public concern is the environment. We need to develop improved methods for reducing pollution, for using energy more efficiently and for recycling materials. The needs are not simply cosmetic; unless technological solutions can be found to these problems significant and

irreversible environmental changes are likely to effect future generations. Should technology education include the addressing of such environmental problems ?

There are other areas of basic human need; these which include for example, clothing, shelter, entertainment, relationships and the need to know which can act as the stimulus for technological activity. If we consider any of these areas important for consideration in technology education then we need to make this explicit together with the levels of knowledge and skills we would expect children to use in making decisions and implementing their designs.

I find it interesting to speculate on the potential of other interpretations for technology education (2):

> "The essence of technology lies in the process of bringing about change or exercising control over the environment ..."
>
> "Technology has its content ... the nature and characteristics of natural and manufactured materials, and the nature, control and transformations of energy."

Do these statements point to a clearer interpretation for technology education, a subject with a distinct core of knowledge?

The APU paper (3) considers technological capability in terms of three distinct elements: skills, knowledge and value judgements. The skills relate closely to the attainment targets in the Technology Order and include investigation, invention, implementation, evaluation and communication. The knowledge refers to the specific subject knowledge of materials, energy and control. The value judgements indicate areas of consideration which could be taken into account and include aesthetic, economic, technical and moral.

Would it be helpful to distinguish between (1) core technology knowledge and (2) areas for consideration in order to emphasise the use of material and system principles in all technology activity? The advantage of this would be to provide a much clearer basis for the development of a rigourous subject discipline through statements which describe what material characteristics and processes, what sources of energy and energy transfer systems, and what forms of control systems, should be understood and used by children.

In any event the value of technology education will be decided by the criteria we set to judge it. If we make the criteria vague then what is taught and learnt will be vague. Success will be more easily justified but that will not necessarily make the technology experience useful or the most appropriate.

References

(1)Technology in the National Curriculum 1990

(2)The Curriculum from 5 to 16 HMSO 1985

(3)Understanding design and technology 1981