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Justifying design & technology

David Barlex

Introduction

This chapter asks the question why do we teach what we teach in the design & technology curriculum? It traces the emergence of design & technology in the curriculum in England and is in three parts. First it gives a brief account of its precursor - technology education. This is followed by a description of its development within the National Curriculum. The final part discusses some of the issues associated with 'limiting' technology education to design & technology.

Technology education

Education in technology has been seen as important since the time of John Dewey who wrote in 1916:
'Its (technology education) right development will do more to make public education truly democratic than any other agency now under consideration. Its wrong treatment will as surely accentuate all undemocratic tendencies in our present situation, by fostering and strengthening class divisions in school and out… Those who believe the continued existence of what they are pleased to call the 'lower classes' or the 'laboring classes' would naturally rejoice to have schools in which these 'classes' would be segregated. And some employers of labor would doubtless rejoice to have schools, supported by public taxation, supply them with additional food for their mills…(Everyone else) should be united against every proposition, in whatever form advanced, to separate training of employees from training for citizenship, training of intelligence and character from training for narrow, industry efficiency'.

In 1987 Denis Stewart and Christine Ditchfield produced a discussion paper for the Secondary Science Curriculum Review that recommended technology ought to feature strongly in the curriculum and be interdisciplinary in nature. This had been echoed by George Hicks HMI, writing in 1983, who argued that to some extent all subjects contributed to technology education. There were some main players to be sure: craft, design & technology (CDT), art & design, home economics, but science and mathematics could clearly make useful contributions with the humanities and religious education supporting the discussion of value considerations.

The situation was, to put it mildly, confused and confusing with little if any consistency of approach across different schools. In 1985 Paul Black and Geoffrey Harrison had wrestled with this problem by writing the pamphlet "**In Place of Confusion**". They acknowledged the interdisciplinary nature of technological activity and produced a 'Task-Action-Capability' model for technology education, as shown overleaf.

Underpinning their thinking is the idea that pupils will need to acquire intellectual and practical resources in order to tackle technological tasks and that full technological capability will be achieved through tackling a sequence of these tasks. Paul and Geoffrey were under no illusions as to the fragmented nature of the school curriculum and the difficulty faced by schools in developing a 'Task-Action-Capability' model for technology education. They saw certification on a single subject basis as a major impediment to rewarding achievement in a subject which *'should not be confined to the boundaries of single subjects as at present defined'* (p. 31).

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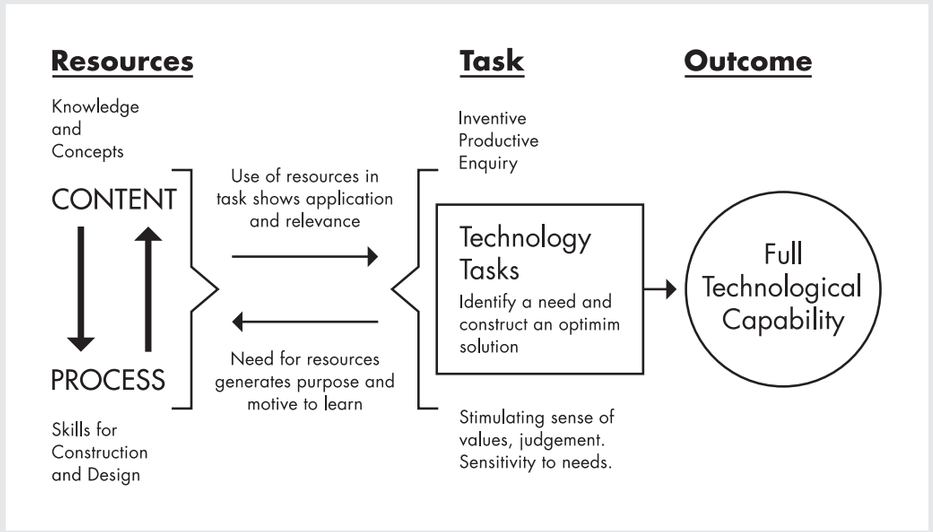

01 The 'Task-Action-Capability' model for technology education developed by Paul Black and Geoffrey Harrison.
(© Nuffield Chelsea Curriculum Trust.)

02 David Layton, Professor Emeritus at Leeds University. The architect of design & technology in the National Curriculum through his contribution to the "Working Group Interim Report".

If you were at school before the introduction of the National Curriculum, cast your mind back to see if you can identify educational experiences that would lead to technological capability. If you experienced National Curriculum design & technology ask yourself to what extent was the teaching you received based on a 'Task-Action-Capability' model?

Design & technology as technology education

In developing a National Curriculum in England the government instituted a range of school subject working parties, each one to consider and identify the unique contribution of their allotted subject to the school curriculum. An intention here was to remove redundancy and overlap so that the school curriculum could be efficient. For the subject technology, which operates across boundaries, this could have been seen as life threatening. However, this did not deter those charged with the daunting task of advising ministers on the school subject which was to become 'design & technology'. Indeed the naming of the subject was not accidental and the working group's interim report clarified and justified the term design & technology.
'Our understanding is that whereas most, but not all, design activities will generally include technology and most technology activities will include design, there is not always total correspondence. Our use of design & technology as a unitary concept, to be spoken in one breath as it were, does not therefore embody redundancy. It is intended to emphasize the intimate connection between the two activities as well as to imply a concept which is broader than either design or technology individually and the whole of which we believe is educationally important. (Accordingly, we use design & technology as a compound noun taking the singular form of verbs in what follows.)'
(Department for Education and Science and Welsh Office, 1988, p. 2).

The working party had to answer this question. What is at the heart of design & technology, namely the special characteristics which are the ultimate warrant for its inclusion as a foundation subject in the National Curriculum? What is it that pupils learn from design & technological activities which can be learnt in no other way?
The answer was elegant and complex.
'In its most general form, the answer to this question is in terms of capability to operate effectively and creatively in the made world. The goal is increased competence in the indeterminate zones of practice'
(Department for Education and Science and Welsh Office, 1988, p. 3).

03 "Design and technology in a knowledge economy".
A report that gives design & technology a broad vocational purpose.
(© Engineering Council UK.)

The report noted the distinction between 'knowing that' and 'knowing how', 'propositional knowledge' and 'action knowledge', 'homo sapiens' and 'homo faber', 'man the understander' and 'man the maker'; pointing out that it is the second of each pair that is indicative of the distinctive nature of education in design & technology. Thus the fundamental nature of design & technology can become its Achilles heel in that it ensures that it is not a subject with venerable roots in the academic tradition, which values particularly the acquisition of knowledge for its own sake. Here again the interim report was clear in its thinking about the place of knowledge in design & technological activities.
'We have argued above that because knowledge is a resource to be used, as a means to an end, it should not be the prime characteristic of attainment targets for design & technology. This is not to devalue knowledge, but rather to locate it in our scheme according to its function. What is crucial here is that knowledge is not possessed only in propositional form ('knowing that'), but that it becomes active by being integrated into the imagining, decision-making, modelling, making, evaluating and other processes which constitute design & technological activity'
(Department for Education and Science and Welsh Office, 1988, p. 29).

? To what extent do you think the design & technology lessons you experienced as a pupil or have seen in school are in accord with special characteristic *'to operate effectively and creatively in the made world'*?

Issues of justification

The journey from the publication of the "**Design & Technology Working Group Interim Report**" in 1988 to the current situation has been long and difficult with at least half a dozen revisions of the Statutory Orders along the way. At the moment we have an importance of design & technology statement which reads as follows:
'In design & technology pupils combine practical and technological skills with creative thinking to design and make products and systems to meet human needs. In design & technology pupils learn to use today's technologies and participate in developing tomorrow's. They learn to think creatively and intervene to improve quality of life, solving problems as individuals and members of a team. Working in stimulating contexts that provide a spectrum of opportunities and draw on the local ethos, community and wider world, pupils identify needs and opportunities. They respond with ideas, products and systems, challenging expectations where appropriate. They combine practical and intellectual skills with an understanding of aesthetic, technical, cultural, health, social, emotional, economic, industrial and environmental issues. As they do so they evaluate present and past design & technology, and its uses and effects. Through design & technology pupils become confident practically and develop as discriminating users of products. They apply their creative thinking and learn to innovate, developing their self-esteem.'
(Qualifications and Curriculum Authority 2007, Draft for consultation 05/02/07).

The statement centres around pupils' designing and making indicating many areas of understanding that inform the activity including the evaluation of design & technology itself and the impact of its use. It concludes with identifying the role of the subject in developing personal qualities and self-esteem.

In 2001 Richard Kimbell and David Perry revisited and extended the 'Task-Action-Capability' pedagogy when writing "**Design & technology in the knowledge economy**". They reiterated the distinctive model of teaching and learning that lies at the heart of design & technology:

- *'It is project based and involves learners taking a task from inception to completion within constraints of time, cost, and resources'*;
- *'Students have to unpack the complexity… to enable then to identify and focus on the central issues that need to be addressed';*
- *'[It reveals] the value issues that inevitably lie inside any claim for "improvement"';*
- *'[It requires students] to speculate and explore multiple "what ifs"';*
- *'[It requires students] to acquire and create new, task-related knowledge'*;
- *'[It] involves the active, purposeful deployment of understanding and skills'.*

David and Richard argue that through this approach to teaching and learning design & technology prepares pupils to meet the skills challenge posed by a knowledge economy. *'We have been pursuing and refining these approaches for thirty years and our teachers are in the vanguard of those preparing youngsters for employment in the knowledge economy'* (Kimbell & Perry, 2001 Executive Summary, p. 4).

This clearly gives a broad vocational purpose to design & technology.

? To what extent do you think the design & technology lessons you experienced as a pupil or have seen in school mirror the teaching and learning espoused by David Perry and Richard Kimbell? Are they likely to prepare pupils for employment in a knowledge economy?

With its focus on designing and making, the importance statement does echo the idea of capability presented in the interim report *'to operate effectively and creatively in the made world'*. However there are some who consider that technology education has a wider remit

than engendering capability. John Dakers, writing in 2006, notes that technology education focuses primarily on
'…the fabrication of artefacts…at the expense of developing critical awareness in young people of the technologically mediated world they inhabit and the way in which their future lives are, and will be, shaped by it'
(Dakers, 2006, p. 1).

He is anxious that
'This unreflectivity…missing literacy…that reduces the concept of technology…to the stuff that we will transform into artifacts that we perceive as necessary for our needs and wants'
(Dakers 2006, p. 2).

If you agree with John that the current design & technology paradigm fails to engage young people with the effect of technology on their lives now and in the future and that this is an important omission then you will need to consider how such an omission might be rectified.

? How would you change the balance of teaching and learning activities in a design & technology curriculum dominated by designing and making to ensure that pupils were able to consider the impact of technology on their lives?

David Layton has voiced concern over the way in which evaluation can be limited to considering technical performance and manufacturing proficiency. Writing in 1995 he indicates the folly of limiting evaluation to fitness *for* purpose when in fact the crucial issue is fitness *of* purpose.
'But the ultimate measures of success are essentially pragmatic: is it effective; does it work? Morality, it seemed, had been jettisoned: providing the thumbscrew, the gas chamber, or the bug worked well, we were dealing with high quality D&T.'
(Layton, 1995, p. 108)

If you are in agreement with David that limited nature of evaluation is morally flawed you will need to consider how you might adapt the curriculum to enable pupils to consider fitness of purpose in the products they meet in their everyday lives and those they design & make at school.

? How might you change the way pupils are introduced to design briefs in design & technology lessons to meet David's concern over fitness of purpose?

Stephen Petrina, writing in 2000, has suggested that technological literacy should have an explicit political dimension and be critical. Stephen describes much technology education as under the influence of business and industry and hence dedicated to the western capitalist mission of competitive supremacy. He argues that releasing technology education from these malign (as he sees them) influences would empower pupils to collectively organise and agitate to say 'no' to competitive supremacy, ecological destruction, and exploitive practices of globalisation. He is arguing for technology education as a cultural study. This is a long way removed from the acts of designing and making and the general activities of design & technology teachers in workshops, design studios and food technology rooms.

If you agree with Stephen that design & technology education should become politicised and incorporate some elements of cultural study then you will need to consider how this might be achieved.

? How would you change the balance of teaching and learning activities in a design & technology curriculum dominated by designing and making to provide pupils with the opportunity to be critical? In what ways could you relate this critical activity to the pupils' designing and making?

Margarita Pavlova, writing in 2005, has described how technology education might respond to issues of social change. She identifies four major processes of social change relevant to technology education.

1. *The shift of emphasis from engaging society members primarily as producers to engaging society members primarily as consumers.*
   Margarita quotes the arguments of Zygmunt Bauman (1998), a sociologist who believes that work as a duty has been replaced by work as a means to an end. The end in western society is increased consumer power.

2. *The colonisation of cognitive and moral spheres of human life by the aesthetic sphere.*
   Here Margarita again uses the work of Zygmunt Bauman who has argued that many consumers are guided now by aesthetic interests not ethical ones. This has been described by the designers Richard Seymour and Dick Powell as *'visceral appeal'*, a response whereby the consumer desires a product before they know what it is or does.

3. *The integration of people into the technological world.*
   Here Margarita calls on the thinking of Jurgen Habermas, a philosopher who has described the erosion of the person as an individual and his or her subordination to the performance requirements of the 'technological' system.

Justifying design & technology
David Barlex

4. *The shift from the Welfare state to the Competition state.*
Here Margarita cites authors who have described the way in which educational reform movements across the world are being colonized by economic policy imperatives. She quotes Robert Cowen writing in 1996:

'The central goal of the modern education system of education, socialisation into the national culture, is replaced by the determination to create new patterns of labour force formation: economic dimension of education becomes more influential than civic' (Cowen, 1996, p. 161).

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04 Dick Powell and Richard Seymour, co-founders of product design agency Seymourpowell - product designers who utlise aesthetic interests.

05 Zygmunt Bauman, Emeritus Professor of Sociology Leeds University and expert on post modern consumerism.

(Photograph © Mariusz Kubik, Warsaw, 2005.)

Margarita, although less strident in tone than Stephen Petrina, is suggesting the politicising of the technology curriculum. She argues that engaging with social change and the role of technology in that change will require radical changes to classroom practice in which pupils take part:
'In democratic debates about the future outlines of technological development, development of their social and ecological sensitivities, avoiding orienting their solutions to the standard of business efficiency and profitability criteria only; helping them to distinguish real needs from desires; discussing the role of designed objects in the life of contemporary society…challenging the way people are manipulated through advertising… and challenging consumer orientated design' (Pavlova, 2005, p. 212).

If you agree with Margarita that technology education should be used to help young people to become aware of social change as it is taking place and challenge this from a critical perspective then you will need to consider how this might be achieved.

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Margarita's concerns are rooted in the identity and purpose of individuals within society, and how this is changing, and how this is related to technology. How would you change the balance of teaching and learning activities in a design & technology curriculum dominated in practice by 'narrow' understanding of designing and making to provide pupils with the opportunity to consider the impact of technology on society in the context of social change? To what extent might it be possible to achieve this by orienting design activity, product analysis, and the nature of the projects towards social aspects of technology?

A word of warning
Engaging pupils in designing and making products of worth in ways that develop creativity, problem-solving skills and the ability to collaborate, as part of general education is a demanding task. Widening the remit of design & technology to meet the concerns outlined above places a heavy burden upon the subject. Add to this a vocational obligation and we approach a situation where failure through overload becomes a distinct possibility. David Layton (1995) reminds us of this danger:

'It would be sad if an exciting and radical curriculum innovation, potentially of great significance, should collapse under the weight of the unrealistic responsibilities being placed upon it' (p. 115).

However, Margarita Pavlova (2007) argues that she has evidence from her work in Brisbane which indicates that the key to meeting these demands is in the nature of the projects developed by the teacher.

? To what extent do you think the design & technology curriculum is in danger of becoming overloaded with unrealistic responsibilities? How might the load be redistributed or lightened to ensure continued growth and development?

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