



Modernising design & technology
David Barlex proposes five different, but related justifications for the inclusion of design & technology in the modern curriculum



Modernising the justifications for D&T

As the curriculum evolves the nature the significance and impact of subjects taught will change according to their justification for inclusion in the curriculum. A justification from a single perspective is no longer adequate. There will be many different reasons for teaching a subject and it is important that you, as a design & technology teacher understand these different justifications and can use them to articulate the worth of the subject for a wide range of pupils with differing aspirations.

This article considers five different yet related justifications and discusses how you might use them in your school.

- A unique contribution to the curriculum
- Supporting the economy
- An important part of general education
- Developing creativity and problem solving skills
- Contributing to citizenship education.

A unique contribution to the curriculum

As a prelude to the introduction of the National Curriculum, working parties were set up for each subject with the intention of defining the unique contribution of that subject. The Interim Report for design & technology articulated this unique contribution very clearly as follows:

What is it that pupils can learn from design and technological activities which can be learnt in no other way? 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 competence in the indeterminate zones of practice.

Almost 20 years later the *importance statement* for design & technology in the National Curriculum reflects these aspirations for our subject as this extract shows.

In design and technology pupils combine practical and technological skills with creative thinking to design and make products and systems that meet human needs.



The report was equally clear on the role of knowledge in the attainment targets used to describe pupil achievement.

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, modeling, making, evaluating and other processes which constitute design & technological activity.

The *attainment targets* for today still hold true to this position describing how the way pupils use their knowledge and understanding changes as they make progress rather than describing the increased body of knowledge that the pupils should acquire.

The particular way in which knowledge is used in design & technology has been clearly stated by Marc de Vries a philosopher of technology with a particular interest in education

...design & technology is concerned with the conception of what does not yet exist and how it might be brought into existence requiring and developing normative knowledge

Developing knowledge and skills as tools to 'operate effectively and creatively in the made world' not only distinguishes design & technology from other subjects in the curriculum but leads some to argue that it has a particular place in supporting the economy.



Supporting the economy

There is every reason to expect that the learning at school will be useful in terms of helping young people finding useful and rewarding employment. Richard Kimbell and David Perry have written persuasively about the *contribution of design & technology to the knowledge economy*.

In the context of a knowledge economy, the interdisciplinary imperative of design & technology is increasingly recognised as a strength rather than a weakness.

The 'skills challenge' of such an economy involves learning structured around projects; based on identifying problems; in a range of contexts in which students (often in teams) transfer knowledge across different domains; using portfolio models of exploration, presentation and assessment.

This is precisely the model of learning through which design & technology operates.

In recent years the government has promoted work related learning and introduced a range of specialist 14 – 19 diplomas. This includes an engineering diploma with the expectation that teachers of science, design & technology and mathematics will be involved in the teaching. This is part of the current particular interest in promoting STEM (science, technology, engineering and mathematics) related careers. The government has set up a high level STEM strategy group and there is a detailed set of implementation proposals which include eleven Action Programmes involving continuing professional development for teachers and curriculum improvements.

So there appears to be little doubt that design & technology can be justified in terms of preparing young people for employment. However it is important that this justification does not become the only one for the subject as *Peter Toft* has warned by asking the following questions concerning the implications for design & technology of links to industrial practice

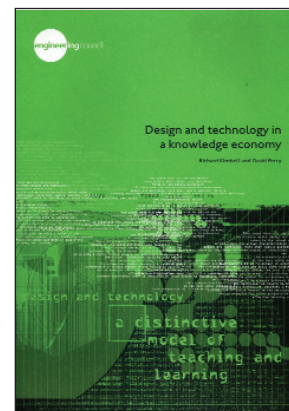
- How far should generalist design & technology education be linked to manufacturing industry?
- What should design & technology become if most low level manufacturing goes to other countries?
- What should design & technology become if these countries develop rapidly to become manufacturing innovators, as well as providers of cheap labour, competing with, and taking over, our technologically advanced industries? What if the UK becomes an entirely service-based economy?
- Is there more to be gained from design & technology, by children, than an insight into industrial manufacturing?

Some, echoing Peter's concerns, see the economic justification as so vulnerable to changes outside education that they seek a completely unrelated rationale.

Design and technology in the knowledge economy argued the case for design & technology as an essential educational experience for the modern workforce



Peter Toft HMI always asks probing questions





An important part of general education

A counterpoint to the economic justification for design & technology is an appeal to the place of design within general education. In 1932 the philosopher A N Whitehead suggested that;

‘There are three main roads along which we can proceed with good hope of advancing towards the best balance of intellect and character: these are the way of literary culture, the way of scientific culture, the way of technical culture. No one of these methods can be exclusively followed without grave loss of intellectual activity and of character.’

In the late 1970’s Bruce Archer produced a report from the Royal College of Art that articulated the characteristics of design that can be used to distinguish technological activity from literary and scientific cultures:

The phenomenon of study is the artificial world. The methods used are modelling, pattern formation and synthesis. The values are practicality, ingenuity, empathy and a concern for ‘appropriateness’.

We can argue that an education in design & technology would, through design activity, initiate pupils into Archer’s distinguishing features but the purpose of this initiation would not be to meet the extrinsic aims of preparation for the work place.

Anita Cross writing in 1980 puts this well when she argues as follows:

Since general education is in principle non-technical and non-vocational, design can only achieve parity with other disciplines in general education if it is organised as an area of study which contributes as much to the individual’s self realisation as to preparation for social roles.

Developing creativity and problem solving skills

In 1999 the government in England invited Professor Kenneth Robinson of Warwick University to chair a working party concerned with creativity in education. The members of the working party consisted of musicians, artists, scientists, entertainers, entrepreneurs and writers but curiously no designers or technologists. The report 'All Our Futures: Creativity, Culture and Education' (Robinson, 1999) argues that a national strategy for creative and cultural education is essential to unlock the potential of every young person. It saw creativity in terms of the task in hand as having four features:

- using imagination;
- pursuing purposes;
- being original;
- being of value.

It is not difficult to relate these four features to the central activity of design & technology: pupils designing what they are going to make and then making what they have designed. This is stated in the opening sentence of the importance statement for design & technology (quoted above) and then reinforced strongly with an additional reference to *problem solving* as follows:

They (pupils) learn to think creatively and intervene to improve the quality of life, solving problems as individuals and members of a team.

There are implications for classroom practice in meeting the creativity and problem solving agenda. The activities that pupils undertake must be sufficiently open to interpretation by the pupils that they can be creative and that genuine problems for them to solve will emerge as they move forward in the activities.

The so called Robinson Report clarified the nature of creativity in education but did little to acknowledge the place of design & technology





Contributing to citizenship education

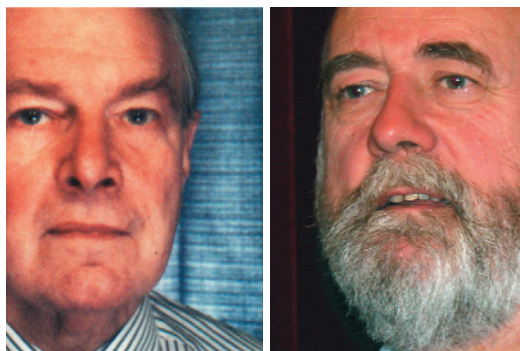
There can be little doubt as to the profound ecological request of our times. We are consuming natural resources at a rate that is not sustainable. The way we live is causing major changes in the behaviour of the planet's natural systems, most notably through global warming. Everyone is becoming more aware of these environmental issues. Design & technology is a natural vehicle for Education for Sustainable Development (ESD) because it deals with real products and systems that are brought into being to meet real needs. Justifying design & technology as a vehicle for sustainability can be seen as a sub set of a wider rationale, developing responsible citizens who can be constructively critical of the way our society develops and uses technology. David Layton reminds us of the folly of limiting evaluation to fitness for purpose when in fact the crucial issue is fitness of purpose.

Morality, it seemed, had been jettisoned: providing the thumbscrew, the gas chamber, or the bug worked well, we were dealing with high quality D and T.

Steve Keirl is an ardent advocate for technological literacy based on ethics.

Developing critical interrogations of the technological world while continuously forefronting the ethical question "How should we live" will serve to loosen the current status quo.

But there are dangers here of losing touch with the practical nature of the subject if this aspect becomes an overly dominant feature of the design & technology curriculum.



David Layton and Steve Keirl whose writings have indicated the importance of critical competence in design & technology

Justifications that are right for your school

Each school is to some extent unique reflecting its local community and helping pupils meet their aspirations within and beyond that community. The extent to which any particular justification is important in comparison with other justifications will depend on this uniqueness. You can envisage the justification package as a range of justifications that overlap and intertwine. Sometimes it will depend on who you are talking to as to which justifications you use. If you work in a school where there are manufacturing industries then you might use the supporting the economy argument when talking to the business community. If you are talking to those in the local authority responsible for developing systems to support sustainability then you might use the citizenship argument. If you are talking to parents and pupils then you might use a combination of the unique contribution and general education argument. In debating with colleagues from other subjects you might use the creativity and problem solving skills justification.

It will be important to be aware that different justifications may not only reinforce one another but might be in conflict. A strong economic justification can lead to the subject being seen as vocational and hence not appropriate for all pupils as a part of general education. This could, in certain circumstances, dramatically reduce the numbers of pupils studying the subject at Key Stage 4.

One way to ensure that a particular justification does not dominate is to consider the way the different justifications relate to the QCA BIG picture of the curriculum.



This article is one of a series available on the Nuffield Secondary D&T website.

www.secondarydandt.org

References and further reading

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Whitehead, A. N. (1932) **The Aims of Education** Williams and Norgate, London, UK

Embedded links within this article

The importance statement for design & technology

<http://curriculum.qca.org.uk/subjects>

Attainment targets for design & technology

<http://curriculum.qca.org.uk/subjects>

Contribution of design and technology to the knowledge economy

www.engc.org.uk/documents/Des+Tech.pdf

Peter Toft article

www.nuffieldcurriculumcentre.org/go/CurriculumIssues/Issue_148.html

Problem solving in design & technology

<http://curriculum.qca.org.uk/subjects>

QCA BIG picture

http://curriculum.qca.org.uk/uploads/A_big_picture_of_the_curriculum_tcm6-1822.pdf?return=http%3A//curriculum



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For further reading on key issues influencing the teaching of design & technology, see the recently published:

Design & technology for the Next Generation
a collection of provocative pieces written by experts in their field, to stimulate reflection and curriculum innovation.

Available from the educational publishers CliffeCo at

www.dandt-thebook.com