Abstract
This paper explores values and design and technology in two ways. Firstly, in looking at how the subject is valued by stakeholders and secondly by looking at how pupils can explore values issues through design and technological activity. It does so at a key point in the history of design and technology as a curriculum subject within the statutory curriculum of England.

In exploring values issues in these ways, the paper draws upon the work of David Layton who wrote two important texts on the same issues 20 years ago. Key issues emerging from curriculum development activity in that period are discussed along with a framework of activities to undertake with pupils. The paper concludes by making the case for reinforcing the centrality of values within design and technology education at the present time.

Values and value judgements are the ‘engine’ of design and technology. Judgements about what is possible and worthwhile initiate activity; judgements about how intentions are to be realised shape activity; and judgements about the efficacy and effects of the product influence the next steps to take. Value judgements, reflecting people’s beliefs are ubiquitous in design and technology activity.

Layton 1992a:36

Introduction
The subject of design and technology, as has been understood in England for the last 20 years, is under threat with a government set on reducing the statutory curriculum requirements. Its future is being discussed, as will be seen below, and potentially re-shaped by a number of stakeholders each of which come from particular perspectives.

Discussion about the curriculum tends to focus on the overall aims of the subject and the relative proportions of designing to making activities. In the process of planning for the future, however, it is important that there be a discussion about the extent to which values issues are explored with pupils.

Technology and values
Given that values issue within design and technology education have been written about for the last 20 years it should not perhaps be necessary to provide an explanation of the relationship between technology and values. At the point of writing, however, there is a feeling that the centrality of values has been missed and the ways in which technologies are manifestations of values are not being recognised.
The relationship between humans and technology is long and it can be argued that human development is linked directly to technological development – that we have only developed as result of technological advances. Heidegger (1977) discusses technology as it affects how we see ourselves as human beings and expresses concern about the ways in which technology affects who we are and how we are. This view is reinforced by Pacey (1983) who provides examples of the positive and negative effects of technology transfer.

With the increased use of modern manufacturing technologies it could be argued that we are getting further away from being directly involved in the design and making of products and that our understanding of what is involved in the process has narrowed. Without design and technology as a general part of pupils' education, the knowledge of the means of production will be held by a smaller and smaller portion of humankind. As this happens it is important that we recognise the importance of developing not only informed users, but individuals able to express their views about technology as a whole.

**The value of design and technology**

1992 a key point in history...

Two works written by David Layton, both with the title of ‘values and design and technology’ (Layton 1992a, 1992b), reflected the state of the subject at the time. Having been introduced as a statutory subject in 1990 (DES 1990) there was considerable debate about it’s role as part of the statutory curriculum. The heavily biased and under-researched report by Smithers and Robinson (1992) said that the technology curriculum was ‘in a mess’. Only 2 years after the introduction of the statutory curriculum this was unhelpful and said more about the biased views of the Engineering Council than a critique of the curriculum in practice. Layton (1992a) presented a coherent view of the debate by presenting different categories of stakeholders as can be seen on the diagram below. Each group of stakeholders had specific views about what areas of content should be highlighted and the purpose of the subject.

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Layton (1992a: 3)
Between 1992 and 1995 there were many different versions of the curriculum produced by those responsible for the curriculum e.g. NCC 1992. Each one of the versions of the curriculum reflected a different pattern of stakeholder influences upon it. Over time these iterations ended in what we recognise as the basis for the subject in England today.

2012 a key point in history...
Currently the subject of design and technology is again under debate and it’s future as a statutory part of the curriculum in England is uncertain as the government in England works on reducing the requirements. As was the case 20 years ago, there are different perspectives on the value of the subject and again recognisable stakeholders.

The context is, however, different than that of 20 years ago not least as there are 20 years of history in between! When discussing the future of the subject, stakeholders are able to draw on what they have seen in school whether this be good practice or not. Whilst the debate is still there, it is influenced by the success, or failures, of teachers as deliverers of the unique contribution to pupils’ general education.

Have we developed creative individuals who can work both independently and in groups? Do we have a generation of individuals who are comfortable with CADCAM technology and are aware of manufacturing systems? With regard to the issue of values have we been able to develop the personal attributes in young people that enable them to work in our technological world as informed users rather than passive consumers?

One of the strongest voices at the moment is that of professional engineers such as Dyson who when interviewed, said of design and technology:

Without it, it will be even harder to inspire young people to go into the engineering professions and develop new technology.

Smithers, R (2011)

This is not a surprising perspective given the rise of STEM (Science, Technology, Engineering and Mathematics). Linked to this voice there are those interested in vocational aspects (economic functionalists) and we are now seeing in England the setting up of University technical colleges (www.utcolleges.org).

Another stakeholder group are sustainable developers and this can be seen from the move to include issues about the relation between technology and human need (QCA 2007). Certainly the world of design has moved to include aspects of sustainability and this is likely to become more central in the future.

Layton (1992a) highlighted another group – that of liberal educators. This group of stakeholders were interested in providing young people with access to technological activity as a unique part of their education. It could be argued that in no other area of the curriculum do pupils see in 3 dimensions the result of their own thinking and decision making. Within our increasingly technological society where the link between people the means of production are getting wider and wider, it is important that young people understand how technology comes about and have experience of being involved in the process.

Looking at values issues in design and technology

An important issue in 1992
David Layton was involved in developing the Interim Report for the Technology curriculum (DES/HMSO 1989) which contained the programme of study for design and technology. Whilst the idea of pupils exploring values issues was implied within the curriculum document it was only in 1992 with the publication of Make the Future Work (Budgett-Meakin 1992) that a fuller, coherent, justification for the inclusion of the issues was given by Layton.
Following on from David Layton’s keynote address a special interest group was set up within the IDATER conference. The subsequently led to the formation of VALIDATE which was active for a number of years. The effect that this group had on the curriculum is hard to define but it did stimulate debate and a number of papers and resources were produced at the time.

At the turn of the millennium there was a gradual change in emphasis by those who were writing about values in the 1990’s. Ethics and sustainability, in particular, were becoming more popular topics and the number of papers written explicitly about values issues in the subject dropped dramatically. This is not to say that the issues disappeared altogether. Literature about sustainability, for example, is written from a values perspective. Take for example the literature developed by Practical Action (www.practicalaction.org). Whilst this focuses on sustainability it is underpinned by a strong values position that promotes positive images of other cultures.

**An important issue in 2012**

It is recognised within the curriculum that is used within schools at the moment that issues dealing with the relationship between humans and technology are important (refs) Issues of sustainability are to be discussed and support materials are much more widely available than before. Values issues per-se, however, are not explicit within the curriculum and are indeed not included within the debates about the future position of the subject. Could this be that it is taken for granted that they are subsumed within other things? Or have we as a community of practice ignored this fundamental area of the subject.

Of course values are always present, as Layton (1992b) says. It is the extent to which we expose this underlying bedrock through the work that we do with young people. It can be argued that more than ever we are in need of developing a critical view of technology (valuing) and need to be aware of the consequences of technological activity.

The exploration of values issues is much more than just being critical of design and technological activity however. The very personal, perhaps spiritual, nature of products that have been made by individuals is something to be valued. Layton (1992a) talked about different types of values namely: technical, economic, aesthetic, social, environmental, moral and spiritual / religious.

**Exploring values in design and technology**

How in the future are we to facilitate the exploration and exposure of values in technological activity by pupils in schools? To answer this question is to draw on the last 20 years of curriculum development and draw out the issues that have been discussed and the ways in which hands-on activities can be developed to support pupils learning.

**Looking at existing products**

Product evaluation is a way of enabling pupils to look at the values embedded within products. With enough information about the product it is possible for them to get an insight into the motivations of designers and the appropriateness of the product for the users. The information about products has become more accessible in recent times and can take different forms in different media.

In addition, looking at the work of others enable pupils to explore how they personally view products and their personal preferences. The fact that different pupils will have different preferences, or values position, when it comes to looking at a selection of products can be a positive influence on how they themselves design.

**Planning and evaluating pupils’ work**

In addition to looking at the work of other people it is important that pupils look at what they themselves have been doing. At the point of exploring contexts for making, deciding on materials and at key points throughout their designing, values come into play. The underlying values can be exposed through questioning and self-evaluation in order to build an understanding of the signifi-
cance that such underpinning has on the final outcome. Looking at each other’s work, through carefully structured peer evaluation, can also be valuable.

**Understanding technological systems**

It could be argued that one of the most important aspects of values in the design and technology curriculum should be in looking at technology outside the classroom. This perspective of technological literacy is significant, at least on paper, part of the curriculum documents of a number of different countries, notably the USA (ITEA 2000). More recently this is beginning to be discussed in England as a more significant component. Curriculum materials looking at the effects of technology across different cultures have been around as part of the Nuffield materials for the last 20 years (Nuffield 1995). How much they have been used is not known but it one can speculate that they have not been looked at much.

So what technologies or technological systems should pupils study? In the United States the curriculum comes under the heading of technological literacy which is broken down into different areas such as medical technologies; agricultural and related biotechnologies; energy and power technologies; information and communication technologies; transportation technologies; manufacturing technologies and construction technologies. (ITEA 2000). Whilst this is understandable it is a very simplified taxonomy and one that has more to do with different industries than the nature of technology as a whole. A much better way of categorising technological systems is to look at them from the micro to the macro in terms of the relationship they have to pupils.

<table>
<thead>
<tr>
<th>Designer</th>
<th>User</th>
<th>Context</th>
<th>Complexity</th>
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<tbody>
<tr>
<td>Self</td>
<td>Self</td>
<td>Home</td>
<td>Single element</td>
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<tr>
<td>Other pupil</td>
<td>Other pupils</td>
<td>School</td>
<td>Joined elements</td>
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<tr>
<td>Single designer</td>
<td>Others outside school</td>
<td>Community</td>
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<td>Organisation</td>
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<td>Commercial</td>
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One of the more complex things for pupils to learn will be that different people have different views about technology in the wider world. In addition it is important to learn that information about technology written by others as can be found through the internet may not be accurate. It is therefore important that pupils develop their own views and critical faculties.

Whilst the subject of design and technology was focused entirely on developing practical skills there was no need, or no curriculum driver, for teachers to engage in a discussion of values and potentially controversial, issues. The curriculum has evolved from that model and now very much includes the development of attitudes as well as the acquisition of skills. Teachers must therefore begin, if they have not done so already, to discuss values issues with pupils and broaden pupils understanding of the nature of design and technological activity. This is an entitlement of the curriculum.

**Exploring contexts**

Pupils look at contexts that they are presented through design and make activities. In addition, pupils can explore other contexts within their own culture or indeed the context of those in other cultures. Considering the needs of others is an important part of developing an understanding of how products and technological systems come about. Looking at different cultures does, however, need to be handled with care. Developing empathy with others through an exploration of their context is one thing. To ‘solve their problems for them’ is quite a different matter and misunderstands the whole purpose of exploring contexts (Siraj-Blatchford 1993)
Conclusion

Margarita Pavlova and James Pitt in their work on sustainability discuss perspectives that people can adopt. One of these is sustainability as a ‘state of mind’ (Pavlova and Pitt 2007: 82) affecting every decision that one makes as a natural process. A recognition of the place of values embedded in design and technological activity would be to adopt a values perspective as a state of mind and as a way of operating in the world.

Design and technological activity undertaken by young people, involving the design and manufacture of products in response to human needs and wants within contexts is valuable for the following reasons;

Firstly as a form of technological literacy it is important in developing pupils understanding of technology and how we value its use and are aware of the consequences of its existence through the effects on others and the environment.

Secondly it is important in providing opportunities for young people to work in a practical way, accessing the domain of technological knowledge and working technologically both individually and with others. This could involve the development of practical skills of using hand-tools and machines or the development of skills to operate machine tools through CADCAM systems.

Critical to the future shaping of the subject, and the extent to which values issues are discussed by pupils in schools, are the values and attitudes of teachers. It would be quite easy for any teacher, as they do, to decide not to include areas of learning as defined by the statutory curriculum. It will only be if teachers are persuaded of the value of values that pupils will be exposed to the true nature of designing and making.
References


