Designed for citizenship? Innovation, technology and social responsibility

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4.3 Designed for Citizenship? Innovation, Technology and Social Responsibility

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Introduction

Design is concerned with innovation. It is a field of study in which designers, from their imagination, create two- or three-dimensional models of products that they think people want or need. Technology is concerned with the use of tools, materials and processes. It is also a field of study in which technologists or industrialists bring products into working reality from designers’ imagination. These products may be objects, systems or environments. Both these fields of study have, therefore, become one subject, Design and Technology, in our school curriculum. It is through this subject that pupils are taught how to design and to make products.

Designers and technologists have become much more aware in recent decades of the social and environmental aspects associated with the designing, making, use and disposal of products. There is now an increased social responsibility - shared by consumers, designers and politicians - not to destroy life and the environment in the process. Similarly, in schools, teachers of Design and Technology foster an awareness of social responsibility through their students' designing and making. It is this that forms the basis of the link between the school subjects of Citizenship and Design and Technology.

This chapter explores this link by reviewing the literature and resources currently available to Design and Technology teachers. It proposes some strategies, through illustrative examples, for teachers to develop their students’ active citizenship skills of participation and responsible action through designing and making.

Planning Citizenship Education through Design and Technology

Whilst Citizenship may be delivered as a subject in its own right there are strong links with the established Humanities subjects, notably History, Geography and RE, and also with the range of other subjects cited in Part Two of this collection. However, Design and Technology is also a Humanities subject, a matter often overlooked by policy-makers, because of the impact that designing and making has on human life. Anthropologists chart this impact, in terms of the use of technology, through historical periods or stages:
10,000 years ago – *homo sapiens var agricola* (farming)
250 years ago – *homo sapiens var industria* (industrial)
50 years ago – *homo sapiens var technologica* (microprocessor).

As outlined above, the advancement of this technological impact brings with it an increased social responsibility, especially as our endeavours begin to have a wider effect, producing global consequences, some of which stretch beyond our own planet. The strongest links made between curricular programmes in Design and Technology and Citizenship are through product sustainability and environmental consequences, issues directly referenced in the Programmes of Study for each subject (DfEE / QCA, 1999a). There are also wider links to values, in particular to legal processes and health and safety and around issues about the use to which products and manufacturing effort is put.

In attempting to develop the knowledge and skills of Citizenship in their teaching, Design and Technology teachers are faced with a complex model, as indeed are teachers of any subject. Interpreting the Programmes of Study for both their own subject and for Citizenship is already a daunting task, before they might begin to do so in terms of other contextual documents, for instance the *Statement of Values* produced by the *National Forum for Values in Education and the Community* (DfEE/QCA, 1999c).

However, a less daunting approach to planning for the introduction of a Citizenship Education perspective or component in Design and Technology is not to start with the Programmes of Study but to consider other sources of available guidance. This has the advantage of allowing teachers to follow the key principles of Citizenship by ensuring they are built-into rather than bolted-onto designing and making. These principles are outlined in *Making Sense of Citizenship: A CPD Handbook* (DfES and Citizenship Foundation/Hodder Murray, 2006), a text in which some of my co-contributors to this volume have helped to produce:

> ... for contributions from other subjects to be officially classified as part of the school Citizenship Curriculum, simply identifying common concerns or points of contact between subjects is not enough. The citizenship element must be the significant part of the lesson. (Ibid: 1 (Chapter 8))

*Making Sense of Citizenship* does not make specific reference to Design and Technology when offering guidance about the teaching of Citizenship through other subjects. Similarly, there are no examples of Citizenship Education opportunities in Design and Technology, a matter that this chapter will redress. However, the guidance in the handbook for Art and Design can be readily translated into Design and Technology (and, indeed, other subjects) as I have set out in Figure 1:
The relationship between the three strands of National Curriculum Citizenship have been much stated in this collection but they are worth recalling here:

- Knowledge and understanding about becoming informed citizens;
- Developing skills of enquiry and communication;
- Developing skills of participation and responsible action.

It is in this context that Design and Technology is described in Citizenship - A scheme of work for key stage 4: Teacher’s Guide (QCA/DfES, 2002):

*Through design and technology, pupils learn to think and intervene creatively to improve the quality of life. During key stage 4 they do this through taking part in design and make projects linked to their own interests and those of the wider community. They consider how technology affects society and their own lives and that new technologies have both advantages and disadvantages.*

*A project may be linked to active citizenship either directly, where the resulting product benefits other members of the community, or indirectly, where, as a mini-enterprise project, it raises money for a community or charitable cause.*

*The requirement to think about issues such as the needs and values of users and any moral, economic, social, cultural and environmental considerations creates explicit opportunities for links with citizenship.*
Citizenship Styles and Values in Design and Technology teaching

The styles of teaching and learning that are required to promote active, effective Citizenship are those that every good teacher of Design and Technology will be familiar with. They can be summarised as:

- active – emphasizes learning by doing
- interactive – uses discussion and debate
- relevant – focuses on real-life issues facing young people and society
- critical – encourages young people to think for themselves
- collaborative – employs group-work and co-operative learning
- participative – gives young people a say in their own learning.

(DfES and Citizenship Foundation/Hodder Murray, 2006: Chapter 1).

Similarly, the values central to good Citizenship Education are also central to good Design and Technology. They require young people to be:

- aware of their rights and responsibilities as citizens;
- informed about the social and political world;
- concerned about the welfare of others;
- articulate in their opinions and arguments;
- capable of having an influence on the world;
- active in their communities;
- responsible in how they act as citizens.

(DfES and Citizenship Foundation/Hodder Murray, 2006: Chapter 1).

Having considered the key features of effective Citizenship teaching within a Design and Technology context, we can now consider the National Curriculum provision itself. However, rather than moving straight to the Programmes of Study statements a more productive approach is to consider the Statements of Importance, which preface the Programmes of Study, and the Descriptors for Key Stages 3 and 4. In Figure 2 they are placed alongside each other to show the relationship between the two subjects and to provide a good precursor to the kind of Design and Technology project planning that encompasses active, effective citizenship learning.
Figure 2

*Statements of Importance and Key Descriptors for Citizenship and Design and Technology at Key Stages 3 and 4*

<table>
<thead>
<tr>
<th>Design and Technology</th>
<th>Citizenship</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Importance of Design and Technology</strong></td>
<td><strong>The Importance of Citizenship</strong></td>
</tr>
<tr>
<td>Design and technology prepares pupils to participate in tomorrow’s rapidly changing technologies. They learn to think and intervene creatively to improve quality of life. The subject calls for pupils to become autonomous and creative problem solvers, as individuals and members of a team. They must look for needs, wants and opportunities and respond to them by developing a range of ideas and making products and systems. They combine practical skills with an understanding of aesthetics, social and environmental issues, function and industrial practices. As they do so, they reflect on and evaluate present and past design and technology, its uses and effects. Through design and technology, all pupils can become discriminating and informed users of products, and become innovators.</td>
<td>Citizenship gives pupils the knowledge, skills and understanding to play an effective role in society at local, national and international levels. It helps them to become informed, thoughtful and responsible citizens who are aware of their duties and rights. It promotes their spiritual, moral, social and cultural development, making them more self-confident and responsible both in and beyond the classroom. It encourages pupils to play a helpful part in the life of their schools, neighbourhoods, communities and the wider world. It also teaches them about our economy and democratic institutions and values; encourages respect for different national, religious and ethnic identities; and develops pupils' ability to reflect on issues and take part in discussions.</td>
</tr>
</tbody>
</table>

**During Key Stage 3:** pupils use a wide range of materials to design and make products. They work out their ideas with some precision, taking into account how products will be used, who will use them, how much they cost and their appearance. They develop their understanding of designing and making by investigating products and finding out about the work of professional designers and manufacturing industry. They use computers, including computer-aided design and manufacture (CAD/CAM) and control software, as an integral part of designing and making. They draw on knowledge and understanding from other areas of the curriculum. | **During Key Stage 3:** pupils study, reflect upon and discuss topical political, spiritual, moral, social and cultural issues, problems and events. They learn to identify the role of the legal, political, religious, social and economic institutions and systems that influence their lives and communities. They continue to be actively involved in the life of their school, neighbourhood and wider communities and learn to become more effective in public life. They learn about fairness, social justice, respect for democracy and diversity at school, local, national and global level, and through taking part responsibly in community activities. |
During Key Stage 4: pupils take part in design and make projects that are linked to their own interests, industrial practice and the community. Projects may involve an enterprise activity, where pupils identify an opportunity, design to meet a need, manufacture products and evaluate the whole design and make process. Pupils use ICT to help with their work, including computer-aided design and manufacture (CAD/CAM) software, control programs and ICT-based sources for research. They consider how technology affects society and their own lives, and learn that new technologies have both advantages and disadvantages.

During Key Stage 4: pupils continue to study, think about and discuss topical political, spiritual, moral, social and cultural issues, problems and events. They study the legal, political, religious, social, constitutional and economic systems that influence their lives and communities, looking more closely at how they work and their effects. They continue to be actively involved in the life of their school, neighbourhood and wider communities, taking greater responsibility. They develop a range of skills to help them do this, with a growing emphasis on critical awareness and evaluation. They develop knowledge, skills and understanding in these areas through, for example, learning more about fairness, social justice, respect for democracy and diversity at school, local, national and global level, and through taking part in community activities.

The Qualifications and Curriculum Authority has produced a leaflet that maps the two Programmes of Study (QCA, 2001) and makes links to the DfES Schemes of Work for Design and Technology (DfEE/QCA, 2000). The main Design and Technology contributions to Citizenship are identified as:

- enabling pupils to resolve conflicting demands during their design and make assignments, justify the decisions they make, and begin to take responsibility for their actions when making products
- enabling pupils to take into account how products will be used and who will use them
- providing opportunities to gather information, make choices and reflect on how technology affects society as pupils work co-operatively with a range of people during the design and make assignment
- providing opportunities to think and intervene creatively to improve quality of life.

(QCA, 2001)

The Design and Technology Association (DATA) has produced a worked-up example of a Citizenship unit of work, for developing a product that meets a consumer need (DATA, 2004). This unit, in the context of Food Technology, provides a good template for teachers of all Design and Technology media.
DEVELOPING CITIZENS

areas. It shows clear learning outcomes for different abilities and has not been over-complicated by Programme of Study statement links. It follows the principles for curriculum planning in Design and Technology advocated in this chapter by using the Statements of Importance and Key Descriptors for Citizenship and Design and Technology at Key Stages 3 and 4.

Whilst the entire Programmes of Study in the Design and Technology National Curriculum should be referred to for determining sufficiency of coverage, the principal opportunities for Citizenship learning are set out in Figure 3 and Figure 4.

Figure 3
Principal opportunities for Citizenship learning in the Design and Technology Programmes of Study at Key Stage 3

1b) consider issues that affect their planning [for example, the needs and values of a range of users; moral, economic, social, cultural and environmental considerations; product maintenance; safety; the degree of accuracy needed in production]

3c) identify and use criteria to judge the quality of other people’s products, including the extent to which they meet a clear need, their fitness for purpose, whether resources have been used appropriately, and their impact beyond the purpose for which they were designed [for example, the global, environmental impact of products and assessment for sustainability]

7a) product analysis

7b) focused practical tasks that develop a range of techniques, skills, processes and knowledge

7c) design and make assignments in different contexts. The assignments should include control systems, and work using a range of contrasting materials, including resistant materials, compliant materials and/or food.

(DfEE/QCA, 1999a).

Figure 4
Principal opportunities for Citizenship learning in the Design and Technology Programmes of Study at Key Stage 4

1b) consider issues that affect their planning [for example, the needs and values of a range of users; moral, economic, social, cultural and environmental considerations; product maintenance; safety; the degree of accuracy needed in production]

3c) ensure that their products are of a suitable quality for intended users [for example, how well products meet a range of considerations such as moral, cultural and environmental] and suggest modifications that would improve their performance if necessary

4e) that to achieve the optimum use of materials and components, they need to take into account the relationships between material, form and intended manufacturing processes

6a) product analysis

6b) focused practical tasks that develop a range of techniques, skills, processes and knowledge

6c) design and make assignments, which include activities related to industrial practices and the application of systems and control.

(DfEE/QCA, 1999a).
In recent years, internet websites have been developed to support Design and Technology based Citizenship projects in schools. This resource base is increasing all the time. However, links between these sites are in need of development to increase their usability. The penultimate section of this chapter focuses on key areas for Citizenship learning in Design and Technology contexts with examples of the web based resources available and how they link to the three strands of Citizenship, especially strand 3: developing skills of participation and responsible action. First, though, I want to explore the particular Citizenship learning opportunities presented by the growing profile of sustainability and environmental impact, both in education and in the broader policy agenda.

Citizenship, Environmental Impact and Sustainability

Often the immediate link between Citizenship and the wider social curriculum and Design and Technology is around the use of what is made: the social value of the product, a child’s educational toy, a device for a person with a given disability, a security device. This is, though, only a starting point. In the limited space available here I want to continue to explore the more fundamental citizenship issues about environmental impact and sustainability issues that require exploration if we are to produce good Citizenship Education and good Design and Technology Education. That is, developing students’ (citizenship) skills of participation and responsible action through the process of designing and making.

Environmental Impact

At present, the UK produces over one million tonnes of waste electrical and electronic equipment every year, or three tonnes per British citizen in their lifetime. The waste is toxic and landfill sites are fast running out. As McDonough and Braungart put it: “Everything… is designed for you to throw away when you have finished with it. But where is ‘away’? Of course, ‘away’ does not really exist. ‘Away’ has gone away”. (McDonough and Braungart: 2002, cited at www.weeeman.org, 2005).

On 1st January 2006, manufacturers and retailers in the European Union (EU) became responsible for financing the collection of ten categories of product at the end of their life cycle. The categories, with their recovery and recycle rates are summarised in Figure 5. The legislation covering this is the European Waste from Electrical and Electronic Equipment (WEEE) Directive. To restrict the use of toxic substances the WEEE Directive is supported by the Restriction of Certain Hazardous Substances (RoHS) Directive, which is set to come into force in the EU as in 2006. The substances restricted include the metals lead, cadmium and mercury. One immediate implication for Design and Technology education is the use of lead-based solder in electronics.
Figure 5
*Categories covered by the WEEE Directive*

<table>
<thead>
<tr>
<th>Electrical and Electronic Product Category</th>
<th>Minimum recovery rate</th>
<th>Minimum recycling of components, materials and substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Large household appliances</td>
<td>80%</td>
<td>75%</td>
</tr>
<tr>
<td>2 Small household appliances</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>3 IT and telecommunications equipment</td>
<td>75%</td>
<td>65%</td>
</tr>
<tr>
<td>4 Consumer equipment</td>
<td>75%</td>
<td>65%</td>
</tr>
<tr>
<td>5 Lighting equipment</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>6 Electrical and electronic tools (with the exception of large scale industrial tools)</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>7 Toys, leisure and sports equipment</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>8 Medical devices (with the exception of all implanted and infected products)</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>9 Monitoring and controlling instruments</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>10 Automatic dispensers</td>
<td>80%</td>
<td>75%</td>
</tr>
</tbody>
</table>

Source: www.weeeman.org

The immediate links between Citizenship and Design and Technology are through activities whereby students consider and learn about the principles underpinning the environmental impact of products designed by them and for them. Such activities include:

- disassembling products to study materials and manufacturing process and their relevance to environmental impact
- selecting materials and components that have reduced environmental impact in their own designing and making
- using more recycled materials and components in their own designing and making
- investigating product life cycles.

The Weeeman website (www.weeeman.org) provides an excellent basis for developing such activities.
Sustainability

The term ‘sustainability’ is better considered as ‘sustainable development’ or ‘sustainable design’ or ‘sustainable technology’. Whichever term, it means the same thing - ‘change’:

*Development is about change. Every time a new product is introduced, and people buy it and use it, the world changes a little bit… …All changes or developments are designed to make the world a better place.*

(Capewell et al., 2002: 21)

Sustainability, therefore, is concerned with how products can be designed to improve the quality of life without adverse global impact in both the short and the long term. Sustainable design can be considered through three aspects: environmental, social and economic considerations. It is inappropriate to separate these aspects entirely from each other. However, each aspect may have its own focus in individual lessons to assist students’ knowledge and understanding about becoming informed citizens. Key moral (or citizenship) questions in relation to each of the aspects are summarized in Figure 6. Each should be considered through looking at the whole life cycle of a product - from the extraction of raw materials, manufacturing and distribution through to its use and ultimate disposal.

**Figure 6**

*Environmental, Social and Economic considerations in designing and making as Citizenship questions*

<table>
<thead>
<tr>
<th>Environmental considerations</th>
<th>Social considerations</th>
<th>Economic considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the environmental impact?</td>
<td>Is the product really needed?</td>
<td>Does making, using and disposing of the product create jobs?</td>
</tr>
<tr>
<td>What toxic emissions are there?</td>
<td>How does it make life better for people?</td>
<td>What sorts of jobs are created: do other jobs disappear?</td>
</tr>
<tr>
<td>How is energy generated and used?</td>
<td>Is it culturally acceptable to the people who will use it?</td>
<td>Who is employed?</td>
</tr>
<tr>
<td>How much water is used?</td>
<td>Does it build on the traditional wisdom and technology of the community?</td>
<td>What is the economic impact on other people, now and in the future?</td>
</tr>
<tr>
<td>What is the environmental impact of any packaging?</td>
<td>What is the impact on social relations?</td>
<td>Is the product fair-traded?</td>
</tr>
</tbody>
</table>
Web-based resources for Citizenship learning in Design and Technology

The reader is strongly advised to visit the websites in this section. They represent an outstanding resource for developing students’ skills of enquiry and communication using ICT-based resources and many will be as useful in the dedicated Citizenship classroom - and, indeed, elsewhere - as in the Design and Technology workshop. And each offers a range of links that can lead to further investigation.

Design Against Crime – www.designagainstcrime.org

The Home Office and the Design Council fund the Design Against Crime programme. The website contains information suitable for secondary schools, higher education and professional designers. The information on the website is useful to students in their designing and making of products that are less vulnerable to theft and which give protection to users. There are some example projects, which include:

- alarm systems such as personal attack alarms
- security tags
- crime prevention/awareness posters.

There are examples of good practice in design covering crime issues. These are presented as case studies using research data from the UK, USA, Scandinavia and South Korea. The purpose of the case studies is to develop a “new perspective of socially responsible design, embracing social inclusion, crime prevention and other key areas of public policy”. (Davey et al., 2002).

Fairtrade – www.fairtrade.org.uk

As the Fairtrade website states (2005), the FAIRTRADE Mark is a certification label awarded to products sourced from developing countries that meet internationally recognized standards of fair trade. By participating in Fairtrade, producers are able to use the additional income to strengthen their organisations and invest in social, environmental and business improvements. Just as importantly, they are able to learn more about markets and marketing, and take more control of their lives.

The Fairtrade website does not, at the time of writing, provide examples of school-based projects. However, there are downloadable lists of fairtrade food products and producers. These are a useful resource for food technology in schools because they can be used to make a direct link between the rights and responsibilities of the consumer, employers and employees. Possible projects include:
• designing and making food products using only fairtrade ingredients
• encouraging preferential purchase of fairtrade products at school and home
• designing material to raise awareness of fairtrade.

Sustainable Technology Education Project (STEP) – www.stepin.org

The Sustainable Technology Education Project (STEP) website was produced by the Intermediate Technology Development Group (ITDG). ITDG, now called Practical Action, is a development organisation that aims to build the technical skills of disadvantaged people in developing countries, helping them to improve the quality of their own lives without damaging the environment.

The STEP website contains:
• a range of case studies drawn from around the world, focusing on practical, sustainable solutions to real problems
• a pop-up glossary
• downloadable teachers notes for teachers
• feedback forums to allow people to express views on the issues of today and tomorrow.

This material provides an invaluable resource to develop students’ knowledge and understanding about becoming informed citizens through Design and Technology education. In the month accessed (May 2005) there were 37 case studies appropriate to food, graphic products, resistant materials, systems and control and textiles.

Sustainable Design Award (SDA) – www.sda-uk.org

The Sustainable Design Award (SDA) scheme was launched in 2003 in response to the government's action plan for sustainable development in education. The three main partners of the SDA scheme are the Intermediate Technology Development Group (ITDG – now called Practical Action, as stated above), the Centre for Alternative Technology (CAT) and Loughborough University. Registration with the scheme is through Practical Action.

The purpose of the scheme is for Advanced level students to explore environmental economic and social issues in Design and Technology through their course work. However, the activities and resources available on the SDA website are suitable for all students of secondary school age and take the form of starter activities and eco-design tools. Examples include:

Starter Activities
• What's wrong with the world? – to help students put sustainability into perspective
• Belief Circles – to help students to develop ideas and understand other possible viewpoints
Line-ups – to encourage students to think about sustainability issues in day-to-day activities
Product Pairs – to help students to think about values behind choices as consumers
The Bigger Picture – to show how consumer choices can impact on the lives of future generations.

Eco-design Tools
- Eco-design Web – a qualitative method of analysis used for assessing and improving a products' sustainability
- Design Abacus – a qualitative method of analysis for identifying areas where a product or a design could be improved in terms of sustainability
- Eco-Indicator – a more detailed qualitative analysis of products or designs to calculate their environmental and social impacts
- Footprinting – a tool to illustrate a person's impact on the world
- Sustain-a-balls – a checklist that aims to guide students through their projects.

In addition to the activities and tools, the SDA website is a rich database of information on environmental and social issues and, especially, on the sources and sustainability of different materials.

Waste from Electrical and Electronic Equipment – www.weeeman.org

The website that supports the European Union’s recently introduced Waste from Electrical and Electronic Equipment (WEEE) Directive contains a wealth of information on the environmental impact and sustainability of utilizing different materials in the design process. It supports the kind of activities referred to earlier in this chapter and provides the necessary information in a very accessible format to enhance students’ (and teachers’) knowledge and understanding about “becoming informed citizens”, to put matters in QCA’s language.

An evaluative conclusion: ‘doing’ Citizenship in the workshop and classroom

This chapter has provided an overview of the strategies and resources available for raising students’ awareness of the importance of social responsibility in the design and environmental impact of products. However, the responsibility ought to start with individual teachers and students. Here lie the links with personal development, social responsibility and practical, actual citizenship: developing a culture relating to social environmental issues in school workshops. It is not enough to simply bemoan the lack of corporate or civic social responsibility (or “corporate citizenship”) shown by some businesses and public bodies or by other individuals and societies or, even, to focus merely on the design and making of items of social worth. There must be a Citizenship perspective to how Design and Technology is ‘done’ in the school. So, to end this chapter, some questions, to which the answers raise
even more questions - answers that rest with an analysis that begins much closer to home and which might call for some immediate action:

- Are the tools, processes and materials being used in the Design and Technology workshops the most environmentally and socially friendly? If not, how can they be made so?
- Do materials and components purchased and used include recycled and fairtrade products and materials?
- Are materials and components recycled through the disassembly of unwanted student projects?
- Do design and make activities encourage the minimum use of and minimum waste of materials?
- Do students consider sustainable issues in their designing and making?
- Do they consider the social worth, purpose and impact of what they are making?

References