

# The development of quality design and technology in English primary schools: issues and solutions

Clare Benson  
Birmingham City University, UK  
clare.benson@bcu.ac.uk

**Keywords:** primary, design and technology, quality, nature of the subject, knowledge, value

## Abstract

Design and Technology (D&T) education in our rapidly changing society has never been more important. The skills, knowledge and understanding that are at the centre of this subject prepare young people for their future lives in so many ways. However the foundations that need to be put in place in primary education are often ignored at this crucial stage of young people's development, either because of ignorance or lack of interest. Unless the building blocks are in place then future progress inevitably will suffer. This paper seeks to identify some of the key issues that can affect the development of the subject in primary settings and offers some possible solutions to the identified issues. Data was gathered from 5 groups of primary teachers (a total of 62 teachers) who were all studying towards an MA Ed through extended primary D&T courses. The teachers completed questionnaires before and after the course and all took part in semi structured interviews and group discussions throughout the course. Their responses were analysed and findings were also related to research. Implications for future activity are identified and suggested in order to help to address the issues raised from the research. Although the research is based in England it may prove a useful starting point for all those involved in primary D&T worldwide.

## Research undertaken

Although D&T was introduced into the curriculum in England in 1990, evidence collected from teachers attending long award bearing primary D&T courses for more than six years indicated that the majority of these teachers were from schools where D&T is not well established. What then are the main issues that can be identified that are preventing good quality D&T? There has been no research that has focused specifically on this area (Harris and Wilson 2003), although studies have looked in general terms at issues that affect quality education provision in primary schools. If the quality of D&T is to be improved, then it is important that issues hindering its development are identified before they can be addressed.

For this research the description of quality D&T was discussed with the teachers. Their common understanding of the term included a school where there is:

- an understanding the nature of the subject
- confidence in subject knowledge
- planning across the whole school where the integrity of D&T is kept; there is breadth, balance and progression in relation to the content of the National Curriculum

- projects are authentic, there is a clear user/s and purpose, there is excitement about D&T
- a range of tools, materials and equipment that are sorted, easily accessible and well maintained.
- understanding of the value of the subject as part of the curriculum

From 2009-11, primary teachers on five long award bearing D&T courses (total of 62 teachers) agreed to take part in a small scale research project to try and identify issues that were undermining development, and then to draw out any common strategies that might provide a positive way forward to develop quality D&T. The teachers came from primary schools around England; over 95% were in charge/were subject leaders of D&T in their schools; over 97% had no formal qualification or none/almost no CPD in D&T; over 95% had held the position for less than 3 years; and over 96% were female. The age profile of the teachers was 37% 21-35 years; 43 % 35-45 years; 18% 45-55 years; 2% over 55 years. Ethnicity information was not gathered. Descriptive research was used (Best 1970) as it is concerned with 'practices that prevail ... how what is has influenced a present condition.' Some quantitative data was gathered to give an overview of answers to some questions; however qualitative research was the prime method used in order that discussion/comments could be gathered to gain more in depth reasons for the teachers' views. The teachers completed questionnaires before and after the course and all took part in semi structured interviews and group discussions throughout the course. It was felt that these data gathering methods would afford appropriate opportunities to gain insights into the teachers' feelings, opinions and reasoning for the stance that they took in relation to D&T development in their schools. Taping interviews would not have been practical in terms of the time it would take to transcribe for the size of this project; instead notes were taken during interviews and discussions – identifying the key points. Ethical considerations were taken into account (Robson 1993, Denscombe 2005). The teachers all agreed to take part in the research and understood the way in which the research would be conducted and findings disseminated and the anonymity of all personnel and schools connected with the study was ensured.

### **Analysis and discussion of findings**

In the first instance, all data was studied, cross referenced and then key themes identified in relation to the teachers' own views regarding blocks that had prevented quality D&T from being identified in their schools. There were no significant differences in the way in which teachers gave their comments based on region, age, experience, and gender. In this paper the three key factors that teachers identified most often are discussed in detail, whilst the next 2 are identified, so that the length of the paper is acceptable for the conference.

#### *Understanding the nature of the subject*

From the initial questionnaires, discussions/interviews, it was very apparent that over 90% of the teachers had a limited understanding of the nature of D&T and this was supported by the work that was being undertaken in their schools. The idea that user and purpose were at the heart of a D&T project was not common practice in majority of the schools; children were taking part in craft activities, or 'appliance of science' activities such as making a torch without designing, or with a user or purpose in mind. After the course almost 100% of the teachers could see not only the true nature of D&T but how they could adapt practice in their school to ensure quality provision. Majority felt that this factor alone would make a huge impact on practice – it was the key factor.

Common quotes included 'we make but we don't design and really there isn't a user for the product'; 'we do skill activities and don't have an end product very often'; 'we have to fit the D&T with History so it ends up with the children making a Tudor house or a Roman sandal which I can see now is not D&T and not good History.'

It may seem unlikely that after 20 years that an understanding of the nature of the subject was missing. However the subject was new then in the primary curriculum and there has been little Continuing Professional Development (CPD) over the years on a regular and sustained basis. Unless the understanding is there, it is difficult to see how the subject can be planned for and implemented. Furthermore, data that was gathered from 2 major projects - one with Foundation Stage (3-5 years) practitioners (Benson, 2003, 2005, 2008) - and one with secondary teachers (11-18 years) (Benson, 2009) clearly indicated that there was still a lack of real understanding as to the nature of the subject with practitioners. A popular misconception among both groups of practitioners was that making was at the heart of the subject and that, for example, designing, exploration of materials, and evaluation was peripheral, if there at all. This finding was particularly surprising in the case of secondary teachers, most of whom had studied the subject to degree level and were teaching students to examination level in their schools. 'Key essentials' that should be included in D&T have been identified and published ([www.data.org.uk](http://www.data.org.uk)) so that there is a consensus that can be used as a starting point and majority of the teachers identified these as being most helpful in developing their understanding of the subject.

I would argue that it is equally important that primary aged children have a clear notion of the subject. They need to understand its nature so they can engage in a more meaningful way with the activities. Little has been researched about primary aged children's perceptions of education and D&T in particular but more recently there has been a realisation of the importance of understanding, and taking into account, the children's viewpoint. (Rudduck and Flutter, 2004 McIntyre et al, 2005; Benson and Lunt, 2007). Over 90% of the teachers indicated they had not considered this notion but that they would address this when creating their D&T development plan.

#### *Teachers' confidence in their subject knowledge*

Almost all the teachers (98%) indicated that they felt that their lack of confidence in their own subject knowledge including practical skills and the use of tools and equipment was a major block to the development of quality D&T in their schools.

Quotes that exemplify their feelings include:

"I have boxes and boxes of stuff and I don't know what to do with it. If I don't know how can I help others."

"I don't have time to research the www for support for myself or for the staff. Where do I start?"

"I look at the catalogue and am not sure what to buy – do I buy bits and pieces or a class kit? If it is a class kit how do we get the creativity?"

"What tools are essential? How do I get the knowledge to use them safely with the children?"

After the CPD this had diminished to 16% but over 90% felt that they would need to offer extended CPD to staff in their schools. Only 5% had studied D&T in any depth in their Initial Teacher Training (ITT) course and majority had had so little that they had difficulty recalling what they had done – even those who had recently graduated. It was evident that whilst the CPD may have enhanced their confidence and knowledge they had to have time on their return to school to support others. They felt that this was unlikely to be given even though D&T was in the development plan for over 70% of the schools. There were always other priorities such as an Inspection, Tests at 7 and 11 years or the high profile of literacy and numeracy.

From the time of the introduction of D&T into the English curriculum, there has been clear inspection evidence (Office for Standards in Education (OFSTED), 1998, 2002, 2003, 2007, 11) of the importance of teacher subject knowledge to enable the planning and delivery of appropriate activities. OFSTED has identified the lack of subject knowledge as a key factor in the poor delivery

of the subject in primary schools. Practitioners need the knowledge and understanding to be confident in their teaching. This issue is not confined to England. In a recent report (OFSTED, 2011) the importance of teachers having appropriate knowledge and understanding was highlighted by other countries such as Australia, Finland and Singapore. To be able to teach effectively, practitioners need to feel confident that they are able to support in-depth learning, even in the Foundation Stage (3-5 years). There is a need to be able to take learning further – taking into account the different depths of learning at all ages and stages of development.

### *Planning the D&T curriculum*

Planning for D&T was the third key issue identified. Over 88% of the teachers indicated that their schools were moving away from subject specific teaching and introducing theme or topic work or the creative curriculum. There are no definitive definitions for these curriculum planning tools but in general terms it meant that they were looking to plan a curriculum that made links across the curriculum – albeit inappropriate in many cases. A few schools (6%) were making links but if the link was not relevant then single subject teaching was planned for. The majority of teachers in this research project had to ‘fit in D&T’ to whatever topic or theme had been chosen and this had led to inappropriate D&T activity, particularly when linked to History. The user and purpose were not identified and children were making history artefacts without understanding why they were doing it and the purpose for the activity. A significant minority of teachers (24% of the 88%) indicated that they understood that change was needed but that they felt there was little hope of making the changes on their return to school. When the initial planning had taken place, comments such as: “the children are making aren’t they” and “D&T links well with History as it is about products in the past” had cemented the link and the teachers felt that more changes would not be welcomed.

At this time in England there is much debate about a new primary curriculum. The ‘Rose Review’ (2009) renewed the debate and many schools took from this that a thematic/topic approach was being favoured (McCulloch 2011). However, the review did indicate the importance of subjects and the knowledge of these. Certainly Robin Alexander’s review (2010) of the primary curriculum is being looked at favourably. Specialists are advocated, subject expertise really matters, and the children’s voice is used. In Alexander’s review, the children identified their interest in pedagogy, their desire to have teachers who know their stuff, who explain things in advance so they know what a lesson is about, make sure the steps put in are not too large, and give the children records of what they have learnt. At the present time English schools await the final new curriculum that the Government is planning but how the curriculum will be delivered still appears to be in the hands of individual schools. It appears unlikely that those who have already spent several years planning a themed approach will change unless forced to and inappropriate links may remain. It should be remembered that there is much research identifying the inability of pupils to make links across the curriculum in terms of both knowledge and skills. (McCormick 2004).

The following two factors – Valuing the subject and attitudes were the next most commonly identified.

### *Valuing the subject*

From the data, particularly at the end of course, analysis indicated that whilst much finance and time had been invested by the schools in course attendance over 60% of the teachers felt that they faced a struggle when they returned to school to disseminate the changes that they felt were necessary to improve D&T. Reasons for this were focused around the lack of commitment of the head to develop D&T, lack of opportunities such as staff meetings and CPD sessions to offer support, and a change in the school development plan. Teachers who thought that they would be able to bring about positive change all indicated that the head’s support was an important factor in this.

During the course 5% of teachers had undertaken D&T activities in different ways with parents. They were all enthusiastic about the outcomes and felt that the parents were now much more supportive of D&T. In one school parents were invited to see a presentation of a Y1 (5-6 year olds) project on Playgrounds. Comments from parents included: "I would never have realised how much thinking took place while she was making her slide; I thought it was just a few pieces of card put together and painted brightly." "I didn't realise that he knew all those words about mechanisms and he could make something that worked so well. He really had to think".

### *Attitudes*

The notion that it is important to foster certain attitudes in D&T grew during the course. Majority of the teachers had been involved in the initiative 'Social and Emotional Aspects of Learning – (SEAL)' (Humphrey et al 2008) and were integrating its principles into certain aspects of the school curriculum. However none had identified D&T as a subject in which SEAL was crucial to the way in which teaching and learning could be improved. It is vital that children feel able to take risks, to communicate and to share ideas in a supportive environment, particularly in D&T as there are no right answers. There are many solutions that can be considered the 'best' depending on the criteria against which they are being judged (Humphrey et al 2008; Benson and Lunt, 2009). In this supportive environment it is then possible for children to work together with others to share ideas and then to either continue on their own path or work together to a common solution. Previous research has shown the importance of SEAL in D&T (Benson and Lunt, 2009).

### **Addressing the issues**

The following are some possible key actions that could be taken to address the issues raised. They are organised to indicate how actions need to be taken at different levels – it is not just the practice of the teacher in the classroom that would lead to the development of good practice in primary D&T. Funding will always be an issue but it is vital to have a vision and a game plan that can be gradually, successfully undertaken.

### *The teachers*

They agreed that for example, more money and equipment would always be useful, more refined ways of assessing the pupils would help them to progress more rapidly, and more time allowance in the curriculum would enable more in depth projects to be undertaken. However, over 90% of the teachers felt that if the first three issues were addressed then improvements in D&T in their schools would be significant. Quality CPD was essential and it should be mainly face to face.

### *At a school level*

Head teachers/principals need to understand and be supportive of the subject if it is to flourish in a school.

There needs to be a clear understanding of what has gone before and what comes after each stage/phase of education (Capel et al 2003; Hargreaves and Galton 2002). This can be achieved through liaison (face to face and electronically), visits to different schools, reviewing resources including websites and publications and auditing the children through a short activity or project as they move from phase to phase. Secondary teachers would have a role to play in supporting their primary schools in ways that are most appropriate for them. There needs to be a mechanism whereby all practitioners have a clear understanding of the subject, whole school planning can take place, expertise is shared, and practitioners can readily access support materials and resources during the planning and delivering of activities.

### *In the wider community*

It should be remembered that many adults will not be familiar with the nature of the subject. Parents may not have studied D&T in their primary school; those in business and industry can be confused and think the subject is linked to computers, or manufacturing.

Parent workshops, leaflets, displays in local community buildings and shopping malls have all proved useful in helping understanding. Invitations to local businesses, industrialists, and retailers to support challenges, to attend D&T events may stimulate interest and action.

### *At a national level*

There needs to be a real understanding of the nature of the subject, the realisation of its value and a commitment to producing documentation that is clear, relevant and is not in a state of constant change. There need to writers/consultants that have a good understanding and experience of primary education and teaching, and practitioners need to be involved.

There needs to be a national programme of CPD that all schools can access, some of which should be face to face and include practical skills development.

There needs to be an active National Association (or equivalent) that can update, provide support and act as a sounding board at a national level.

Inspectors need to have a clear understanding of the nature of the subject in order that they can provide accurate and supportive ways to take forward schools and provide a national picture of D&T education.

### **Final thoughts**

It may seem as though achieving quality D&T in all schools is an impossible task but it is possible, with appropriate support and enthusiasm from practitioners and heads. Although this small scale research has shown some of the stumbling blocks teachers have identified, in the recent OFSTED report (2011) in England it was exciting to see the improvements in primary D&T where teaching in design and technology was good or outstanding in seventy two percent of the schools visited and in none of them was it less than satisfactory. A decade ago over half the teaching was deemed to be satisfactory, unsatisfactory or poor. Children's achievement was good or outstanding in three fifths of the schools visited. It is a tribute to the tenacity and resourcefulness of primary teachers that these improvements have been secured, often with very limited training opportunities and resources.



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