Blurring the Boundaries or Muddying the Waters?

Sally Aston & Dot Jackson, St Mary's University College, Twickenham

Abstract
This paper outlines reflections by two tutors in Initial Teacher Education on ways design and technology (D&T) has been included in cross-curricular modules at our institution. These modules were a new addition to our courses in response to a conviction by tutors that cross-curricular teaching and learning in primary schools is important for children's education and well being. We felt that this approach would support a move towards a more creative curriculum. Often we found that students were unfamiliar with cross-curricular teaching and learning and we discuss how we have been developing strategies and pedagogies to support their understanding of this approach. We are convinced that, in order to raise the status of D&T there is a need to provide exciting and relevant contexts for learning subject specific knowledge and skills, as well as those which cross curricular boundaries.

Key words
Cross-curricular, Initial Teacher Education (ITE), primary, design and technology (D&T)

RESEARCH

Introduction

Design and technology (D&T) has struggled to gain recognition as a significant subject in the primary curriculum, and recently there have been some important debates about how it should be taught in schools. One such debate concerns whether a move towards a more cross-curricular approach to teaching and learning will provide teachers with opportunities to raise the profile of D&T or only serve to lessen the value, status and importance of the subject, resulting in its disappearance into a 'muddy' curriculum. At the time of writing, the primary curriculum is undergoing two comprehensive reviews, one led by Sir Jim Rose on behalf of the government and the second is an independent review led by Robin Alexander. The findings of both reviews are likely to have a significant effect on the future curriculum in primary schools. In this paper we will discuss our own experiences of changing approaches in the teaching and learning of D&T as we move towards a more integrated approach in our practice.

Our context

As tutors at an institute of Higher Education, we are responsible for the teaching and learning of Primary Design and Technology in undergraduate and postgraduate Initial Teacher Education (ITE) programmes. In addition we convene two cross-curricular modules that have been recently introduced into our curriculum.

The national context

The subject-based national curriculum was first introduced to state primary and secondary schools in England, Wales and Northern Ireland following the Educational Reform Act in 1988. It aimed to provide a broad and balanced curriculum for all pupils. One of the subjects newly identified in this curriculum was design and technology (D&T), though activities linked to what we now define as D&T were being taught in primary schools long before its formal introduction in 1990. As Benson (2004:139) states, 'there were schools in the 1970s and the 1980s that included aspects of design in their curricula; there was art and craft; and some 'topic work' was closely aligned to design and make assignments.' In the National Curriculum (DfEE, 1999), D&T is categorised as a foundation or 'non-core' subject, which indicates how D&T is positioned in relation to the core subjects of English, mathematics and science.

The later introduction of the non statutory, yet widely adopted, National Literacy Strategy (NLS) and National Numeracy Strategy (NNS) in 1998 and 1999 initially encouraged teachers to focus on developing literacy and numeracy skills discretely. These strategies, the standardised testing of core subjects at ages 7 and 11 and associated performance tables, gave the subjects of English and mathematics higher status than other subjects in the primary curriculum. Sometimes this has led to what Alexander (1984) described as the two curricular syndrome with 'basics' as one curriculum (which comprises reading, writing and mathematics) and the rest of the subjects forming the 'other' curriculum. Concerns arose amongst some teacher educators who value a broad and balanced curriculum, that certain subjects, including D&T, have been marginalised in the primary curriculum. Education departments have responded in various ways to address this concern. For example, in 2002, the HEARTS (the Higher Education, the Arts and Schools) project was conceived to strengthen the initial teacher training of primary school teachers in the arts (Downing et al., 2007).

Blurring the Boundaries or Muddying the Waters?

When 'Excellence and Enjoyment – a strategy for primary schools' (DfES, 2003) was introduced we hoped that this would encourage teachers to move away from this two tier curriculum and develop more creative, innovative and integrated pedagogies in their schools, and that the 'other' curriculum would assume more prominence. 'Excellence and Enjoyment' encouraged teachers to 'take control of the curriculum and to be innovative' (p16), as well as to promote creativity. The vision was for a sector where high standards are obtained through a rich, varied and exciting curriculum which develops children in a range of ways. We hoped that this strategy would raise the status of foundation subjects, especially those that specifically offer opportunities for creativity, including D&T.

However some primary schools have seemed 'reluctant for a variety of reasons to move away from the emphasis on literacy and numeracy and to provide opportunities across the curriculum for children to engage in more open ended activity, where they are able to make their own decisions and choices, take risks and exhibit originality' (Benson, 2004: 139). Indeed, a report by the Office for Standards in Education on the National Literacy and Numeracy Strategies (Ofsted, 2005: 2) stated that 'school's focus on the literacy hour and daily mathematics lesson has been largely unaffected by the publication of Excellence and Enjoyment.'

The importance of a creative and innovative curriculum

Professor Tim Brighouse (2006) noted that in successful schools outstanding teachers are creative about curriculum and pedagogy. Following the introduction of 'Excellence and Enjoyment', where teachers were given more autonomy, we expected to see evidence in schools of a more creative and innovative curriculum. However, when we visited students to support them on school experience, we saw few curriculum changes being made in schools to promote creativity. Alexander (2007), in a lecture reporting midway progress of his independent review of primary education, comments how those that want to reform the curriculum are often frustrated by 'habits of thought and practice' such as the divided curriculum into 'basics' and little else 'despite all we know about the cognitive and cultural power of talk or the rooting of truly civilised human relations in the capacity to imagine and create.' In order to imagine and create exciting new learning experiences in the curriculum, teachers have to be willing to take risks, a feature common to those of us familiar with problem solving in D&T. Teachers are ideally positioned to influence curriculum developments. However, in an editorial for the Design and Technology Association journal, Kimbell (1997) questioned to what extent teachers regard the curriculum as fixed by others and 'the extent to which they see their professional responsibility as including the continuous development of that curriculum.'

Our concern

To be confident to influence change, teachers must feel secure in their understanding of what they value in education and how children learn. As teacher educators we encouraged students to be reflective and consider how their own values and philosophies of education influence their practice. However, we were concerned that we did not provide a wide enough range of learning experiences in our courses to support students in becoming innovative and creative curriculum planners when in school.

Our module evaluations showed that we successfully developed our students' awareness of the nature and value of D&T, and the importance of providing exciting and enjoyable learning experiences that develop children's D&T capability. However, we were concerned that some students were not thinking creatively about ways to promote D&T when in school. In research that we carried out with Rutland et al (2006) we found that most students were able to teach D&T focused lessons when on school placements. Nevertheless, lessons observed often showed missed opportunities to make links with D&T when teaching subjects such as English or mathematics, which we were more likely to see being taught given their prominence in the primary curriculum. Although tutors included some links across curriculum areas in their teaching, it seemed that students' own experience of a subject led curriculum as pupils, as well as their experiences as student teachers, influenced their perceptions of how children should be taught in schools. Their lack of confidence, partly due to limited experience of teaching, seemed to lead to an over reliance on prescribed solutions to lesson planning, rather than recognising their own ability to be creative.

We were concerned that we were not providing students with sufficient experiences in college to show how D&T can provide relevant contexts to enhance, and be enhanced by, other curriculum areas. We are committed to improving our courses and, with colleagues in our primary teams, identified that there was a need to change our primary ITE programmes to reflect our belief that there is a place for cross-curricular work in primary education. While we do not advocate a return to a completely unstructured curriculum we also recognise the value for learning when subject boundaries are blurred. This view is supported by 'Excellence and Enjoyment' (DfES, 2003) which states:

> *There is no requirement for subjects to be taught discretely – they can be grouped, or taught through projects – if strong enough links are created between subjects, pupils' knowledge and skills can be used across the whole curriculum. (p17)*

Even educationalists like Gardner, though a staunch defender of subject skills and knowledge, wrote that 'any topic of significance can, and should, be represented in a number of different ways in the mind' (2004:141). We support Barnes' idea that 'teachers do not have to choose between *either* subject disciplines or thematic methods but should have *both*.' (2007: 231)

Cross-curricular learning

Barnes (2007) favours an approach led by learning experiences and defines cross-curricular working in this way:

> *When the skills, knowledge and attitudes of a number of different disciplines are applied to a single experience, theme or idea, we are working in a cross-curricular way. We are looking at the experience of learning on a macro level with the curriculum as the focus (p. 8)*

Importantly, carefully planned cross-curricular work can motivate children to engage with their learning experiences. This does not mean making tenuous, artificial links between subjects in order to fulfil a curriculum need but identifies a meaningful context that is relevant to children's lives and interests. Wragg (in Wilson, 2005) was passionate about making use of real situations for learning, emphasising the importance of using opportunities such as a snowy day to suspend all curriculum plans, cross subject boundaries and allow children to gain first hand experiences of the snow outdoors. This holistic approach to learning, with its benefits to children's well being, supports the Every Child Matters (2003) agenda. We agree with Csikszentmihalyi (in Dickinson,1991) who believes that it is of paramount importance that learning is enjoyable and motivating and when learners are totally immersed in the learning experience, they enter a state of consciousness that becomes 'a flow experience'. This can be achieved when learners are absorbed in a focused D&T activity or when working in a wider cross-curricular context. When learning has a discrete subject focus, and when subject boundaries are blurred, children develop a range of key skills such as communication, improving own learning and performance, application of number, information technology, problem solving, working with others, as well as range of thinking skills such as reasoning and evaluation (QCA, 1999).

There have been many debates about the value of a cross-curricular learning in schools. We agree with Barnes that there is a need for 'a balance between the unique skills, knowledge and attitudes of each 'traditional' subject and the uniquely motivating effects of cross-curricular and child centred learning' (2007:6). Shoemaker (1989) uses the term 'integrative education' which, she argues, 'cuts across subject-matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study.'

Cross-curricular topics were popular in schools in the 1970s and 80s, following the publication of The Plowden Report 'Children and their Primary Schools' (1967). Its emphasis was on child centred learning and recognised that 'rigid division of the curriculum into subjects interrupts children's train of thought and interest.' Although the resulting integrated approach to education had fierce critics, when planned and taught well it also allowed meaningful learning to take place. Twenty years after the report was published Lady Plowden (1987) wrote that although the report 'endorsed the trend for individual and active learning' it did not deny the value of learning 'by description' or the need to practise skills and consolidate knowledge. The move from the Plowden ideal where the child was placed at the centre of the educational process was replaced by the government's belief that 'the school curriculum is at the heart of education' (DfES, 1981). This paved the way for more control by government, the introduction of the national curriculum and other national strategies which resulted in more discrete subject teaching and less that crossed subject boundaries.

Cross-curricular learning can occur in large projects or on a smaller scale by linking one core subject with one foundation subject. Benson and Mantell (1999) outline the benefits for children and teachers of linking English and D&T by offering real contexts and opportunities for developing designerly thinking skills. Hope (2006) offers examples of using fictional stories as a starting point for D&T activities and also suggests ways to develop mathematics, science and ICT through D&T. Johnsey (in Eggleston, 2000) outlined a successful project exploring how D&T may be used to enhance learning in science. He also suggests that D&T is unique in that it is often dependent on using the knowledge and understanding learnt in other curriculum subjects, for example mathematics and science, thus demonstrating how D&T can also be enhanced by other subject areas.

D&T has an important place in bringing together curriculum areas whilst drawing on a range of key skills and thinking skills to generate new knowledge and solve

problems. We believe that learning experiences provided in focused D&T lessons, and cross-curricular projects, can encourage children to create their own knowledge and will do so given a suitable supportive educational climate.

Children's experiences of cross-curricular learning in England

In England, children have differing experiences of cross-curricular learning as they progress through their formal education. In the early years (0-5 years), nursery and reception classes follow the revised 'Early Years Foundation Stage' (DfES, 2007) curriculum which has broad themes and principles of care and learning. The Learning and Development theme is divided into six broad areas of learning *not* into traditional subjects. One such area is entitled 'Knowledge and understanding of the world' which incorporates a range of knowledge and skills associated with subjects such as D&T and Science. In early years settings, learning is a developed without curriculum boundaries.

However, when children reach the age of five they are required to follow the more subject based National Curriculum at Key Stage One (5-7 years) and Key Stage Two (7-11 years) which clearly outlines 'traditional' subject knowledge and skills as discussed above.

At the age of 11, young people enter secondary education and, until recently, learnt in a more clearly divided subject based curriculum with lessons taught by subject specialists. However, following the recent review of the Key Stage Three curriculum (11-14) schools have been given greater flexibility and there is less prescribed subject content. Teachers are being encouraged to continue to teach 'essential subject knowledge' but to balance this with 'the key concepts and processes which underlie the discipline of each subject' and to identify opportunities 'to enhance and enrich learning, including making links to the wider curriculum' (QCA, 2008). This review recognised the importance of blurring curriculum boundaries and the current review of the primary curriculum will make similar recommendations.

The recently published interim report by Rose (DCSF, 2008) states:

> *A design for the curriculum is proposed, which promotes challenging subject teaching alongside equally challenging cross-curricular studies. Given the excellent examples of both of these approaches observed by the Review, high quality subject teaching must not disappear from primary schools, nor should the benefits to children of well-planned cross-curricular studies. To this end, six areas of learning are proposed to give schools optimum flexibility for planning cross-curricular studies, and ample opportunities to teach essential content discretely and directly. (p 5)*

Reflections on changes we have made towards a more cross-curricular approach

When the undergraduate and postgraduate ITE programmes were due to be re-validated in 2007, many tutors in the primary teams saw this as an excellent opportunity to introduce cross-curricular modules to both programmes. We welcomed the opportunity to develop links between subjects and to work collaboratively to plan the new modules. As D&T tutors we hoped that this opportunity would enable us to promote the importance of D&T in the curriculum.

The new modules were planned to encourage students to generate their own ideas and be creative in their planning and teaching. Our epistemological values influenced our move towards this approach as we felt that it would give students more opportunities to co-create knowledge which they could later share with others. This approach enabled us to model a good way of working with children and is commensurate in our belief that D&T enables children to work collaboratively and create their own knowledge and understanding.

We also decided to make some changes to our existing D&T introductory modules to develop students' awareness of ways D&T can provide a relevant context to enhance learning in other curriculum areas. We now outline changes we have made in order to improve our courses and personal reflections on the impact of these changes.

Undergraduate programme BA (ITE) degree

Before re-validation

In the undergraduate programme both students and staff were concerned prior to re-validation that there were limited opportunities within the existing course for students to gain knowledge and understanding in some of the foundation subjects beyond the students' first year of study. Although some students would continue with specialist elective modules, for the majority the year one introductory course was the only opportunity in college to develop skills and knowledge in some of the foundation subjects, including design and technology. There was a separate subject specific assignment in each curriculum area.

Changes implemented in 2007-8

Introductory D&T module

The existing first year module was modified. Tutors emphasised relevant cross-curricular links in sessions and students completed a single assignment which had a cross-curricular focus. In this way we reduced the amount of assignments for students and gave them some experience of making links between foundation subjects.

Cross-curricular module

We introduced a three week module for second year students undertaken before their school placement. It was developed by tutors with an interest and/or experience in this way of working. Drawing on the team's expertise, workable themes were identified which linked selected curriculum areas and allowed opportunities for a wide variety of outcomes. These were:

- Creative arts (art and design, music, English and drama).
- Who do you think you are? (history, art and design, music, maths and modern foreign languages).
- Outdoor learning (design and technology, P.E., IT and science).
- Our world (geography, D&T and drama).

Students selected a theme and the module began with a guest speaker presenting a rationale for cross-curricular teaching and learning providing inspiring examples of experience-led, themed work with children. Students then split into their chosen areas and tutors introduced each one by modelling an example of a cross-curricular approach for the theme. Then students worked in small groups to plan their own project for a themed week in school. Optional workshops, online support and tutorials were offered to support students as they developed their ideas culminating in an interactive display of each group's work at the end of the module. Students were encouraged to make use of ICT, including photography and multimedia applications. Short films, power point presentations and photographs were included in a number of displays.

The outcomes

Introductory D&T module

Evaluations of this module indicated that the majority of students developed knowledge, skills and understanding of D&T particularly in ways it differs from art and design. They valued having practical experience in sessions and some commented about being more aware of opportunities for developing creativity through teaching D&T. A number wrote that their understanding of links between D&T and other subject areas had been raised.

From feedback and discussion about the assignment we felt that students tended to focus purely on a unit from a QCA scheme of work and outlined occasions where other subject skills and knowledge were developed. This was not unduly concerning as first year students often need a structure on which to build. Students frequently commented that the assignment 'made' them become familiar with the National Curriculum and QCA schemes of work for a range of foundation subjects. There were a few notable exceptions where a context or experience led the activities. For example, one project incorporated designing and making food products to sell for the charity 'Children in Need'.

Year 2 Cross-curricular module

This cohort of students had not undertaken the new cross-curricular assignment in their first year. However they approached the module with excitement which we hope to some extent, was a reflection of tutors' enthusiasm for this new module.

We were very impressed with final exhibition showing a varied range of learning contexts. Examples included:

Figure 1. An 'Outdoor Learning' project

We also noted an apparently empowering outcome of the largely student-led module. Comments included:

This project has given us the opportunity to explore areas of the curriculum that we are not covering in out electives and has widened our knowledge and experience of working in different fields. It has also made us more aware of the importance and benefits of teacher and pupils learning within cross-curricular projects.

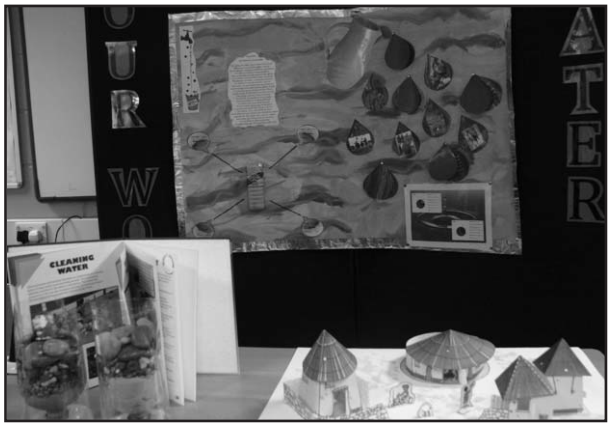

Figure 2 An 'Our world' project

Figure 3 A classroom display about fair trade

Students also commented about the success of working in a collaborative way. This comment is representative of many:

'We found working together as a group on the cross curricular module very useful and we were able to benefit from each others' ideas. Every member of the group was committed to the project. Initially there were differences between us but we pulled together as a team and each member worked conscientiously and we were able to capitalise on our individual strengths.'

This was encouraging for tutors as each group member was awarded the same mark so students were advised to develop strategies to ensure work was distributed equally and to make use of individual expertise within the group.

Tutors were also pleased with the outcome at a range of levels both for opportunities to work with colleagues and how much commitment was shown by students. One tutor noted how his understanding of cross-curricular work had changed in a positive way although he still had reservations about the potential for subjects being 'shoe-horned in'. We felt our choice of themes was appropriate and allowed for developing a wide range of ideas linking subjects in a variety of contexts. The new cross-curricular module successfully inspired some students to consider making links between D&T and other subjects in their future practice. For example, one student developed a global citizenship project for a fair trade week during the school experience following the cross-curricular module. She included a range of cross-curricular links between geography, design and technology, art and design, ICT and global citizenship to raise awareness of fair trade issues surrounding the chocolate and banana industries with her class (see Figure 3).

At the time of writing the current Year 2 cohort are participating in this cross-curricular module. It will be interesting to reflect on their evaluations as these students have had some experience of cross-curricular learning in their first year foundation subject modules and assignment.

Postgraduate (PGCE) programme

Before re-validation

Before validation in 2007, postgraduate students were provided with a short introductory course to design and technology. Evaluations showed that students' awareness of the nature and value of the subject increased, as well as their confidence to teach it. Students' own capability in D&T was developed through subject focused lectures, practical activities and discussions. A few cross-curricular links where made during sessions. The assignment required students to record a design and make activity completed during a teaching session, then to evaluate the end product and process undertaken with reference to the D&T national curriculum. The new modules were introduced in two phases.

Post validation. Phase 1 2007-8

Introductory D&T module

The course content remained as before, as did the assignment which focused specifically on D&T without requiring links to be made to other curriculum areas.

Cross-curricular module

The new post graduate module was introduced with a lead lecture outlining the nature and value of cross-curricular teaching and learning. Some examples of themed projects in schools were shown. For example, a

RESEARCH

project about World War 2 in which one tutor had participated in a local school. Students then worked collaboratively in a variety of practical sessions. The two with a D&T focus used food and textiles as contexts for learning. Students' learning experiences showed how relevant links could be made across the curriculum. At our institution we are very committed to ensuring our work links with global citizenship so our ideas for cross-curricular projects all had a global dimension. We used the Adinkra project (Lowe and Growney, 2007) which provided an excellent example of a cross-curricular project within a global context. Due to the time restrictions on a PGCE course, it was necessary to incorporate some specific D&T knowledge and skills in cross-curricular sessions. We found this helped us to clarify which knowledge and skills specifically relate to D&T, which relate to other subject areas and which are transferable skills which cross curriculum boundaries. Students were then required to work collaboratively in small groups to plan a project for children that made meaningful links to three subject areas. These had to include two foundation subjects and make reference to the relevant subject areas in the National Curriculum (DfEE, 1999). The assessment was to present their ideas for their projects using ICT and write a rationale for cross-curricular learning.

Outcomes

This was very successful and students selected a range of relevant themes. For example, one group chose 'India' as their theme linking P.E., geography, D&T, ICT and mathematics. The D&T element focused on evaluation of Indian textile products then using this to inspire children to design and make a textile product 'expressing Indian culture'. Another example of a theme that incorporated D&T was the Olympics which included research and design of an Olympic stadium. Students' self assessments and rationales confirmed that they had developed a good understanding of the nature and purpose of cross-curricular learning, as well as how it may benefit teaching and learning in foundation subjects. For example, one student commented that cross-curricular teaching 'has immense benefits for children's learning' and that it excites 'children to learn through purposeful, stimulating and inter-related topics.' Another student wrote, 'I appreciate how effective a cross-curricular approach to teaching and learning can be within a classroom' and found it 'useful to demonstrate the knowledge gained from studying the foundation subjects.' On the assignment she reflected that it had 'allowed us to expand on subject content and practice, applying what we have learnt.' It has 'been beneficial to my confidence and helped me to develop ideas. It has left me with a future planning tool which will be useful in our future careers.'

Many students commented on how the module had developed their ability to work collaboratively and the importance of innovative and creative planning. For example, one student reflected that 'cross curricular learning can develop creativity in planning and teaching and creating a more enjoyable learning experience for pupils.' Tutors also found it to be a very useful experience to work collaboratively in the planning, teaching and assessment of this module.

.

Phase 2 2008-9

Introductory D&T module

At the time of writing, students have just completed this module. During each session, we made more links with other subjects, when appropriate. For the assignment, students have designed lesson plans to show how D&T can be linked with English or mathematics, accompanied by a short rationale. The hope is that this will encourage students to allocate some of the time still devoted to the literacy and numeracy strategies to D&T as well.

Outcomes

Course evaluations confirmed that students have developed their D&T capability, as well as their awareness of links between D&T and other subjects. Students' self assessments demonstrated that this assignment has encouraged them to look for links between D&T and other subjects. For example, one student wrote, that the assignment 'allowed me to see the strong curricular links D&T can have with core subjects such as English' and that 'D&T is a motivating subject for children that can make other subjects more interesting'. Others noted that the course had increased their awareness of the importance of promoting creativity in schools and to be innovative in their planning.

Cross-curricular module

At the time of writing we are planning this module. It will remain very similar to 2007-8 though we will be incorporating opportunities for each group to show their cross-curricular project plans to others in their cohort.

Conclusion

From our experiences to date, we believe that it is important that student teachers have a good understanding of the nature and value of D&T through a subject focused module. However, in order to raise the status of D&T in primary schools, we must also demonstrate both how it

can enhance, and be enhanced by, other curriculum areas. As we reflect on the changes we have made to our practice, we believe that the subject itself can be shown to provide relevant and meaningful contexts for learning and that capability in D&T can be developed through broader cross-curricular themes.

Primary education is at a point of transition as we await the outcomes and recommendations of two very important reviews. We anticipate both will have a major impact on the curriculum in primary schools. Mike Baker, writing in the Guardian newspaper (2008), thinks the Rose review could be 'as epoch making as the Plowden report'. The recently published interim report from the Rose review (DCSF, 2008) recommends

> *…neither discrete subject teaching nor cross-curricular studies must disappear from primary schools. Schools should protect time when learning is best served by teaching subject content discretely and systematically, and give children ample opportunities to use and apply their developing subject knowledge, skills and understanding in cross-curricular studies. (p9)*

The report proposes six areas of learning to give schools flexibility for planning cross-curricular studies and for teaching subjects discretely. These are: Understanding English, communication and languages, Mathematical understanding, Scientific and technological understanding, Human, social and environmental understanding, Understanding physical health and well-being and Understanding the arts and design.

Although Rose has been encouraged to be radical and creative, and to introduce more flexibility and personalised learning in school, he is not able to change the way children are tested in English and mathematics which is currently a significant constraint on teachers. The proposal suggests that by introducing the six areas of learning, the designated 'core' and 'foundation' subjects would no longer apply in the same way. However the report states 'that literacy and numeracy must continue to be prioritised' (DCFS, 2008: 37).

Although it is possible to identify many opportunities within the proposed structure to develop D&T capability, we are extremely concerned that the discrete nature and importance of the subject is likely to be greatly diminished in future school curricula if it is not given higher status in the final review due to be published in Spring 2009.

It is our hope, however, that whatever the final outcomes and recommendations, the review will pave the way for a more creative and innovative curriculum where children enjoy learning, make good progress and whose capability in D&T will prepare them for life in the 21st century.

As we strive to embrace changes we agree with Wright (in Kimbell, 2006: 120) that D&T's 'intensely humanistic and practical purpose is possibly only realisable not as a bounded 'subject' but as a flexible, synthesised learning experience.' Those of us who believe in the value and importance of D&T and its capacity to understand and improve the made world, have a responsibility to ensure its survival. To do so we will need to continue to create innovative ways to ensure that this is recognised in the emerging curriculum.

By modifying subject focused courses and introducing new cross-curricular modules we have made innovative changes to improve our programmes. Rather than D&T disappearing into muddy waters, by blurring curriculum boundaries we have been able to raise the subject's status at our institution and demonstrate its important place in primary education.

References

Alexander, R.J. (1984), *Primary Teaching*, Holt, Rinehart and Winston, London.

Alexander, R. (2007), *Towards a vision for primary education? Midway through the primary review.* Retrieved on 18/11/08 from http://www.primaryreview.org.uk/Downloads/RJA_Weavers_Company_lecture_web.pdf

Baker, M. (2008) *Testing Decisions* in The Guardian, 21st October 2008
Retrieved on 18/11/08 from http://www.guardian.co.uk/education/2008/oct/21/sats-schools

Barnes, J. (2007), *Cross-curricular Learning 3-14*, Paul Chapman, London.

Benson, C. (2004), Professor John Egglestone Memorial Lecture 2004 Creativity: Caught or taught? *The Journal of Design and Technology Education*, 9, 3,138-144

Benson, C. (2005), *'Developing Designerly Thinking in the Foundation Stage'*. In The International Primary Design and Technology Conference, 2005, in C. Benson, S. Lawson, & W, Till (eds.), Fifth International Primary Design and Technology Conference, Birmingham, University of Central England. 15-18

Benson, C. and Mantell, J. (1999), *Developing Language through Design and Technology,* Design and Technology Association, Wellesbourne.

Brighouse, T. (2006,) *'Essential pieces: The jigsaw of a successful school'*. Conference paper, International Design and Technology Conference 2006.

Central Advisory Council for England (1967), *Children and their Primary Schools* (The Plowden Report), HMSO, London.

Csikszentmihayli, M. (1991), Thoughts about Education in Dee Dickenson (ed) *Creating the Future: Perspectives n Educational Change,* New Horizons. Retrieved on November 15th from http://www.newhorizons.org/future/Creating_the_Future/crfut_csikszent.html

Downing, D. and Lamont, E. with Newby, M. (2007), HEARTS *Higher Education, the Arts and Schools: an Experiment in Educating Teachers*, NFER, Slough.

Department for Children, Schools and Families (DCSF) (2008), *The Independent Review of the Primary Curriculum Interim Report,* DCSF, London.

Department for Education and Employment (DfEE) (1999), *The National Curriculum,* DfEE, London.

Department of Education and Science (DES) (1981), *The School Curriculum,* HMSO, London.

Department for Education and Skills (DfES) (2003), Excellence and Enjoyment – *a Strategy for Primary Schools*, DfES, London.

Every Child Matters (2003) Retrieved on 18/11/08 from http://www.everychildmatters.gov.uk/

Department for Education and Skills (DfES) (2007), *The Early Years Foundation Stage*, DfES, London.

Gardner, H. (2004), *Changing Minds: The Art and Science of Changing our Own and Other People's Minds*, Harvard Business School, Boston, MA.

Hope, G. (2006), *Teaching Design and Technology at Key Stages 1 and 2*, Learning Matters, Exeter.

Johnsey, R. (2000), Identifying Designing and Making Skills and Making Cross-curricular Links in the Primary School, in John Eggleston (ed), *Teaching and Learning Design and Technology,* Continuum, London.

Kimbell, R. (2006), *Footprints in Shifting Sands*, Design and Technology Association, Wellesbourne.

Kimbell, R. (1997), *At the Edge of Chaos* (Editorial). The Design and Technology Association Journal, 2, 3.

Lowe, C and Growney, B. (2007), *Adinkra: A Primary cross-curricular project using a textile tradition from Ghana,* Reading International Solidarity Centre, Reading.

Office for Standards in Education (Ofsted) (2005), *The National and Literacy and Numeracy Strategies and the Primary Curriculum,* Ofsted, London.

Plowden, B. (1987) 'Plowden' Twenty Year's On, *Oxford Review of Education,* 13, 1.

Qualifications and Curriculum Authority (QCA) (2008), *Key Stage 3 curriculum – What has changed and why?* Retrieved on 18/11/08 from: http://curriculum.qca.org.uk/key-stages-3-and-4/developing-your-curriculum/what_has_changed_and_why/index.aspx Site updated 2/5/08

QCA (2008), *Skills across the curriculum*. Retrieved on 18/11/08 from http://curriculum.qca.org.uk/key-stages-1-and-2/learning-across-the-curriculum/skillsacrossthenationalcurriculum/index.aspx

Rutland, M. et al, (2006), Student teachers' impressions of primary design and technology in English schools: a pilot study In E W L Norman, David Spendlove and Gwyneth Owen Jackson (Eds) *Designing the future Design and Technology Association International Conference 2006*, The Design and Technology Association, Wellesbourne.

Shoemaker, B. J. E. (1989), 'Integrative Education. A Curriculum for the Twenty-First Century'. In *OSSC Bulletin* 33, 2 (October 1989), Oregon School Study Council, Oregon ED 311 602.

Wragg, E. (2005), 'Going Against the Flow' in Anthony Wilson, *Creativity in Primary Education,* Learning Matters, Exeter.

astons@smuc.ac.uk
jacksondd@smuc.ac.uk