

RSA Design & Society. *What's Wrong With DT?* by John Miller, accompanied by a summary of a review by Ian McGimpsey of the academic literature on design education in the National Curriculum since its establishment in 1988. The introduction of the English Baccalaureate to secondary schools this year is set to have a number of profound effects on the shape of the curriculum. The emphasis on the traditional academic territory of maths, English, science, humanities and languages inevitably impacts on the status of other subjects – as perceived by heads, teachers, pupils and parents. One of the losers is certain to be Design and Technology – compulsory for two decades, now optional only post-14, and losing time and resources to the core E-Bac subjects.

Many involved in 'DT' fear a return to the bad old days of the subject's roots in woodwork, metalwork, needlework, home economics and technical drawing – which were in many schools regarded at best as a pre-apprenticeship grounding in handicrafts, and at worst as the 'sink' subjects in schools with academic pretensions, providing a half-hearted vocational alternative to pupils based in remote 'tech blocks'.

How can this be, given the 20-year opportunity the new subject of design and technology has had to establish itself? And given the apparent alignment of the subject with both the STEM (Science, Technology, Engineering, Maths) agenda and with design – a process regarded by both New Labour and Coalition governments as vital to building a competitive, knowledge-based economy based on ideas and innovation?

This paper is a view informed by personal and professional experience: my own educational and professional career has coincided with this lifespan of DT. I was the first in my school to do a Craft, Design and Technology A-level in 1987. It was the most formative of the subjects I studied at school. I had a higher education and early career in design before training as a DT

## Foreword

In theory, and especially if you ask designers, design has the potential to unlock a practical competence, a critical spirit and a creative, resourceful optimism in young people. Teaching them design should enhance their ability to learn, respond creatively to challenges, and actively participate in society's evolution.

There is evidence, in the form of research literature and the anecdotal perceptions of designers and practitioners, that the teaching and learning of Design and Technology does not always fulfil this potential. Why is this the case? Is the awkwardness of DT a result of the training and conventional practices of DT teachers or is it a problem with the framing of DT as a subject in the national curriculum? Is the contemporary subject of DT struggling to shake off its vocational antecedents in wood and metalwork? Is design so poorly and partially understood by the general public that DT can only hope to be half-baked in the school curriculum?

At a time when DT – along with several other non-'core' subjects – is under scrutiny and excluded from the Government's E-Bac framework, it is important to establish some evidence for how well DT performs as a component of general education. If it performs poorly, should it be taught differently – and if so, in what way? For example, should the focus be on Design's validity and operation as a discrete subject; on enhancing its transferability across – or complementarity with – core academic subjects; or should it be regarded as narrowly vocational in purpose? If there is evidence that it performs well, how should it be supported and rehabilitated?

RSA Design and RSA Education jointly commissioned two pieces of work to begin to answer the question 'What's wrong with DT?' John Miller's essay analyses the vast breadth of study implied by DTs ad hoc Key Stage 3 & 4 menu of 'resistant materials', 'systems & control', 'textiles' and 'food'; describes an operating context that forces a formulaic classroom approach; and recognises the pressures on a workforce of DT teachers who for the most part conspicuously lack design training. For all of these reasons DT has failed to break the bounds of its pre-National Curriculum antecedents in Craft, Design & Technology and Home Economics, and has not universally become the place where students explore how to create a better world.

We asked Ian McGimpsey to answer the question in a different way, by reviewing the academic literature on DT since its establishment in the National Curriculum in 1989. His review, summarised here and published in full on the Projects page of [www.thersa.org](http://www.thersa.org), suggests that DT has tried to be too many things to too many people, rather than focusing on its own worth and integrity as a subject area. By claiming to be an inter-disciplinary 'necessity to all subjects', and a solution to Britain's global competitiveness via an often tenuous relation to STEM, it has been preoccupied in over-justifying its place on the curriculum to the detriment of the subject itself. Particularly, perhaps, the skilled engagement with materiality which may be the principle cognitive virtue of design process.

The RSA has long considered itself to be at the heart of thought leadership on Design and Education, and we are passionate advocates for Design's place in the curriculum. We intend that these documents stimulate debate on the philosophy and content of the DT curriculum, and look forward to responses.

Emily Campbell  
Professor Becky Francis  
July 2011

teacher in 1997. I then did my teaching in universities rather than schools, interviewing many DT students for places on the courses I ran. Latterly at University College Falmouth in Cornwall, I worked with local DT teachers to establish Design-Ed in Cornwall, a celebration of post-14 design and technology work done by pupils across the county. Now I am back in the business world, running a design and manufacturing company but again interviewing young people with a passion for DT – this time for employment.

My enthusiasm for DT exists as it is the home of two linked activities that I consider to be essential – designing and making. Designing is the activity that connects what is desirable with what is possible. It links real wants and needs with knowledge, and demands *full* knowledge – *how* and *why* things are, rather than just *what* they are. A great design project based on a well-articulated problem or need is therefore a powerful educational tool. Solving the problem motivates us to find the specific knowledge needed – knowledge which may come from any source or discipline. It may also require us to learn a new skill or find a skilled person to apply what we have learned. So design projects are a great driver for multidisciplinary working and cross-curricular learning.

Then there is making. Matthew Crawford's 2009 book *The Case for Working With Your Hands* re-articulates the value of tacit knowledge – the know-how that comes from direct hands-on experience with materials and tools; making and mending things. The value of craft in education and craftsmanship in life is newly fashionable; a reaction to a recession which looks like the triumph of the unreal – credit-driven consumption over the real, the valuable and *crafted*. In schools, the opportunity to make things has long provided an alternative mode of learning, particularly important to children who are not stimulated by abstract classroom-based learning. Learning through making may be the only way to learn certain things about the way things are – about materials, systems, machines and the world formed by them. Using our hands and working with tools gives us immediate feedback: how can a structure or electrical circuit first be understood without being built? But more than this, for many the workshop is the alternative classroom that turns us on to learning. It is a place where children can thrive who may be bright, articulate, good problem solvers, negotiators and team-workers, but just not in tune with the prevalent classroom-based mode of learning and assessment and so easily perceived as 'academic' underachievers.

So why 'What's Wrong with DT?' The question comes not because the subject has failed, but from a sense that the great DT experiment itself has underachieved. Given its opportunity – as the home of activities, processes and ideas which are both strategically important and actually enjoyed by the kids who take it – why has DT not made more of a mark? The subject has enjoyed parity of resources, curriculum time and (in theory at least) esteem with more traditional disciplines at school. So who in public life and leadership owes their position to DT,

or even a design education? Where are the designer-leaders and chief executives – not to mention government ministers?

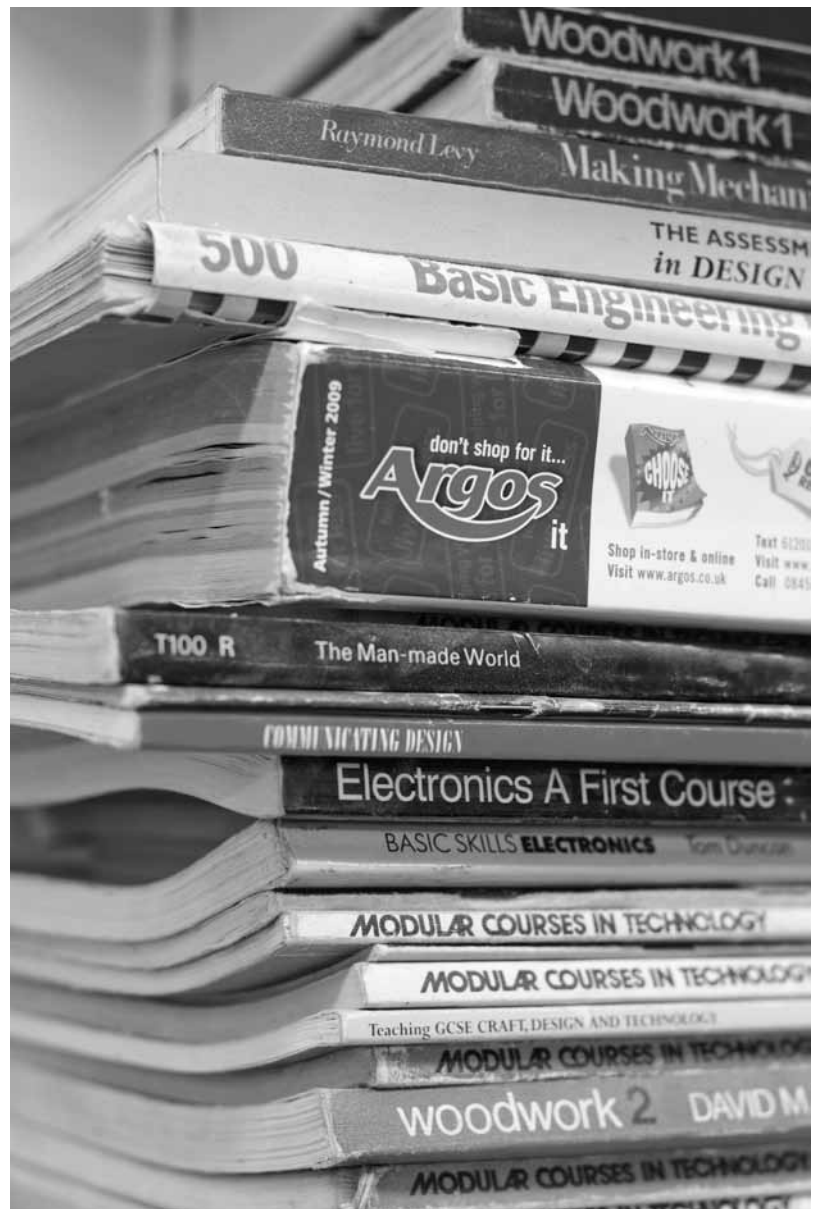
Design Technology in its current form was introduced as a discrete subject in the National Curriculum of 1989. It drew together a variety of subjects from the technical and vocational end of the school curriculum and united them under a common syllabus. Technical areas remained as subject specialisms – food, textiles, resistant materials, graphics – but were located in a common design framework. Furthermore, whereas these subjects were often pursued only to age 14 by more academically able pupils, the National Curriculum initially required all 16-year-olds to take a GCSE in DT. This was a startling piece of policy. Design in 1989 was widely misunderstood and derided. Most readily associated with fashion, even the word ‘designer’ had come to be used as a prefix to apply to just about anything that was flash, overpriced and over-manipulated. A surprise then that it should be given such a prominent position in the Thatcher government’s flagship National Curriculum.

To those in the design sector and design education, however, it was an enlightened move; the most radical element of the 1988 Education Act, which made Britain the first country to introduce compulsory design and technology education. Lady Margaret Parkes, the chair of the Design and Technology Working Group, articulated the strategic importance of this move:

*‘Our approach to design and technology is intended to be challenging and new. The aim of our proposals for design and technology is to prepare pupils to meet the needs of the 21st century; to stimulate originality, enterprise, practical capability in designing and making and the adaptability needed to cope with a rapidly changing society.’*

There was much talk of the benefits of transforming the pupil from a passive recipient of knowledge to an active participant. Project work, learning by doing, and ‘live’ work with businesses had long been established as design teaching methods and added to the subject’s distinctiveness and vibrancy. Design education was a UK success story and the design industry had grown massively throughout the 1980s. It was seen by government as an essential tool of capitalism; differentiating products and services in the marketplace and adding value. Here was a rare marriage of progressive pedagogic ideas and political and economic policy.

One effect of the elevation of DT to the core curriculum – especially to age 16 – was to raise its status, and so raise the status at school and at home of the kind of learning that goes on in a DT lesson; project work, learning by making and doing. It provided an opportunity for those students more at home bent over a lathe in the school workshop than a book in the school library to outshine peers who excelled in a more traditional view of academic practice.



It is difficult to measure the effect of mass DT education – the impact of most under the age of 40 now having had some kind of design education. Certainly we seem more design literate now, as evidenced in public taste, the rise of IKEA and ubiquity of contemporary public architecture. We are more discerning consumers, with higher expectations in the design of our products, information sources and services. What is measurable is the rise in popularity of design as a subject at University, with 63,000 students currently on design studies courses in the UK<sup>1</sup> – double the total number and a greater proportion of all students than in the early 1990s.

The subject itself has changed too. In higher education for example, design students are now more likely to understand their subject beyond the narrow confines of a discipline, be it textile design or car design. They will be more aware of the transferability of design process and thinking into many areas of life – service and systems design as well as products and graphics. Design students this year are being asked in the national RSA awards scheme to design a means of conflict resolution. When I entered the competition in 1990 the brief was to design a suite of bedroom furniture.

In business too, design companies have long outgrown the traditional design disciplines. Seymour Powell, the iconic product design agency formed in the 1980s, today includes product design alongside six other disciplines including ‘Strategy’ and ‘Insight’. The move by designers into the realm of business consultancy is best exemplified by IDEO, the Silicon Valley-based agency who have successfully promoted ‘design thinking’ as a driver for all areas of business and service innovation.

Design has even made successful inroads into public service design, exemplified by a Design Council regional programme called ‘Designs of the Time’ or DOTT. DOTT runs a series of design projects often without a ‘product’ outcome in sight – instead they are concerned with designing *with*, rather than *for*, people. Projects include designing public services, community initiatives and opportunities – even helping people to design themselves back to work by using design to bring clarity and meaning to the various support services and training available.

These are important changes in design over the last twenty years, but it’s hard to tell if they have taken place aided by, or in spite of DT. Certainly, the notion of Big Design as a powerful and pervasive activity broadly applicable outside of traditional product territories seems absent from most DT lessons. Designers and commissioners of design today see the subject as being about resourcefulness, sustainability, facilitation, multi-disciplinarity and solving problems of all shapes and sizes. Instead, DT in schools seems wrapped up in a rather formulaic design process model of ‘design sheets’, narrowly focussed practical tasks and collage passed off as research. It does not always look like the vital and exciting new subject referred to by John Eggleston in this 1992 quote: ‘Government ministers and leading industrialists [are vying] with each other to emphasise the crucial role for Design and Technology in

the future, even for the survival of the national economy and for the long-term prospects for individuals.<sup>2</sup>

Students studying DT at Key Stages 3 and 4 today will generally be offered a rotation of Food Technology, Textiles Technology, Resistant Materials and Systems and Control, with some schools offering more options such as Graphic Products, Electronics or Product Design. (For the curious, 'Resistant Materials' is DT jargon for wood, metal and plastics). Food Technology – which never seemed to blend easily into the mix – has been freed to an extent from the DT terminology and students can now focus on how to prepare and cook healthy food, rather than to 'design' menus, novelty foods, packaging and advertising campaigns. In the other areas, the subject is predominantly design project-based, with projects varying from a month to a term in duration. A summative GCSE project will take up most of year 11. These projects are structured around a design process template little changed since the original National Curriculum of 1989. Students spend roughly half their time in research, analysis and designing, with the remainder spent making and evaluating their work.

As opportunities to design, the projects will vary from essentially teacher-focussed tasks with little creative opportunity other than choosing the colour to self-directed projects often based on a pupil's own outside interests. These may be as ambitious as a collection of garments, the complete design of a restaurant interior, brand and exterior or even a working model of a solar powered vehicle – or as pedestrian as a storage cabinet for DVDs.

At its best, DT is a broad and challenging subject which engages children across a full spectrum of abilities and learning styles. It is taught in distinctive environments using specialist equipment and a wide range of teaching methods. It is concerned with the real world – the students I interviewed when preparing this paper emphasised that DT is about using technology, not just learning about the technology.

But there is another side of DT; of unfinished and undemanding work. Weeks and months spent on worthless tasks that seem designed more to aid classroom management than learning. Project work that seems formulaic – based on a linear design process so rigid that few in the design profession would recognise it – where creative thinking has been squeezed out by the need to fill boxes with a prescribed number of 'ideas', or 'research' consisting of collages of the Argos catalogue. My overview of DT in recent years tells me that the latter is all too prevalent. In interviewing applicants for design courses, I have struggled to see the individual student emerge from the portfolio of DT project work-by numbers. And DT has failed to make an impact on employers as a compelling grounding in creative thinking, technological understanding and practical skill. It is perhaps such a perception of DT that has sealed its E-Bac demotion.

2. Eggleston, J (1992)  
Teaching Design and Technology,  
Open University Press





Considering the popularity of DT and the enthusiasm of children to learn in the subject, as well as their readiness to take a pride in the work they produce, the shortcomings I have described in outcome are unlikely to be on the part of the learners. In exploring what's wrong I want to look at what is taught, how it is taught, and by whom.

### *WHAT is taught*

The breadth of study in DT is vast. To not only learn about, but design and make using cooking and handcraft skills, CAD/CAM techniques and an understanding of structures and mechanisms. Utilising a wide variety of materials, including smart materials, and control systems including electrical, electronic, microprocessors etc... All this requires significant curriculum space and a diverse staff team. However, arching over all of this subject content is the 'Design and Technology process'. The National Curriculum defines this in eight fairly abstract phrases such as

*'generate, develop, model and communicate ideas in a range of ways..., plan and organise activities ... shape, form, mix, assemble and finish materials, components or ingredients..., evaluate..., solve technical problems..., reflect critically and modify.'*

It names further common design considerations including users' needs, measurement of quality and impact.

In my focus groups with year 11 pupils, all said that DT was 'hard'. But when challenged, this meant hard work over long hours, rather than containing hard concepts to understand. The challenge of DT seemed to them more to do with time management than intellectual rigour. And it seems fewer students are meeting the challenge than in other subject areas. In 2010, 64% of GCSE pupils achieved A\*-C grades compared to a 69% across all subjects.<sup>3</sup> However, pupils' description of what they are doing in DT dwells on the technical content of materials and manufacturing techniques rather than the design process described in the quotes from the National Curriculum above. There seems to be too much in the DT curriculum to have time to reflect on the broader picture of Big Design.

### *HOW is it taught*

It is the need to cope with this load of content that drives what I have described above as a formulaic approach to project work. The context that the DT teacher operates in looks something like this: a group of 20 children for one hour a week for 10 weeks; a design and make project that addresses the specialist subject content be it food, textiles, graphics etc; the eight-phrase DT process and 4-point design process; and finally, an overwhelming pressure for all to pass driven by the school's published attainment statistics. Add to this the expectation of the curriculum and the learners that they will be spending at least half

3. Department for Education, GCSE and equivalent results in England, 2009/10

their time making. The only sensible strategy is to present the class with a formula. A project file with 10 pages. Week one homework, page one; research – collate pertinent images from catalogues and the internet. Week two, page two; design ideas – divide the page into four and put an idea in each... Indeed some slick DT departments will even have these sheets made up as pro formas for the children to put their work onto.

There is clear evidence too that this volume of project work does squeeze out the opportunity to make something of real value over an extended period of time. For a skilled adult to make a desirable product in five hours is a tall order. To do this as a child and acquire the skills along the way is most unlikely. Therefore the temptation in project design is to keep the making task as focussed as possible, so that the pupils' creative input may be limited to a choice of a few options, or the way in which the product is 'styled'. This leads to reliance on some classic DT projects such as 'The Coat Hook' or 'The Steady Hand Game'. Where the subject starts to open up in Key Stage 4 and there is more time to explore ideas within self-directed projects, the volume of work is still acutely felt by pupils and discourages risk-taking.

It also discourages the kind of deep thought, reflection and analysis that would lend the subject more academic rigour and therefore esteem in the eyes of employees and University admissions tutors. 'Making as thinking' requires time to repeat and develop a task or technique – make, fail, learn and make again. An absorbing practical task can create a special kind of learning space which can be focussed with the right kind of 'what if' challenges. What if we scaled this activity up? How would this production be done in England/China/Africa? By whom and in what conditions? How could we use less material or energy? How does this task relate to what is going on in the Science/Citizenship/Geography class?

An alternative model of design education in schools has been pioneered by the Sorrell Foundation with its JoinedUpDesignforSchools Programme. This turns the DT approach on its head, in that the emphasis is entirely on involving children in the Big Design questions, not the detailed execution of all the project stages. The programme was designed by the foundation's founders, Sir John and Lady Frances Sorrell, and informed by the insight that asking a child to undertake a simulated design project is often a recipe for failure. "There is just too much to do in a design project – too many different skills and techniques involved – that, for a 12-year-old, it is likely to end in a disappointing result," explains Sir John. "However, if you engage her in the design process as a client, the effects can be amazing – not because of the insight she can bring to the project, but because of the transferable skills she can gain in things like negotiation, working together and citizenship."

The year 11s I met were very aware of the overcrowding of the curriculum. Indeed, they ascribed another feature of the subject to it: the disparity in the achievements of boys and girls. Girls outperform boys in GCSE A\*–C grades more significantly than in most other subjects – by 17% across all DT subjects and an astonishing 29% in Textiles

Technology.<sup>4</sup> Both the girls and boys characterised their preferences on the ‘project folder’ and the making respectively. The variety of learning opportunities that DT offers appears to be reinforcing gender stereotypes. If the female-friendly ‘supporting work’ is attracting more of the marks than the made outcome, this could account for some of the imbalance in grades.

A final observation on the context of DT is that the subject still appears isolated in schools. DT takes place in specialist rooms, usually conveniently located for deliveries and where any overspill from ‘work in progress’ will not look untidy. In other words; at the back, out of sight. In the past, the teaching methods and ‘vocational’ nature of the subject have also characterised DT teachers as something of a breed apart. The need for them to cover more than one DT specialism means that teachers of DT are less likely to offer specialisms outside of their department. The reverse is also true, with few teachers of science, art or geography taking DT lessons. In short, DT ghettos exist in some schools and are a real problem – especially when one considers the transferability of the design process across the whole curriculum. Ofsted subject reports have noted that ‘Design and Technology projects in secondary schools did not always capitalise on the mathematical and scientific knowledge of more able students.’<sup>5</sup> Even Ofsted’s emphasis reveals an expectation that DT should be principally allied to the STEM subjects – in fact DT’s isolation from Art & Design seems even more of a mystery. What subject other than design finds itself in the titles of two separate school departments and with apparently different meanings? Whereas design in DT is driven by a proscribed formula, design in Art & Design is commonly held to be more ‘creative’ and embraces influences and inspiration from contemporary culture, fashion, colour, visual language and critical thinking. In these circumstances what should the pupil think of design?

### *WHO teaches*

Who are DT teachers? In the early 1990s, as the subject was in its infancy, it was being taught mainly by former teachers of CDT (metal-work and woodwork) and home economics. Many of this generation of teachers are still working in schools, and, due to the variation in staff turnover between different areas of the country, can make up whole departments in smaller rural secondary schools. This group of DT teachers bring great experience and are often exceptionally skilled teachers and subject practitioners. They are very unlikely to have been design trained however, and did not receive design training at the advent of DT.<sup>6</sup>

I would hypothesise that the overly formulaic approach to design that has developed in DT has been in part a response to the need to engage a workforce of non-designers to teach it. I remember an ex-technical drawing teacher instructing us for weeks in how to lay out a border and title block on a sheet of paper, then how to carefully print lettering onto it, all to delay the commencement of ‘design’ – by then

4. Department for Education, GCSE and equivalent results in England, 2009/10

5. Ofsted (2011) Meeting Technological Challenges

6. Atkinson, S (2009) Are Design and Technology Teachers Able to Meet the Challenges Inherent in the Theme ‘D&T – A Platform for Success’? Design and Technology Education: an International Journal, 14(3)

completely inhibited by the preciousness invested in the design sheet. Considering that many university design courses still consider an art foundation course an essential prerequisite to the study of design, it was a tall order for teachers steeped in home economics or engineering to become the exponents of creative thinking. A formula was really the only solution.

The situating of DT mainly in former CDT departments seems not to have been the intention of the original Design and Technology Working Group in their work in the late 1980s developing the DT curriculum. From a re-reading of the contemporary literature it is clear that the new subject was intended to be genuinely cross-curricula, and not merely a successor to CDT. The Working Group reported that ‘the body of knowledge in support of design is unbounded; designers have the right and duty to draw upon knowledge from whatever sources seem likely to assist them in their quest for a solution’. The term ‘design process’ was itself discouraged, and particularly any linear, rule-bound version of designing.<sup>7</sup> It was proposed that Design and Technology in schools should be led by a member of the senior management team without any particular departmental affiliation. However, even in 1989, John Steers of the National Society for Education in Art and Design observed that in the Working Group’s final report, ‘despite the overall emphasis on a cross-curricula approach, a disproportionate number of the examples given appear to be from the CDT area,’ and also that the attainment targets in the proposed curriculum closely mirrored the established CDT linear process model.<sup>8</sup> The same author reports in 1993 that ‘management decisions in schools have placed technology mainly in the hands of former CDT teachers’.<sup>9</sup>

Of course this was a long time ago, but something of the culture remains. The necessarily diverse specialisms of applicants to DT teaching courses mean that a minority have a design training, and still fewer have professional experience in design. Furthermore, the subject needs teachers with expertise in manufacturing, catering, construction and IT – most of whom will not also be designers but will need to teach it.

When I did my teaching qualification in 1997, the majority of design-trained students in my intake trained to become art teachers rather than DT teachers, and I have observed that preference amongst design graduates since. There is an antipathy to DT in much of design at higher education – particularly those departments derived from former art schools – which is surely both hindering the progression of DT students from A-level to HE, and preventing good design graduates in seeking to become DT teachers?

In a 2007 study of trainee DT teachers, Dr Gwyneth Owen-Jackson found that in her sample, the acquisition of specialist technical knowledge takes on a greater urgency than learning about design.<sup>10</sup> DT teachers need to be equipped to teach two DT specialisms (eg food, textiles, resistant materials etc), which means that typically a student will need to learn a new specialism while undertaking teacher training. This new specialism will be expressed as a concrete list of knowledge and skills

7. Wilson, V and Harris, M (2004). *Creating Change? A review of the Impact of Design and Technology in Schools in England*. *Journal of Technology Education*, 15(2)

8. Steers, J (1990), *Design and Technology in the National Curriculum*, *Journal of Art and Design Education*, 9(1).

9. Steers, J (1993) *New Realities for Art and Design: An Overview*, *Journal of Art and Design Education*, 12(1).

10. Owen-Jackson (2007) *DEPTH2 – A study of the developing professional knowledge of student teachers*. Open University



which is much more tangible than getting to grips with design for the first time – particularly alongside the overwhelming demands of the first terms of school-based teaching practice. This means that design is not being positioned in teacher training as being the heart of the subject, and naturally this sense of priority is going to be passed on in the school classroom or workshop.

In summary, DT in schools is very often taught by teachers with little or no design education. In these circumstances it is unsurprising that staff will tend to over-rely on the curriculum requirements, transforming them into an inflexible model.

Before leaving the subject of DT teachers – lest they should feel battered by the above observations – it is important to credit the fact that practical work is taught in incredibly demanding environments, and that any exhortations to increase the opportunity for creativity, choice, experimentation need to be balanced with the very real demands of classroom management. DT teachers work in semi-industrial surroundings, often supervising a wide variety of processes at the same time that may include sharp tools, hazardous substances, high speed machines, hot food or molten metal. To observe a skilled textiles teacher keeping 20 students on-task and 20 sewing machines functioning is a salutary experience.

Whilst the above critique applies in its entirety to few secondary schools, there is much about the underlying culture of the subject that remains common to most.

The best practice I have witnessed involves four principles. Firstly, close cooperation or even merging of DT with art departments – perhaps through necessity in small schools – with the breaking of the artificial divide between the art room and the workshops. Secondly, I have seen really ambitious individual project work based on personal interests – surfboards, guitars and vehicle designs for example. Thirdly, the best projects also show a resurgence of group work, and clear evidence of drawing in knowledge from science and maths. Finally, although still exceptional, there is a growing tendency for students to explore ‘big issues’ through design. Food technology projects often lead in this respect, but students are also addressing issues of sustainability and business needs through design.

What’s wrong with DT is that it has not fully broken the bounds of the old CDT and home economics and, because of this, has not achieved the parity of esteem promised by the original National Curriculum. If it had, if DT really had become the home of a Big Design for the big issues of the day; if it had been a fulcrum of cross-curricula learning drawing in other subjects to solve compelling problems and projects; if it had also provided a place for hands-on creative, crafty, and techie experimentation, and time for risk-taking, trial and error – then surely the subject would have been included in any progressive English Baccalaureate? DT has not failed – it is a modern subject – it does in some ways ‘meet the needs’ of the 21st Century as Lady Parkes had hoped. But it has failed to go beyond merely meeting needs and help a new generation to *shape* the 21st Century.







# Summary of a review of the academic literature on Design and Technology in the National Curriculum

RSA Design and RSA Education commissioned a review of the academic literature on Design and Technology within the National Curriculum since its establishment in 1988. This is a summary of his findings which are published in full on the RSA's website under Projects/Design and Projects/Education.

## *Introduction*

Establishing key words for the research was itself difficult for three reasons: because 'design' and 'technology' are ubiquitous terms in wider education literature, not necessarily pertaining to the subject DT; because DT is multidisciplinary and rapidly-developing and therefore is often referred to by means of other words; and because DT is relatively new and the language associated with it lacks consensus.

Because the review focused on *design* either in Craft, Design & Technology (the curriculum subject which preceded DT), Design and Technology or Art & Design, texts primarily about art, crafts, woodwork or metalwork, technology, home economics, ICT, science, engineering, maths or architecture were excluded. This long list of exclusions has a reductive effect; as if design exists apart from these, when in fact it is embedded in all of them. This finding underscores the elusiveness of design both as a concept and a curriculum subject.

## *The shape of the literature on DT*

The Education Reform Act, 1988 established Design and Technology as a compulsory subject in KS1-4 as a part of the Education Reform Act. The subject envisioned by the Design and Technology National Curriculum Working Group (commissioned by the Department for Education and Science) was unusual for being profoundly multidisciplinary – explicitly incorporating Craft, Design & Technology, Art & Design, Home Economics and Business Education – and for forging links with other subjects; while also attempting to establish a distinct and unitary concept of design and technology which the knowledge and skills of the incorporated subjects were intended to serve. Technology capability was summed up as the development in the student of 'capability to operate effectively and creatively in the made world'. DT was intended to be set in specific contexts where knowledge and skills were to be placed in the service of design tasks. The implementation of the Technology Order was far from smooth, perhaps because the understanding and skills anticipated by the Working Group were not widely shared in the teaching profession.

Concerns have consistently been raised that DT as framed by the Working Group could be interpreted by teachers as encouraging a 'linear' design process of moving through pre-determined stages (though this was expressly not their intent), and that the language of 'procedural' knowledge it used might foster a notion of design as simply 'moving through a procedure'.

In 1995 a Revised Order for Design and Technology attempted to slim down and conceptually clarify the curriculum by focussing on 'Design and Make'. This modification largely removed the notion of researching contexts for design problems, incorporating 'planning' and 'evaluation' within the processes of designing and making. Some were critical while others thought the revision brought clarity to the DT fields of knowledge and the activities through which they should be taught.

Until recently, much of the literature on the impact of DT was based on small-scale studies drawn from narrow practitioner research. A significant proportion of the literature beyond this consists of un-evidenced advocacy for DT, attempts to re-conceptualise DT in response to policy and wider educational contexts, and accounts of policy interpretation or application. These might be regarded in a broad sense as 'policy' texts in the sense that they attempt to frame what DT is, how it is practised and how its benefits should be understood. The lack of systematic academic research may have contributed to a lack of criticality about DT in the literature that is available – for example, working with new materials is assumed to be beneficial with little questioning of the value of the new.

What base of systematic or larger scale research there is in DT has been driven by policy implementation – by the demands of assessment, for example. While this is valuable, there is a notable lack of similarly-scaled or systematic research that seeks to deepen professional knowledge of how best to deliver either the educational aims or wider benefits that are claimed for DT. There is no such systematic enquiry into the impact DT, for example, on young people's agency as citizens of a 'made world', on their numeracy and literacy, or on behavioural issues like truancy. The status of design and technology depends less on evidenced progress against educational aims and more on it being discursively well-positioned as supportive of policy makers' political goals.

The relations of DT to maths and science have been part of the discussion of DT since 1988, though this has become even more explicit in recent years within the advancing STEM (Science, Technology, Engineering & Maths) agenda. However, since the mid-90s, a number of concepts have grown in prominence in the DT literature, most notably the term 'creativity', particularly in association with 'problem solving', but also 'cultural understanding', and 'critical evaluation'. More recently, 'sustainability' has also come to be a regular feature of DT texts.

The removal of DT as a compulsory subject at KS4 in 2004 caused considerable anxiety among its advocates. More recently, and acutely

today, the identification of STEM, and latterly the English Baccalaureate, as strategically important subjects that significantly do not include design are also causes of concern. The design profession today is most prominently focussed on tackling the low profile of DT within the STEM agenda as the most expedient way to raise the status of the subject.

#### *Themes within the National Curriculum DT discourse*

Calling for conceptual revision or clarification is a remarkably stable part of the discourse of DT. Such calls often either articulate an ‘essence’ of DT while observing that its practical realisations or accounts within policy are not aligned with this conceptual essence; or they realign DT with prevalent policy discourse, perhaps conveying a sense of status insecurity for DT.

The first prevalent theme is technological capability and its relation to knowledge. It has become increasingly common to make reference to the requirement for meta- or strategic knowledge in relation to design. That is, to argue that design is not simply the application of technical knowledge but also its application in an arena where choices are value-based and require the consideration of other perspectives than the designer’s. The concept of purposeful activity in context tends to be used to distinguish DT from design within Art & Design which tends to be more focussed on creative self-expression.

There has been consistent discussion of relations between DT and other subjects; latterly bound up in a loss of status for design in relation to STEM. The lack of evidence that DT has directly supported science and maths has led to arguments for collaboration or cooperation between subjects and for design as neither vocational nor academic but essentially and inherently interdisciplinary or ‘itinerant’.

Creativity now occupies a central position in definitions of design on the curriculum; as it has risen in importance within the wider education discourse. Creativity in DT is described as disciplined or progressive towards an end. DT has been presented as fundamentally creative in that design should alter the curricular domain of which it is part). To realise this creative potential of design requires risk taking, student autonomy and a focus on process rather than end product. However, the curriculum priorities of content, assessment and economic instrumentalism inhibit DT’s ability to realise opportunities for creativity. In essence, the curriculum restricts the ability of DT to be ‘designerly’.

The second persistent theme is technological capability as a distinctively human characteristic. The ability to imagine futures that are essentially better than our present is a consistently told narrative in DT discourse.

The third theme is citizenship in a modern technological world. The idea that DT promotes citizenship by enabling young people to develop into adults who can fully participate in a democratic society is more often expressed than explained or discernable in DT projects. The more

radical version of this argument is that DT enables young people to intervene creatively in their made world and to be actively involved in shaping it. This idea is perhaps particularly associated with the design education movement that helped define DT prior to the National Curriculum.

The fourth theme is the relation of DT to economic productivity. It is argued that practical, economically useful skills incorporated into DT would enable young people to apply theoretical knowledge developed both in DT and elsewhere – most usually science and maths – in imitation of the real worlds of industry and business. The rise of the notion of the knowledge economy in the late 90s and early 2000s led to the development of policy designed to increase student uptake of subjects and skills viewed as economically legitimated by their asserted capacity to foster innovation. Often this policy focussed on science and maths, technical skills, and the creative synthesis of these two in their application to problems or goals.

Either there is a lack of evidence for DT having been an effective vehicle for this policy, or it plays a more limited role than might be expected. Ironically, advocates for enlarging the role of DT argue that it has remained a popular subject while, broadly speaking, the uptake of STEM subjects has declined. While the STEM agenda promotes subjects that are ‘strategically important *and* vulnerable’, DT has remained popular with students while losing prominence in education policy discourse.

A fifth recent discursive counter-move is to position DT within a creativity– rather than knowledge–based economy. This creativity-based economy is said to depend on processes intimately associated with design – holistic thinking, imagination, creativity and visualisation – rather than traditional analytical skills taught by MBA programmes or on STEM. In this relatively low-profile discourse, design is viewed as crucial to new cultural modes of communication and media literacy. Its success depends upon the wider circulation and acceptance of the creative economy as legitimate and known.

The final theme is the growing tendency to align DT with the need to respond to the ecological problems caused by modern mass production and consumption, a rising global population and growing energy demands.

### *The practice of Design Technology*

DT is pedagogically demanding: Ofsted reports over the years seem to require DT to combine what might seem to be dichotomous aims, for example: to provide creativity *and* structure/discipline; to be practical/procedural *and* abstract and paper-based; to require team/collective work *and* silent/individual work; to yield opportunities for project-based/contextual learning *and* coverage/continuity; breadth *and* depth. DT is said to have an uncomfortable status because it lacks a disciplinary home as either an art or a science; because of its exclusion

from articulations of strategic policy priority through either STEM or the more recent E-Bac; and because of its loss of compulsory status at KS4. A statistical analysis of uptake of GCSE subjects during the years 2000–2006 found that ‘the DT subjects are, in general, not favoured by the high attaining students’ (Rodeiro, 2007). Also that while more boys than girls take DT (except for Food Technology), girls achieve higher results.

### *Concluding remarks*

Policy drives discourse towards the new, the better, the more efficient. This constant drive towards the new is at odds with the real and pre-existing practice of design using time-honoured skills, tools and materials. DT bears testimony to the tension between the old and the new and has lost continuity with the established discipline of design, and with it, definition or identity as a subject.

Prominent commentators have observed that while the UK has lots of designers, it has too few engineers; and furthermore that our engineers do not understand design. DT in practice has failed to answer these compelling arguments for making it central to STEM.

For all the visionary claims about non-linear, creative process, DT took its place within a content-focussed curriculum and a content-focussed assessment and qualification framework in which policy implementation was carefully policed through Ofsted, end-of-Key Stage testing and published league tables. In the context of these pressures to conform, it is hard to see how DT could do anything other than struggle. The National Curriculum that afforded DT its status has constrained and shaped it to the image of schooling.

The preoccupation of DT advocacy with justifying its existence in the National Curriculum, and the very methods of justification, have been self-subverting. There have been two key tendencies: firstly, to argue that DT underpins all other curriculum subject areas, and supports an incredibly wide range of lifeskills; and secondly to appropriate DT into neoliberal discourses as vital to Britain’s place in the global economy. The diffusion of design in the first point – along with the lack of evidence to support it – have undermined the case for the second.



### *The authors*

John Miller is a director and co-founder of MARK Product Ltd – which designs and produces furniture for commercial and home interiors from its manufacturing base in Cornwall. Previously John worked at London Metropolitan University and University College Falmouth as a tutor, course leader, and finally Director of UCF's School of Design. Driven by connecting education with business and innovation, at London Met John established the Metropolitan Works digital manufacturing centre and developed the AIR project at UCF. John continues to teach and lecture occasionally, and was co-founder of DesignEd – an annual celebration of excellence in DT in Cornish schools.

Ian McGimpsey led the RSA Education programme from 2008–09, where he was involved in curriculum innovation and developing voluntary sector networks to support and promote progressive education in schools. Ian trained as a youth and community worker, going on to develop and run community-based advice and education services, and volunteering programmes in Tower Hamlets. He is currently undertaking his PhD studying how youth workers are responding to changes in youth service provision.

### *RSA Projects*

Royal Society for the encouragement  
of Arts, Manufactures & Commerce  
8 John Adam Street  
London WC2N 6EZ  
+ 44 (0) 207 930 5115

### *Director of Design*

Emily Campbell

### *Design team*

Melanie Andrews, Sevra Davis,  
Janet Hawken, Jamie Young

### *Photography*

Matt Jessop

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