

## The Maurice Brown Memorial Lecture Teaching Design and Technology in a Changing World

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*The Maurice Brown Memorial Lecture at the D&T Exhibition 1994 was given by Bob Welch, and we are pleased to reproduce most of it here. Regrettably, some parts — a slide showing the bonfire Bob made of past National Curriculum consultation documents, for example — have had to be omitted.*

Previous speakers have taken the opportunity provided by this forum to make a contribution to the current debate and in many ways, nail their own particular set of colours to the mast. I do not intend to break with this tradition and I hope that what I will be saying tonight will not only be of interest but also moves the debate on and enables us to perhaps look beyond the current preoccupations with statutory Orders and day-to-day matters associated with the teaching of design and technology in schools.

I will be mentioning some of the changes to the statutory Order and the implications for schools and teachers, but tonight's talk will be very much personal thoughts and reflections on the current scene. Perhaps I should also at the outset make clear that this evening I will try to limit my references to the National Curriculum Orders and also, wherever possible, restrict my comments concerning the inspection of schools under the OFSTED framework.

After I recovered from the initial shock of being asked to present this lecture I must say that I enjoyed undertaking some background research into the areas I will be covering. I have been able to delve back into the archives and dust off a few old books and re-read some of the articles which influenced my thinking early on. I also looked through my collection of photographs and slides taken over the last fifteen years or so. This I must say was a great pleasure, as it was good to be reminded of what we have achieved in schools.

Photographs of primary school technology fairs and exhibitions of O level, CSE and A level design work all raised fond memories. They also reminded me that design and technology was alive and well in schools before programmes of study, attainment targets, design and make assignments and other National Curriculum paraphernalia.

I have never thought myself to be old but I think that old age is creeping up on me because, first of all, I remember when we could get into museums for nothing; the Science Museum and the Victoria and Albert were second homes to me as a boy. Secondly, I remember when learning a musical instrument at school was free; at the newly opened school I went to in south London I was not only encouraged to learn to play several musical instruments but also the heads of physics and what was then technical studies were developing a new course in what would now

be called control technology. Thirdly, I cannot remember having PSE lessons at school. Neither, I suspect, did I or my friends at school work so hard, or suffer such pressures, as children do today.

I came across a booklet published as a colour supplement in the late sixties. It contains an article about the school of the future, the school of 1990. In this school there were no teachers, only facilitators. There were no lessons, only optional seminars and the principal method of teaching and learning was through the use of computer terminals linked to an extensive mainframe computer. Some of this revolution has taken place but other predictions, with the great benefit of 20/20 vision hindsight, have been shown to be false.

Whilst looking to the future, we should not forget our past for if history teaches us anything it is that history teaches us nothing. There was no Golden Age as far as technology in schools was concerned but there were some nuggets of excellent practice which glistened and shone out to inspire others.

Whilst some, and I emphasise *some*, of the work I see as an inspector and in my visits to schools to offer advice is mundane, repetitious and poorly thought out, there is always something to excite. There is nearly always some work by perhaps only a small number of children which creates a buzz in the mind. What are the words I use to describe this work? Yes, the outcomes are successful, they do what they have been designed to do and do it well. Yes, the outcomes make efficient use of materials and are well made. But there are other important words: *elegance, flair, gosh!* They are words to do with feelings, not words to put in level descriptors or try to explain using other words. But they are words which spring to mind when you see the work and talk with the pupil. The product is *elegant*. An *elegant* solution to a fascinating problem.

### ■ The current scene

What is the current state of play? In secondary schools, technology challenged the status quo. It did not sit comfortably with existing patterns of staffing, accommodation or curriculum organisation.

Compulsory technology for all pupils in Key Stage 4 came as something of a shock to some schools — particularly to parents and governors who had either not been informed or



led to believe that it would not actually happen. Some colleagues in other subject areas also recognised the implications for their subject in option schemes when technology for all arrived.

When it did happen there was some gnashing of teeth and threats to boycott, but most schools took the plunge, modified option schemes, and went ahead with the new suite of courses. The new courses in some instances became unwieldy and teachers were concerned that pupils' performance would suffer.

Then came the news that the requirement to study technology would be temporarily suspended for two years. There was joy and rejoicing in those schools who had done little and tears and sorrow from those of us who had worked hard to get the notion of technology for all established firmly in the culture of schools.

Primary schools were, and still are, under pressure to ensure mastery of basic skills, particularly in the core subject areas. Curriculum time is precious. How many primary schools, I wonder, teach design and technology in the morning, when minds are fresh? How many leave it until the afternoon? How many leave it to Friday afternoon?

## ■ Issues

I chose the title for this lecture — 'Teaching Design and Technology in a Changing World' — for a number of reasons. I wanted to concentrate on the key word *teaching*, and hope to offer some support for a group of people who I truly believe feel embattled, deskilled, beleaguered and stressed through the constant changes they have seen in recent years. Most sad for me is when I meet teachers approaching retirement who do so with mixed emotions, pleased to be relieved of the strain but saddened by a lowering of standards and unsure that what they achieved in their professional life was valued.

Teachers of design and technology in our primary, secondary and special schools are central to any notions we might have of raising standards and improving quality. Teachers are central to encouraging young people to do well and to enjoy our subject. Finally, teachers are also central to developing the subject area and moving it forward.

It is a sad fact that one unplanned side-effect of the introduction of the National Curriculum has been the growth of a general lack of

confidence amongst teachers. Their good work, *your* good work, over many years, their enthusiasm, *your* enthusiasm, their inventiveness and sheer flair has been sapped by too many initiatives, mountains of paperwork and a general lack of clarity in expectation of what is required and what could be considered good practice.

When D&T was first introduced in the National Curriculum some pundits claimed that this was a *totally* new area of the curriculum. Not only were such statements arrant nonsense, they also devalued the work which had been taking place in many schools over many years trying out ideas, developing curriculum material and producing examinations with wide acceptability. It was nothing less than an insult for many teachers, advisers, lecturers and project teams nationwide.

The title refers to a changing world. We live in a rapidly changing world in many ways and not least in the world of education. The sheer pace of technological change has been staggering. To put this in perspective, although it did not actually happen, it would have been possible for the first man to fly, Orville Wright, to have discussed his experience with the first man in space, Yuri Gagarin, and the first man on the moon, Neil Armstrong. The technological developments from the first fragile aircraft to the sophistications of a moon mission took place in one lifetime, with only 66 years between the two events.

I myself span a major technological change in the area of electronics. As a boy I used to keep warm from the glow of thermionic valves in the back of my radio. I had to remember to switch the wireless on before the start of the programme to allow the thing to warm up. I also remember the white spot on the television tube when you switched it off. This all changed with the invention of the transistor and I spent some time in my youth soldering components together and making printed circuit boards. During my time at university, the first microchips appeared and I can remember spending many hours trying to understand the workings of the microprocessor.

Thus in my own lifetime the technological developments have been such that, not only has the consumer electronics boom continued unabated but we as a society rely more and more on technologists finding solutions to problems and improving the quality of our



lives. We might not be able to agree a definition of it but we rely on technology and place great faith in it.

Such rapid changes, which of course continue, have serious implications for the teaching of the subject in schools. Just what are the core areas of knowledge and skills which all pupils should know, understand and do? It is a question which we have struggled with and continue to struggle with since the subject started to be taught. Some have concentrated on the process skills of investigation, research, identification of need, planning, making etc. Others have sought to define key concepts and areas of knowledge in elements of technology such as control, structures, materials and energy. The problem which arises when one defines a subject solely as a set of process skills is that it can be difficult to decide whether one has a subject at all.

Some attempts to define technology have produced definitions which embrace all human activity and others use technology as a convenient description of generalised problem solving activity. This has particular consequences for schools. There must be a clear distinction between a cross-curricular activity, one which draws on knowledge and skills from a number of subject areas, and a mechanism for delivery which is cross curriculum. Too often in the past this point has been confused.

Let me illustrate with an example. I used to go into many classrooms where groups of pupils were making towers from drinking straws. The children were generally enjoying themselves, talking constructively and thinking about what they had been asked to do. They were learning to co-operate with each other, ask questions and experiment with materials. I had to ask myself whether the activity was developing each child's technological capability. Today I would have to ask whether this was a design and make assignment, a focused task or a disassembly task.

Clearly, learning occurred and the task provided good opportunities for developing communication skills. However, was it technological or perhaps PSE? I concluded that it could be either. It could be technological if the teacher was guiding the pupils to ask certain questions. Questions such as 'Why did you choose that shape/are triangles important to your tower/what is the tower for/why did

you join the straws together in that way/are there other ways of joining the straws?'. In essence, it all depended on teachers asking the right questions.

Thinking about asking the right questions, I said at the start of this talk that I would not say much about OFSTED inspections. I will, however mention a couple of points. I believe the OFSTED framework is and will continue to be a powerful influence on the management of schools and the curriculum. The criteria for evaluation are explicit and published for all to see.

NAAIDT organised a one-day conference for OFSTED inspectors to look at the issues associated with standardising judgements in the subject area. This was very successful in enabling inspectors to discuss their experiences. This was very valuable and I believe NAAIDT was the first advisers' association to do this. We need to do much more as (and this may come as some surprise) there is no system set up by OFSTED for subject-specific training and support of this kind. The seminars here given by NAAIDT will give you much more information about what we have found in schools. Inspection has a crucial role in helping schools plan beyond the minimum requirements of the National Curriculum.

This term has seen the start of the inspection of primary schools where our subject is less well embedded in the curriculum culture. My own thoughts are that, particularly at Key Stage 2, design and technology is receiving less attention than in previous years.

Cynics might suggest that this could be linked to the fact that as a subject, it will not be statutorily assessed but, more likely, it is due to the sheer overload placed on schools by the National Curriculum prior to the Dearing review. What I do perceive, however, and this is most worrying, is a growing differential between schools with some pupils receiving a rich entitlement of design and technology whilst others receive little, if indeed, any. It will be interesting to read the first OFSTED primary reports to see what trends are emerging.

We certainly have no shortage of issues facing us. Vocational education, the new funding agency for schools, local government reorganisation, the end of TVEI, concerns about standards in public examinations, the



implications of the information superhighway, changes to initial teacher training, the list goes on and on. It is now time, however, to look for some strategies.

### ■ Strategies

I have for some time thought that those working in the field of technology would welcome some guidance and clarity of vision for the future. Teachers, lecturers, advisers and inspectors, suppliers and those working in a range of support agencies I believe need some unifying agent to restore coherence and provide confidence in what we are all trying to achieve.

I perceive a growing gulf between the best practice in schools and the work taking place in other schools. This chasm has to be bridged and, as Lloyd George once remarked, you do not cross a chasm in two short leaps. You need a major campaign.

I have been considering what to call this campaign and one possibility was the Campaign for Real Technology, or CART for short. This has the advantage of being easy to remember and relates to other successful campaigns concerning real ale and real bread.

I think that there is a need for a national initiative in this area to bring together the various groups who all have something to offer. It must be very confusing to observers outside the world of D&T to come to grips with the plethora of projects and initiatives taking place in this area. In one respect, such a diversity of projects is good news as it shows that the curriculum is alive and well. It shows that people are interested and willing to invest their time and not inconsiderable resources to support our subject in schools. On the other hand, it can all be somewhat confusing and lead in some cases to repetition and re-invention of wheels. Another factor which is worrying is the propensity for support projects to be launched with great skill, attracting much attention, work to benefit some schools but then, due to cessation of funding or other factors, cease to exist and not, most sadly, become embedded in the curriculum fabric of schools. Such national projects play an important role in developing the curriculum and would be key players in my campaign. These agencies offer concrete help to teachers.

Help is also available to teachers from other sources. Teachers of technology are relatively

well supported when compared with other subject areas. What other subject area has a termly free newspaper multiple copies of which are sent to all schools? I am referring to the excellent *Design and Technology Times*, unique as far as I am aware as a subject-focused free paper for teachers.

There are major national projects including the work taking place at the Royal College of Art and the work of the Nuffield project. There is also the initiative of the Engineering Council to produce much-needed resource material in the area of control technology. Much of this rich range of material is of relevance to Key Stages 3 and 4 and I know that project teams are keen to extend the work to cover all phases. There is also a great need to develop resources for use in special schools and to support the less able pupil in mainstream education.

This annual exhibition of resources for design and technology at the NEC and its increasing programme of seminars throughout the three days has become an important date in the diaries of many teachers. HMI and OFSTED have produced and continue to publish valuable resource material. I must also mention DATA, the Design and Technology Association. The need for such a national body with the status to represent our subject in high places as well as support teachers is clear.

It would be somewhat presumptuous of me to tell DATA what it should be doing but I would like to offer just a few thoughts for the members of DATA to consider. It has taken some time to become established but under the guidance of its new Executive Director must now meet the challenge head on. It has a crucial role not only in co-ordinating the myriad of initiatives in this curriculum area but also taking a lead by setting the future agenda for change and helping to shape the subject in schools. It is vital that a policy statement is agreed and a development plan, fully costed with manageable targets, is produced. I am sure that this is well in hand but I would wish to stress the urgency of this if progress is to be made and losses suffered over the last few years are to be recovered.

An agenda for future action has already been proposed in an excellent article by Alan George, education liaison manager for Unilever, published in the DATA's *Design & Technology Teaching*. The recent DATA



conference at Keele also gave clear pointers to the way ahead.

Here are my own thoughts about a mission statement and some targets. The information published in the recent DATA reports can provide the baseline for measuring improvements over the next five years:

*Our aim is to ensure quality teaching and learning in design and technology*

*By the year 2000:*

- *All primary teachers to have greater confidence*
- *All secondary schools to have sufficient, qualified staff*
- *All schools to have an appropriate range of materials, accommodation and resources*
- *Parents, governors and industrialists to better understand the unique place of D&T in the curriculum of schools*
- *Numbers of pupils taking A levels in D&T to have increased by 2% each year from 1995*

Who else can help with my campaign? There has never been a shortage of advice for teachers. One of the books I came across during my researches was *Practical Schools Method*, published by the Normal Press Ltd. It is a manual for teachers and those directly concerned or interested in the practical work of education. It is a fascinating read and very helpful. It covers all aspects of teaching including discipline, lesson preparation, and general principles of instruction. It lists the qualities of a good teacher and this might be of interest to those concerned with admissions to teacher training courses or the recruitment of staff. You will have to tolerate, I am afraid, the writer's view that all teachers are male.

'A teacher must be well equipped with suitable qualifications.' The teacher must be patient, tactful, kind, cheerful and courteous with perfect self-control and command of temper. 'A teacher must display earnestness and uprightness of character.' A teacher must have a thorough knowledge of his work; the teacher must not only know what to teach, but also why he teaches it and how to teach it. 'He should have common sense views about children and the best methods of managing them and a continual desire to extend their own intellectual acquirements. Finally, a teacher

must have 'a strong constitution, a considerable amount of bodily energy, quickness of eye and ear and, some proficiency in national games is often also desirable.'

So there we have it, the qualities of the ideal teacher. Little mention of the ability to assess pupils' attainments, little mention of record-keeping skills or coping with continual imposed change and no mention at all about skills in marketing the school in a climate of open enrolment.

This little book also contains guidance on planning for progression (although it does not of course use the word). 'Proceed from the known to the unknown, proceed from the simple to the complex, proceed from the indefinite to the definite and finally, proceed from the concrete to the abstract.'

There is much else to do with general teaching method, class control and the teaching of various subjects. Unfortunately there is no section on the teaching of design and technology. There is a section on manual training, which is a term used to describe various forms of practical activity which serve to train the hand and the eye and stimulate aesthetic taste. In other words, the head, the hand and the heart.

Finally, and right up to date, the author, one J. H. Boardman BA, late principal of the Douglas PT Centre writes: 'Besides the foregoing advantages, it is of the highest importance to remember that the continuous training of children in useful manual work throughout their school career is an essential factor in maintaining the industrial prosperity of the nation'. Although the terminology used would be different today, much of the sentiment would remain the same, particularly the emphasis on all children undertaking work in this area.

As I have said, there is no shortage of advice for teachers of practical subjects. An article published in 1935 gave some sound advice to teachers who were worried that their lessons were becoming a little stale. I will just restrict my self to two short quotations. 'Get the students' viewpoint. Make up situations so that they will say what they think. Find out what they would like to make even if they can't make it. Persuade them that they can't later. But, if they can, let them make it' and secondly, 'Keep up with the times. Some teachers don't. The atmosphere in their



workshop betrays them. The world has moved on while they have remained fixed'.

Some might think that help is at hand in the form of National Curriculum Orders. There will also be non-statutory guidance, the status of which has always presented something of a problem. I understand that the NSG will at least this time be published alongside the Order.

The purpose of a National Curriculum Order is by now, I hope, clear. It sets out those aspects of a subject which should be taught to all pupils and an indication of what progress can reasonably be expected to be made over a period of time. It should provide sufficient information for teachers to plan suitable schemes of work. What an Order is *not* is a definition of the subject or everything you wanted to know about how to teach it.

The Order for art does not define what art is, neither does the Order for any subject. Neither can an Order define any particular teaching style or means of delivery. This is a matter for the professional judgement of teachers. I do not believe that the professional would want to be instructed in how to teach any aspect of a subject or what precise proportion of a teaching week should be devoted to the teaching of any subject.

The new set of Orders has now been published. Many aspects of the new Orders have been welcomed including the centrality of designing and making and the requirements for all pupils to continue a study of design and technology in all four key stages — at least in England. Concerns have rightly been expressed concerning the degree of detail needed in a statutory Order, particularly one which will see no major changes, we are told, for five years.

This new set of Orders really is the minimum requirement. It buries for ever the myth that D&T is an amalgam of five subjects. The expertise to teach D&T lies with teachers from various subject backgrounds. The new Order goes one stage further. The need will be for teachers to read the programmes of study and the knowledge and skills to be taught and then select the most appropriate material or materials to use.

We see a reduction in the prescribed content, particularly at Key Stage 2, in response to comments made by teachers during the consultation period. One element which has gone is the requirement for pupils to learn

about the work of distinguished engineers, designers and technologists. Whilst I understand the pressure on time I hope that this element will remain in the work as it does make pupils aware of the design and technology heritage which is theirs.

I have a small concern that the disassembly tasks may become an end in their own right rather than used to inform design and make assignments. We need to think about what we want pupils to gain from such disassembly tasks. Taking things apart to see how they work is fine, and this would more accurately be called dismantling. But disassembling is more analytical. Some have commented on the need to include assembly skills as well as disassembling and we could see groups of pupils all doing this at the same time — collective acts of assembly. We should also remember that whilst taking a clock apart tells you something about gears and springs, taking a digital watch apart will not reveal much about how it works as the black microchip remains mystic and magical.

To return to the Order, the level descriptions have also caused concern, particularly linked to their interpretation, by teachers across the country. The move away from statements of attainment may avoid over-use of tick-boxes but I doubt whether the management and staff development needs will be lessened in any way.

Consistent and coherent interpretation of the level descriptions will demand much in the way of inter-school moderation. Such moderation meetings, where they took place as part of CSE, GCE or GCSE examinations, provided a valuable opportunity for staff development and allowed consensus views of standards to be achieved. Moderation meetings, and I remember many of them, were not cosy affairs and sometimes heated debates took place about the allocation of marks to a particular pupils work. However, the pain was worth the gain in sharing school practice and ideas. Assessing D&T capability is a developing art calling for professional judgements to be made. We have moved a long way from the crude instruments used in previous years.

## ■ Openness

Something else we need is openness. In order to help our cause we must enlist the help of the media. Now, over the past few years the educational and national press have given



mixed reviews about technology in schools. The media will always be more interested in a story which contains problems rather than successes. However, I am sure that we can harness the press to our cause by skilful selection of stories and making sure that we celebrate the best work taking place in schools. By all means debate and discuss the key issues, by all means air your views about what concerns you but, if we are to form a strong alliance, then perhaps sometimes the best means of communication may not be the letters pages of our newspapers. As I said we must celebrate the best but reject the mediocre and mundane.

### ■ Resources

What we must also have is resources. Resources in terms of equipment and materials for pupils to experiment and try out ideas. The environment in which we teach the subject must be welcoming and stimulating. A child entering a design and technology room should be excited by all the possibilities which now confront him or her. Design and technology should be the highlight of a child's week in school, whether it be a primary school, a special school or a secondary school.

If we are to achieve this then there is a need for a substantial investment of resources in *all* schools. Not just the CTCs and TSI schools, *all* schools. Such resourcing must be carefully targeted and its use monitored to ensure that appropriate priorities are established and adhered to. It is all too easy to spend large sums of money on computer networks without necessarily establishing the teaching and learning priorities.

We must also ensure that class size does not limit the achievements of pupils. This has been a long-standing issue as this quote from the minutes of a conference, held in Birmingham in 1935 illustrates:

The following resolution was put to the vote and carried. That this conference protests against the practice of certain HMIs of Secondary Schools, advocating that one master shall be responsible for a full form of 34 to 36 boys at handicraft; and that this Conference recommends to the Board of Education that no class for handicraft instruction shall exceed 20 boys per qualified teacher.

Of course we no longer teach handicraft but the issue of class size will not go away. Some headteachers have argued that, given the reduced emphasis on practical work and the increase in paper-based and investigational work, larger group sizes are acceptable. Very few headteachers have taught the subject and understand the demands made of teachers of practical subjects.

Evidence from OFSTED reports is that group size in secondary schools is increasing. This trend must be stopped and the only way to do so is with hard evidence that the nature and scope of the work is restricted and standards achieved are lowered. This of course is difficult to do as all teachers want their classes to do well and want them to succeed. Some areas, such as Northern Ireland, have an agreed maximum for class sizes in practical subjects. This has never been agreed in England and Wales to my knowledge but could be, particularly if the case was argued strongly by a General Teaching Council and, of course, DATA.

### ■ Support

After help, openness and resources we need support. We need the support of parents, employers and politicians. But teachers also need the support provided by independent, well informed, locally based advisers and advisory teachers. It is all too apparent that some existing structures for support are being dismantled with the result that the provision of advice to schools is becoming very varied across the country. At a time when schools need the support provided by small locally based networks, such networks are finding increasing difficulty in surviving.

This may sound like special pleading but I do believe that well managed teams of advisory teachers, working alongside other teachers in the classroom and providing sound advice on resources and curriculum material have shown themselves to be most effective and helped to promote best practice in schools. I am fortunate that in my own authority we have managed to retain a strong advisory team and have indeed recently moved our design and technology centre to new premises.

### ■ In-service training

Finally in this section on support, I want to mention in-service training. This is an area which is rapidly reaching a crisis point. The



devolution of funds to schools has had a number of effects, some positive and others detrimental. Positive in the sense of greater school involvement in planning for staff development and providing schools with the ability to ensure courses are relevant to their needs. Other effects have been a tendency for schools to devote funds to school-based initiatives, generally linked to whole-school management issues.

In-service training in design and technology is time consuming. It is not subject to quick fix solutions through twilight sessions after school at teachers' centres. Teaching design and technology can be a physically exhausting activity and, after a long teaching day, it is wrong to expect teachers to undertake detailed curriculum study. One other effect of the change in funding arrangements has been the reduction in teachers undertaking further professional study at higher levels including research degrees.

Teachers in all phases, and particularly primary school teachers, need extended periods of time to study the knowledge base associated with the subject and to undertake substantial design and make projects for themselves. They also need time to develop schemes of work and strategies for supporting the work of other teachers in their schools. The 20-day courses funded from GEST have provided a much needed opportunity for such INSET to take place.

This was — and I find this staggering — the first national INSET programme specifically targeted on design and technology in primary schools. In previous years there has been support for science and mathematics but nothing specifically for D&T. Just as these courses have become established, the rules have again been changed and the funds available stretched to cover all National Curriculum subjects and suggestions that the course could be shorter. One has to question the value of a five-day course in D&T and what can be achieved.

We have to continue to attract the best people to teach D&T. Some time ago we had a shortage of teachers in Berkshire schools and I suggested we undertook some careful advertising designed to appeal to potential teachers. Unfortunately, this campaign was rejected.

Some newly appointed teachers are proving to be excellent, both in their knowledge of the subject and their enthusiasm to teach it. Sadly, however, too few primary school teachers receive sufficient grounding in the subject as part of their initial teacher training.

## ■ Examinations

Finally in my list, we cannot ignore examinations. Let me touch on one aspect which is not often raised: the development of examinations such as the CSE, GCE and GCSE. In the field of technology, many innovative and successful teaching schemes could be accredited through the examination agencies, principally through a Mode 3 route. What would happen would be this. An enthusiastic teacher would develop a course of relevance to the pupils in his or her school. They would approach a local examination board and ask for the course to be accredited. A panel would look at the syllabus and an external examiner would ensure standards were maintained.

Such a system encouraged the teacher but also had one important secondary effect. As more teachers got to hear about the course other schools entered pupils and the new course caught on. In time the course might evolve to become a Mode 1 CSE and be offered to all schools. Thus the initiative, enthusiasm and vision of one teacher could be harnessed to move the subject on. All this was swept away by the cold hand of centralised bureaucracy.

The flaw with the system was that large numbers of courses, sometimes with exotic titles, were being offered at examination level. Some felt that a CSE in *Street Artistry and Juggling* was an inappropriate qualifications for a 16-year-old. Technology was an area of the curriculum renowned for the proliferation of subject titles. Early TVEI schemes encouraged the development of new courses and the list of qualifications became longer and longer. Some titles were frankly bizarre and only made sense to the syllabus developers. I remember seeing a course called *Technology across the Curriculum* and wondered what an employer would make of a young person with a qualification in this area.

The system needed to be tightened but in so doing I believe that the enthusiasm and commitment of the individual was smothered. It takes a long time to write a syllabus and the associated assessment scheme and few were



willing to go through a long and tortuous path in the hope of receiving approval from an increasingly restrictive system working to sets of complex criteria.

So now we have H for help, O for openness, R for resources and S for Support and E for Examinations. This seems to fit well with my notion of campaign for real technology. But perhaps my E is a little narrow. E should stand for enthusiasm, energy, excitement.

Having looked at my cart and my horse I now become worried. Is a horse-drawn cart really the image for the end of the 20th century? It reminded me of the first mobile teaching resource unit. I am proud to say that this was in Berkshire in 1888. In fact, it was one of the first things that Berkshire County Council did.

We recreated this travelling wagon for a local show to celebrate one hundred years of the County Council. It was perhaps somewhat ironic that we had no difficulty at all in finding the forge, tools and equipment to recreate the wagon. We did not have to go to the local antiques shop but only had to visit a couple of local secondary schools. Out with the horse and cart. We should be using the image of the high-speed EuroStar express train or the new generation of supersonic aircraft. But even perhaps these technologies are becoming outdated. A better method of travelling would be a Star Trek transporter to beam us up to where no one has been before. To boldly go to futures unknown.

### ■ The future

Let us look at what might happen in the short term, towards the year 2000.

We do have friends in the world beyond schools who understand what our subject has to offer and why it should form an essential component in the education of all children. For example, Article 127 of the Maastricht treaty pledges the European Community to implement educational policies which facilitate adaptation to industrial changes. We must capitalise on this and draw the attention of central government to the implications. Closer to home, a recently published report from BT complimented another from the CBI in highlighting the need to prepare pupils for a multi-skilled, technological future.

For the BT report, *Matching Skills*, a team of teachers investigated the skills required for

companies of the future and then related this recent changes in the UK education system. They listed the needs in three areas:

Future knowledge needs  
*increased technological competence*

Future skills needs  
*acquisition and development of core skills*

Future capability needs  
*how to be flexible, adaptable and cope with uncertainty*

The list of important capabilities was particularly interesting and included the need for people to be flexible, adaptive and innovative, to exercise leadership and cope with uncertainty. These are all qualities developed through D&T activity.

In the area of specific skills the report concluded that young people needed to be technologically educated, technologically literate and able to exploit varying technologies, able to adapt to new technologies and prepared to understand the changing nature of the world of work. If a D&T course does not cover such activities then do we have any right to insist that all pupils take the subject?

I believe that design and technology has a bright future in our schools. It may have been through troubled times but the struggle remains worthwhile and we must all maintain the momentum which has been achieved so far. We will continue to have setbacks and be called upon to defend our place in the school curriculum. We must believe in what we do and, to adapt a quote of Matthew Arnold who said 'You will only find the Holy Grail if you believe in it' — you will not succeed with D&T unless you believe in it.

Let us continue to celebrate the best and convince all that D&T is not in a mess, it is not a problem, but it is an area of the curriculum which is dynamic, unique and above all forward-looking and a joy to teach. We do need a national campaign to take us forward. A campaign which involves all the stakeholders; teachers, parents, industrialists, project teams, researchers and academics, suppliers, central government, SCAA, OFSTED and the most important stakeholders of all, young people in our schools and colleges.