

Millennium Conference

– A Once in a Life Time Experience

Introduction

The Design and Technology International Millennium Conference, organised by DATA, NAAIDT and TEP, took place on the 12th–14th April 2000 at the Institute of Education in London. With over 150 time-tabled seminars packed into three days, there is not enough room in this journal for complete coverage of the conference. However, for those of you who couldn't get to the conference, or if you wish to relive some of the highlights, here follows a conference report featuring the main points from the keynote speakers.

The research papers have been published in a separate volume, available from the DATA head office in Wellesbourne.

Opening address – Jacqui Smith MP

Dr Ray Peacock introduced Jacqui Smith MP, the Parliamentary Under Secretary of State for Schools, to the delegates. She began by speaking of the strong position DATA holds, built upon an excellent relationship with not only their own members but with government agencies and industry.

Jacqui Smith went on to look at the importance of design in industry, pointing out that two-thirds of large firms believe that design plays a significant role in their business. However, we are faced with the challenge of responding to the advances in technology, which not only eliminates jobs but also creates them. Technology has created better paid, higher skilled jobs whilst reducing many of the labour-intensive, unskilled jobs. It is crucial that young people gain/develop key skills to enable them to respond to these ever-changing technologies. She went on to comment that the UK was the first country to introduce design and technology into schools, and that we are considered world leaders in this field.

Design and technology is important for what it provides students at school. Design and technology not only prepares students for life, but most importantly, students enjoy the subject. Jacqui Smith went on to congratulate the audience for their work. Ofsted results show an improvement in secondary design and technology, and teachers are the key to this success.

Smith went on to talk of the acute shortage of students training to become design and technology teachers, and how new government plans should redress this situation. She spoke of David Blunkett's launch of a £70 million budget programme targeted at education, including the issue of recruitment. A £10,000 package has been put together to encourage students to train as teachers in this shortage area. Also a new pay system has been

introduced, with classroom teachers potentially earning up to £30,000. There are also plans to issue clear guidance on disapplication next month (May).

James Dyson CBE, Chairman of Dyson Appliances

James Dyson began his talk by reflecting on his own education, and the non-existence of design when he was at school during the 1950s and 1960s. He went on to compare this with today's situation of disapplication, targeted at high achievers and low achievers. Dyson sees design and technology as a subject of benefit to all students. Making design and technology non-compulsory is taking a step backwards, at a time when many countries are emulating our curriculum successes. His personal aim is to help design and technology grow.

Dyson went on to look at the situation at Dyson Appliances. Out of 300 designers, only 20 are female, all of whom were influenced by their own fathers, who were themselves engineers. He went on to point out that great designers have to be great engineers too. The link between creativity and manufacturing is vital, yet 50% of graduates want to work in media – an industry which appears to cater for the creative mind. As a country we prefer academia to practical skills. "We are a nation of thinkers not doers." James went on to quote Libby Purves in the TES, who said that makers are at the heart of everything. He called for an end to the snobbery of thinkers against doers.

Dyson considered his own personal experiences, and the development of his vacuum cleaner. He made a machine how he thought it should be, not how the research/trends dictated. For example, the price of the 'Dyson' was twice as much as the market leaders – much more than consumers usually paid for a vacuum cleaner. Research would suggest that this product wouldn't sell, yet it did.

Putting manufacture and design together makes something worthwhile. Manufacturing is the *raison d'être* for the other 70% of UK industry. It is far easier to be the 'middle man' than the creator, for example Dixons don't make hi-fi equipment but they do sell it. Retailers have the power in this country and they make the money, not the manufacturing industry. Less and less money is being invested in manufacturing, with the UK being 47th in the research and development world league table, factories are closing down and fewer products are being made in the UK. Eventually we will lose the know-how to manufacture. James Dyson explained that it is crucial that we attract more talent into the manufacturing industry. Design and

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technology is the fourth most studied subject at GCSE – these students need to be encouraged to enter industry, to see it as a creative and exciting career path.

Julia Barfield, Designer of the London Eye

Mike Ive introduced Julia Barfield who, with her husband David Marks, designed the British Airways' London Eye, described in *The Sunday Times* as a 'ring of life'. Julia's keynote speech looked at the development of the London Eye, from concept to production.

In 1993 *The Sunday Times* in conjunction with the Architectural Association launched a competition to find a landmark for London to commemorate the millennium. The Millennium Wheel Company was founded and planning application sought by Barfield and Marks. An article appeared in the *Evening Standard* and started the 'Back the Wheel' campaign. In 1994, British Airways agreed to provide resources for the Wheel and over the next two years the project was presented in a bid to find potential sponsors.

Lambeth Council were supportive, seeing the Wheel as an inspiration which would promote and regenerate the South Bank in addition to

boosting the economy. The South Bank is the geographical centre of London and was therefore the ideal location for the Wheel. Planning permission was granted. In October 1998 all the legalities were completed, leaving a two-year project to be completed in just 14 months.

Various countries and nine design and engineering companies were involved in the structure and construction of the Wheel which was to stand 125 meters high, supported on one side only resting on a hub-cast. This basic design concept encountered various problems but building commenced in December 1998. It was decided to build the Wheel horizontally, constructed in four parts with the permanent cable fitted in last, the spindle was to be 23 meters high with 300 spokes in the wheel. The 32 capsules, with unique heating and cooling systems installed were finished in France and attached after the Wheel had been erected.

The Wheel is already being used for a wide range of educational purposes and the London Eye Company is developing packs for schools at primary and secondary level. RIBA is also piloting a schools pack.



This presentation was largely visual with slides showing the Wheel in its various stages of construction.

Paul Thompson, Director of the Design Museum

How can the Design Museum contribute to the design and technology curriculum, asked Paul Thompson in his keynote address?

Design and technology encourages students to work in teams in a non-competitive manner, and provides the learning skills which Tony Blair has championed. It is vital that we close the performance gap between us and our competitors. This can only be achieved by strengthening the roles of innovators and entrepreneurs and improving skills in the workplace and therefore we need to strengthen how we teach. After all, employment and training are the primary outcomes of teaching.

Demand for creativity is based on the birth of the knowledge-driven economy, and some 50,000 jobs are expected to be created in the next three years in the 'creative' industries. So what exactly is creativity? Creativity is the application of knowledge and skills in new ways to achieve a goal.

Paul Thompson went on to say that our world is a complex one, which is changing rapidly, one could almost say 'out of control'. To keep up with these dramatic changes, for the UK to have commercial success, we need to invest in research and development. Yet take up rates in engineering courses at university have been in decline over the last 30 years. To meet industry's long term objectives, a greater provision for training must be made. Paul hoped that investment into education would be increased in line with the rest of Europe. It is vital that design and technology teachers have access to continued professional development. As technology is rapidly changing, the teachers' skills need to reflect this. Teaching design and technology is a very fast moving profession, not least because of the changing technologies that need to be kept up with. It is no surprise then that design and technology has the worst retention rate for teachers – working in such an unpredictable landscape. To keep teachers, we need to invest in training and upgrading skills, which will keep up morale and innovation, in turn creating a greater confidence amongst the profession.

But how can a museum help? The Design Museum is all about learning and inspiration. It's a living resource that can excite and inspire students and teachers alike. The Design Museum supports teachers, and like DATA, is a 'doing' not 'talking' organisation.

Thompson then went on to outline some of the many ongoing schemes being run by the

Design Museum. One project is Millennium Products, which are case studies of good products getting the recognition and status they deserve. Plans are being made to extend the project with Nuffield in 2001. The Design Museum also produces books, which are written by their own education team, who have combined experience of working at the Museum and years of teaching experience. For those schools unable to get to the Design Museum in London, a loan box can be requested. Six versions of this 'Design Museum on wheels' have been produced, and there are plans for a Millennium Products one soon.

Paul Thompson finished his keynote speech by inviting teachers to tell the Design Museum what they need as resources, in order that they could be developed.

Lord Sainsbury of Turville, Parliamentary Under Secretary of State for Science

Lord Sainsbury began his keynote by praising the work of DATA, stating that design and technology is an important part of the curriculum, a subject which stimulates all levels and abilities. He went on to say that we should never underestimate the ability of the young to be creative and innovative.

“Design and technology is a subject which stimulates all levels and abilities.”

So why is design so important? There will be few low skilled jobs in the future in developed countries. People will only be able to compete with skills, knowledge and social capital. Take for instance the creative economy in London. This sector is growing at twice the rate of any other industry, with £12 billion per year being generated.

The design process adds value by virtue of its effect. Design triggers improvements and capitalises on knowledge, improving the quality of our lives. And the UK is highly successful at innovation. We have a wealth of young talent in this country with a huge impact on the global market. The trends are set here. The UK has many excellent innovators and design consultants – what we lack is skill in engineering.

At the opposite spectrum is Japan. Japan is increasingly concerned with its record of innovation and is keen to follow the UK's example. The Japanese are beginning to realise that their education system is at fault. Their teachers tell students what they need to know – whereas in the UK students are encouraged to form their own views. This leads to the creative power of individual thought. Risk taking is part of the knowledge market – it is

vital that we are encouraged to try again. Lord Sainsbury spoke of the Government's intention to review bankruptcy laws to address this situation. He compared the UK with the risk taking attitude common in the USA, and quoted "there are no failures, just successes and learning experiences". It is the flexible, free thinkers who will flourish in our rapidly changing world.

Lord Sainsbury went on to discuss disapplication at Key Stage 4. He reassured the audience that the Government was committed to design and technology in schools, that the subject was a key part of the curriculum. He reiterated that disapplication is the exception, not the norm.

Andrew Summers, Chief Executive, Design Council

David Barlex introduced Andrew Summers, Chief Executive of the Design Council as the man with the mission to inspire government, business and education.

The presentation started with a trailer featuring a cockroach trap developed in Southampton, the design based on a plant found in America. The video is a way of illustrating how film can be used to promote a product and engage an audience.

Millennium Products are examples of design, creativity and innovative practise. This project was launched in September 1997 by Tony Blair and by December 1999, 1012 products had been created including the following:

- Anyway up cup.
- Electronic violin – produces sound and power in any temperature.
- Optimusic – interactive music environment, good for rehabilitation purposes.
- Skystreme – inflatable marker for outdoor pursuits, can also be used as a splint.
- Accuhaler – a dry powder inhaler for treating asthma using a new drug formulation.
- Divine Chocolate – the first mainstream high quality product on sale nationally which is fairly traded.
- Lantan Link bridge – Typhoon proof bridge in Hong Kong.
- Heathrow Express.
- Wilkinson's protector 3D razor.
- Endotherm – food refrigeration monitor.
- Neotrend – monitors carbondioxide levels in premature babies.
- Plastic can.

There were three aims in creating Millennium Products:

1. To inspire innovation among companies.
2. To promote Great Britain – the products are exhibited world-wide and are all featured in the Greenwich Dome.
3. To use for learning purposes – the website, www.sharinginnovation.org.uk, is part of a national programme to stimulate and bring business and education together by way of tools, teaching materials, events and networks. Some progress has been made already: The Design Museum Handling collection is a box containing half a dozen Millennium Products to be used as a 3D input into learning. The Nuffield Millennium cards explain the technology behind the products. A new web site www.think.com is an on-line source for pupils and teachers which is currently being trailed in Essex and should be available in the summer.

The Design Council is setting up a Project fund to help organisations produce innovative materials. Following the success of Channel 4's 'Design on your...' series, a new set of programmes entitled 'Back to the Drawing Board' is to be shown in the summer. In parallel with this, the Design Council are producing teaching and learning materials available on the website to accompany the series.

Key trends of the future have been identified as follows:

- Living longer – by 2020 half the adults in the UK will be over 50.
- Flexible working – 2 million people work wholly or partly from home – by 2006 it is estimated that this will apply to 30% of the workforce.
- E-futures – the digital revolution will continue to have an impact on trade, commerce and business.
- Smart products – products that adapt to our personal requirements by the use of embedded micro-chips.
- Services – the provision of better, more effectively designed services.
- Innovation culture.
- Sustainable futures.

These trends emphasise the importance of design on the future and are looked at in detail on the web site www.designhorizons.org.uk. The progress of design and technology in schools is of paramount importance in building future skills of both designers and the workforce – teachers should ask themselves 'is there an innovative culture in my classroom?' The Design Council aims to work closely with teachers to inspire this.

Jack Hynds, Chief Electrical Engineer, Jaguar

Jack Hynds began his keynote address by providing a background to Jaguar cars. He highlighted that Jaguar is a world-wide and easily identifiable brand sold in 62 markets. In each case the basic product is the same but there are small differences to reflect the needs of that particular market. For instance of the Jaguar cars sold in the USA, 40% are owned by women who want the car to be safe and secure, in Germany the majority are sold to men, who perceive owning a Jaguar as reflecting their 'desire to be different'.

The production of Jaguar cars will have quadrupled by 2001 and 80% of this production will be for export. There has been a change over time in the motive for buying a Jaguar, not only are there strong rational reasons for the purchase, the emotional pull has grown stronger over time, as customers perceive the car to be a special, unique and personal product.

Jack Hynds looked at the adaptive technology applied to the product, such as engine management systems (EMS), which make the car efficient in terms of fuel consumption and emissions, voice recognition systems for the air conditioning, car phone and radio, and navigation systems. Hynds then went on to examine the design process technology that makes such innovation possible. CAD/CAM and rapid prototyping have transformed the design process from a linear to simultaneous evolution.

Today's designers and engineers must cope with this abstract environment and the key characteristics that Jaguar looks for in its employees were outlined. Engineers needed to be inquisitive (they are often the students who take things apart), challenge the norm, abstract thinkers (who are usually labelled as 'dreamers') and have a sense of adventure. What makes engineers great is their tenacity, the ability to overcome obstacles, communication skills are vital if they are to get their ideas across to others and adapt, they need to be team players and life long learners as technology is forever changing.

What's missing however is that there are not enough students going on to become engineers. Those that do are often short of essential skills and know-how. They do not fully understand the process of design, they lack problem solving techniques and quality and robustness techniques. They also lack presentation skills and they are not always comfortable with the team approach.

Hynds finally outlined Jaguar's contribution to encourage more students into engineering.

Jaguar are involved in educational engineering schemes, they have Education Business Partnership Centres, each with a specialist slant on the design and manufacturing process. They support professional bodies and hold open days. They offer work experience opportunities and support students in their industrial year whilst at university. For current employees they provide internal training in essential skills, training plans are organised, competence audits are carried out and they have a strong commitment to internal education.

Hynds concluded his keynote by highlighting the importance of engineers and designers. Modern society is one which is ever changing and increasingly challenging, in which new technologies are needed to survive. It is the engineers and designers who drive these new technologies.

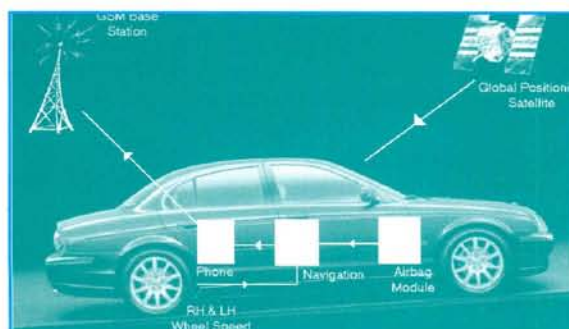
Professor Richard Kimbell, Goldsmiths College, University of London

Professor Kimbell's keynote presentation highlighted the dichotomy between the rhetoric and the reality of creativity in the curriculum, and how this discrepancy places design and technology in a position of constant struggle to preserve this vital element of the curriculum.

Adaptive Cruise Control.



Telematics.



Kimbell began by highlighting the strength of the rhetoric supporting creativity in the new National Curriculum and the political sphere. Of the 'distinction contribution' statements of the new National Curriculum, more than half claim that creativity is part of their core concern. Tony Blair shows his support for the creatives in society by holding parties (notably these are often drawn from the music industry).

However, there is cause for concern that the reality does not follow the rhetoric. The Robinson Report 1999, from the National Advisory Committee on Creative and Cultural Education recommended that 59 actions need to be taken to revive the creative heart of education.

Richard Kimbell then went on to discuss the potential and the necessary conditions for creativity in education. Design and technology has as its cornerstones the motivation to improve and the capability to create. Kimbell used a description of such qualities from the *Ascent of Man* to illustrate the potential of design and technology to provide a vehicle which enables students to cultivate these two uniquely human qualities. However, whilst the potential for such growth exists with design and technology, do the necessary conditions which encourage creative acts and thinking exist within the classroom?

Professor Kimbell used the research of Gardner, which points to the need for two distinct dimensions of support which form the necessary conditions for creativity. The *affective* dimension takes the form of emotional support, whilst the *cognitive* dimension involves the intellectual support of the 'critical' friend. Teachers must play both these roles for their students, and it is the contrary nature of the two roles which makes teaching difficult. This dual role also however provides the basis for a relationship of trust between students and teaching, trust being the number one quality required for creativity thinking to occur. Creative thinking is by its very nature risky, students who believe that they will incur penalties if they take risks will not be creative. It is vital that they trust their creativity will be rewarded if their design and technology activities are to be innovative and visionary.

At this point however, Kimbell notes that this issue now becomes more than the creativity of children, but also the need for teachers to be creative. They need to offer students both emotional and intellectual support, whilst having the confidence to allow students to take ownership of their work and develop it in unexpected ways.

For teachers to fill this role their own creativity needs to be rewarded. It is a basic law of psychology that behaviour which is rewarded will be repeated. So what behaviour in teachers is being valued and rewarded by Ofsted? Kimbell provided a humorous interpretation of the value placed on 'management' and 'creativity' by Ofsted through their reports. Of the Ofsted report examined by Kimbell the word 'creative' appeared only once. The word 'manage' was mentioned a total of 87 times. One can conclude that Ofsted rewards creative behaviour by completely ignoring it.

Despite the words of the Secretary of State "Creativity is a vital art of our children's education..." (Blunkett, 2000) the creative culture is not apparent in the very organisation which rewards teachers' behaviour and the ethos it promotes to schools. In the Ofsted corporate plan (approximately 14,000 words) the words 'creative' or 'creativity' are never mentioned. Ofsted is not the only villain of the piece. The TTA make no mention of creativity in the standards that define the acceptable levels of professional performance for teachers.

The consequence of the emphasis on management over creativity has had a knock-on effect of the perceptions of teaching in those graduates whom we would hope to encourage into the profession. Professor Kimbell highlighted the attitudes of 'engineering' and 'design' graduates who perceived teaching to be low on creativity and variety, two of the qualities that were high on the list of their 'ideal' job.

The remedy for this perception would be to bring back the naming and shaming culture. Teachers must be given emotional and intellectual support and space to foster their creativity, allow them to trust and take risks and learn from their mistakes.

Professor Kimbell's analysis not only provided a critique of the conditions that have served to damp down creativity in design and technology, but also provided an insight into the actions that must be taken in order to revive and refresh the curriculum. Creativity in the curriculum is in deep crisis, and Kimbell called upon Mr Blunkett to match the rhetoric of the creative culture to the reality of teaching.

Mike Ive OBE, HMI

Mike Ive opened by encouraging everyone involved with design and technology to have a 'Strategy of Risk'. The recent amalgamation of NATHE and DATA, the Design and Technology Millennium Conference and the work of the late Mike Steels HMI were

highlighted as good examples of risk taking. Risks could also be taken in the classroom, for example submitting group projects for examination and teaching creativity. It was stressed that in the UK designing/creativity is “lousy”.

Ofsted's main findings (1998 – 1999) found that in the primary sector making is better than designing and the knowledge and understanding is often weak. Overall in the primary sector Ofsted found that INSET is effective, teaching is improving, assessment is still weak but improving and curriculum planning is weak in a third of schools.

The main findings (1998 – 1999) in the secondary sector found that teaching is good in nearly two thirds of schools and that teaching is effective when there are clear shared objectives, real relevant tasks, enthusiasm, knowledge applied, a prompt start and a brisk pace. The assessment of portfolios and products is improving but often fails to acknowledge the skills displayed in their production. The formative value of assessment and the need for moderation are often undervalued. INSET was found to be effective but there are many needs in ICT, S&C, industry, progression and assessment. Genuine access to Continual Professional Development is called for at both primary and secondary level.

“See the big picture, design and technology is not just a collection of design and make tasks” says Mike. He stresses the importance of the Rationale Statement set out in the revised National Curriculum and that teachers must use it:

- preparation for **participating** in technological society
- learn to think, **intervene** creatively to improve quality of life
- autonomous and **creative** problem solvers – own and team
- seek needs/wants/**opportunities** ideas products, systems
- **combine** practical skills with understanding of aesthetics, social, environment, industry
- **evaluate** present and past design and technology
- become discriminating and informed **users** of products
- become **innovators**.

Staffing recruitment is “dire”, with only 2.5% of the target met for September 2000. But with the introduction of £10,000 whilst taking a PGCE things could improve. We need to publicise the value of design and technology.



Mike Ive encourages us to “think nationally, act locally” – who do you know that you might influence?

Trevor Baylis OBE, Inventor

The struggle of the lone inventor

Trevor gave a highly entertaining lecture on the struggles of the lone inventor. His presentation was very visual and largely anecdotal, so here follow the key points he raised:

- Why are inventors perceived to be ‘mad’? It is because they cannot disclose their ideas in case someone copies them, thus they have to talk to themselves – the first sign of madness!
- The importance of teaching pupils about the Patent Office. If they are to be successful inventors they need to be able to protect their ‘intellectual property’ by securing a patent. Dyson secured over 160 patents at the cost of £1million.
- Inventors in the past have often ended up living in poverty and without the recognition and honour they deserved because they did not secure a patent.
- The British Academy of Invention. Trevor Baylis had to work for years to get his wind-up radio launched. He had no help with patenting, preparing a business plan or the astronomical cost of translation of patents. Yet it is estimated that Britain has lost a total of £165 billion through inventions made here but exploited abroad. He believes that an academy for inventors giving impartial advice is the way forward. In return for help, the academy will share in the rewards when an invention is sold or licensed.



John Kay 1704-1781, inventor of the Flying Shuttle. Trouble: Idea pirated, house attacked, died disillusioned and poor in France.