

Abstract

'I think therefore I design' (When Descartes met Bronowski):

Reflections on the last 20 years of 'designing' and projections into the future.

Embedded within the concept of pupils attitudes to technology, is the concept of doing technology. I would argue that *doing* technology is inseparable from the act of designing. Since its faltering entry to peoples' education the concept of designing has had a somewhat bumpy ride. It has for some been seen as the magical and simultaneously unteachable item in the technology equation.

This paper attempts to trace the emergence of designing and its position 20 years ago. It will attempt this by viewing the activity from a variety of evidence ; examinations and school syllabus; initiatives and research projects; philosophical and technical rationales; commercial and sociological viewpoints.

The work then takes a similar look at the situation today and tries to say what has changed and why. In conclusion it seeks to show that the drift from modernist to postmodernist constructs of the pupil, combined with the socio- cultural restructuring of the values of products, knowledge and creativity, has elevated the importance of the act of designing. It posits that this topic can to be seen as a new and vital currency for individuals and citizens of the future.

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The nature of this paper as an attempt at some kind of reflective account, will lean on personal experiences, events and research and writings of the time. Inevitably it will be somewhat anecdotal, yet I would hope not lacking in rigour.

In the 'Ascent of Man'(1973) Bronowski outlined those qualities which distinguish us as a species from other animals and the qualities that have helped us succeed. Those qualities, I propose, have strong similarities to what we now call designing.

Man is distinguished from other animals by his imaginative gifts. He makes plans, inventions, new discoveries, by putting different talents together; and his discoveries become more subtle and penetrating, as he learns to combine his talents in more complex and intimate ways.

Bronowski 1973 page 20

Descartes notion of the view of the human condition being a 'subjective view' of reality means that these views of betterment which define designing are individually based. He saw this as a proof of the existence of mind;

'Cogito ergo sum'- I think therefore I am

which suggests not that we all think (and I would add, design in the same way but that our individual perceptions of 'reality' will form our views of how we can change our lives for the better.

My rather playful notion of the coming together of two great thinkers represents an attempt to see designing as a defining capability in humans. Descartes definition with its emphasis on an individual's understandings of their world is central to my argument.

Prior to 1985 the idea of design and designing [in that in many contexts they are used interchangeably, Walker J.A. (1989)] emerged from an activity which was implicit within professional activities. Architects and engineers, for example, did it but often didn't recognise designing as a part of their work. Designing has become a generic activity which could have a methodology of its own and could be seen 'within' a range of professional activities. Alongside the recognition came the acceptance of a methodology by which design could be managed. The chart in figure 1 below shows the correlations of views which were evolving around the same time of methodologies in architecture, engineering, education and psychology.

Figure from Lawler. Idater 1999

Asimow 1962 (Engineering)	RIBA Architects 1965	Psychology of problem solving	Linear Model of Design and Technology (education)
Stage 1 Feasibility finding a set of feasible concepts	1. Inception 2. Feasibility	Preparation	
Stage 2 Preliminary Design Selection and development of the best concept	3. Outline proposals 4. Scheme design	Incubation	Identify problem research
Stage 3 Detailed design An engineering description of the concept	5. Detail design	Illumination	generate ideas
Stage 4 Planning Evaluating and altering the concept to suit the requirements of production distribution, consumption and product retirement	6. Production information 7. Bills of quantities 8. Tender action 9. Project planning 10. Operation on site 11. Completion 12. Feedback	Verification	select and detail make solution evaluate
Columns reproduced from J.C.Jones (1980)		Column reproduced from Lawson (1990)	Column reproduced from Kimbell et al (1991)

Fig 1

From the history of technology education (Penfold 1988,Rutland 1997) what I see as the tensions in education for designing are:

1. The desire to enhance the fulfilment of the individual;
2. The requirement of citizens to serve the needs of society. (a social, cultural, and economic construct)

(Penfold 1988) describes two primary school teachers from London visiting Sweden in 1844 for a summer school (no small feat) and bringing back with them ideas (Sloyd) of human fulfilment through activity, which they introduced to their slum school children. At the same time the moves by the Guilds and Education Boards aimed to ensure that all girls could study food and sewing, so that they could feed and clothe their families and be more employable as servants (Rutland1997). The boys, on the other hand, learned metalcrafts, woodwork and engineering drawing so that they could maintain their homes and become employable (in the industrialising world) (Penfold 1988). The contrast between the value positions behind the

introduction of Dloyd on the one hand and the more functional skills teaching on the other, express these tensions.

Technology education in schools in the UK in 1985

In describing schools and the position of designing in 1985 in the UK I have focussed particularly on the examination systems. Prior to 1970 there were essentially two components of the examinations for 16 year olds, a written examination and a skills based practical test. In 1970 under George Hicks, the then chief examiner for London University GCE O level, the board introduced a 'pre-practical' element into their examination. This was the beginning of a designed element in the activity being 'embedded' into the curriculum. The pre-practical part of the examination -

'required candidates to work from a tightly constructed design brief and design and make a part-product... Kimbell (1997) page 6

For pupils of 16 years of age there were two levels of examination set and administered by different bodies; the GCE (General Certificate of Education) for the more able, and CSE (Certificate of Secondary Education) for the rest. Teachers were involved in the writing and moderation of both sets of examinations. Teachers would choose the examination most suitable for themselves and their pupils. The examinations were moderated to be of the appropriate standards such that a grade 1 for CSE was equivalent to a grade C at GCE. Whilst this may seem now a potentially chaotic situation it did provide opportunities for curriculum innovation to be directly rewarded an example of this comes from a school with a particularly innovative curriculum (Stantonbury Campus) who abandoned all GCE examinations preferring instead to write and administer special CSE examinations particularly for their school. Subject boundaries were no longer a problem and pupils were given credit directly for what they could do.

There was also innovation at A level for example Oxford A level Design which enabled a direct focus in on the generic activity of designing. Pupils were encouraged to work to design in ways which produced the most appropriate outcomes for their notions of 'betterment'. I

myself marked submissions which included: the design of a television programme; a racing bicycle; and a booklet for parents of children with muscular dystrophy, in the same school with the same teacher.

Alongside this there were also numerous examples of syllabii which involved the reproduction of rote learned facts and processes - only a small development from their 19th century precedents.

Even earlier in the 1980's the Design and Craft Education Project at Keele University, directed by Professor John Eggleston developed the idea of designing as a process. Recognising the role that examinations had in curriculum development, the process was embedded within a CSE level examination established in 1970 entitled 'A Course of Study in Design'. As the course booklet explained it had an innovative approach to notions of content and assessment.

'It is not therefore possible to itemise a syllabus for practical work under headings of specific knowledge or motor skills because these may vary according to the individual needs of candidates and the requirements of different design problems'

NWSEB 1970 North West Secondary Examination Board page 2

In the UK in 1985 we had no agreed National Curriculum but having established a curriculum area called Craft Design and Technology a National Criteria for CDT examinations were agreed. Within these the aspects of pupils being assessed on individual and original pieces of course-work was well accepted. There was no doubt that pupils were required to design and make things. What was conducted by particular teachers in any single school was as a result of what they felt was 'appropriate' for their pupils. This view of appropriateness was often governed by the ability of those pupils to pass the terminal examination taken at 16 years of age. At that time there were around 10 examining boards each marketing a range of examinations. Exam boards in the UK are profit making businesses.

The difficulties of compatibility and reliability with such a diverse system, plus the speed of curriculum development, led to the amalgamation of the two levels of examination and a standardised set of GCSE General Criteria established by the Secondary Examinations Council (a government QUANGO,¹⁾ All examinations had to follow these criteria. The subsequent examinations areas were then re-named Craft Design and Technology, with sub titles for materials disciplines eg. Woodwork, Metalwork, Design Communication. All had to include notions of design. These examinations retained aspects of the previous system including, a timed practical test, an exhibition of practical designed and made work (coursework) and a (traditional) written examination. Further evidence of the acceptance of the activity of designing was that at that time Art examinations were also renamed, Art and Design. The idea of pupils being required to exercise an element of designing expressed in individual and different outcomes was embedded within the marking criteria of examinations in both these areas of the curriculum.

The APU Design and Technology Project, commissioned by the Department for Education and Science reported in 1991, for the first time described capability across a range of pupils and subject areas of the curriculum. Significant in its approach was the emphasis that capability was an active measure. It was not based on a 'knowledge' base but on capability as a result of 'doing' designing and technologistsing.

From the earliest work in this field, there has been general agreement on certain basic tenets of Design and Technology. It is an active study involving the purposeful pursuit of a task to some form of resolution that results in improvement (for someone) in the made world.

Kimbell et al 1991

With the introduction of the National Curriculum in 1990 came a further definition of that which pupils should achieve in all areas of schooling. Attainment was classified as to Levels (how good pupils were) and Attainment Targets were established for the 4 major divisions: Key Stages 1 and 2 for primary schooling; Key Stage 3 for mid secondary schooling; Key Stage 4 up to the end of secondary compulsory schooling. These corresponded to 5 to 7; 7 to 11; 11

to 14; 14 to 16 years of age. At the same point the curriculum areas were regrouped and were called 'Design and Technology'. The new 'subject' now included the CDT subjects, Textiles and Home Economics, renamed Food Technology. Thus for the first time what had always been seen as similar disciplines were collected together under the same banner. Furthermore within the National Curriculum Order, there was a compulsory entitlement for all pupils from 5 to 16 years of age to Design and Technology. Some might say a dream of 'designing for all' come true.

But has the been the case? In my experience this entitlement has not resulted in a greater exposure of more pupils to designing for two reasons: the exam system and OFSTED inspections.

The number of examining boards in England has reduced to nominally 3. The costs to administer the examinations, crucial to the boards' economic survival, have had an influence on assessment procedures. A linear process of designing has been translated piecemeal into the assessment rubric for the examination. Despite the findings of the APU report, teachers have translated and installed this model throughout the Design and Technology Curriculum. The resultant emphasis on filling in the 'right' pieces of paper at the 'right' stage seems to dominate schemes of work at all levels. The practical coursework which had become an assessed component of all exams under the CDT banner, rather than being previously marked by teachers and then moderated on site, now is submitted to the examining board, in a more standardised (and transportable) format. This has resulted in a greater emphasis on recording of the process of the work and less on the made outcomes. This change has often lead to pupils giving excessive priority to the presentation of their work, rather than focussing on the content of that being presented. This often resulted in what Mike Ive, former chief HMI for Design and Technology, referred to as 'nice nonsense'.

Also in order to assess the effectiveness of schools nationally, a regime of inspection is carried out. OFSTED (Office for Standards in Education) seeks to ensure and drive up the quality of education. It cannot be questioned that OFSTED inspections and the National

Curriculum have clarified and driven up standards. OFSTED reports however make scant reference to ideas of designing and creativity (Kimbell 2000) ² The emphasis on 'tracking' students alongside Programmes of Study has seemingly taken the energy that teachers used to give to ensuring that pupils are stretched to engage in designing to produce varied and exciting outcomes has, in my view, been reduced to what in many cases is a series of 'focussed practical tasks'³. So this has led to a position that whilst embedded within the curriculum, there are no means by which to assess pupil capability using terms such as creativity or designing ability.

This key sentence in the National Curriculum for Design and Technology document *'It (Design and Technology) enables them (the pupils) to understand how to think and intervene creatively to improve the world'* QCA, 1999: 122, was applauded for its inclusion by Kimbell (2000) in his millennium conference keynote entitled Creativity in Crisis, it is also seen as a 'hollow promise' at a time when creativity is in 'crisis' in our schools. And if creativity is in crisis, by association so is designing.

Commercial and Governmental Perceptions

In 1985 the UK and the developed world were still a part of an industrial continua where origination and manufacture were in most cases in the same country or continent. The ideas of the contribution that the activity of designing could make were well established within the process of production. It was how things were made. The emergent idea of Design Management was finding a level of acceptance. Ideas of 'Total Design' (Hollins and Pugh 1991) where the idea of design and designing could have an influence on the management of manufacturing and service industries were emerging. The increasing proliferation of computing and the subsequent access to and speed of transfer of information announced the dawn of the 'information age'. The natural and seeming congenial fear of business people to the concept of 'risk' was being confronted by the idea that 'risk' was essential, perpetual and speedy development was necessary in order to survive. Van Stamm(2003) Hollins and Hollins

(1999) Cagan and Vogel (2002) have gained recognition by suggesting how 'design thinking' can help business in dealing with the risky business of being innovative.

Governmentally in the case of the UK and influenced by Hutton's 1995 'The State We're In' (1995) advised by DEMOS (Seltzer and Bentley 1999) and prompted by demographic changes in manufacturing, have recognised such ideas as 'stakeholder capitalism'⁴ These have led through concepts of individual workers and their development, to constructs of 'national wealth' being that of the summation of the capabilities of society. The skills that such a society has is effectively what we have to sell and with what we will succeed in the future. Political mantra 'education education education' within prime minister Tony Blair's campaign speeches, are both altruistic and logical if such an argument is followed. Thus returning to my views that one of technology education's roles is as a provider of the 'workforce of the next generation', it would not be surprising for such ideas to surface in the present educational climate.

Philosophical, Marketing and Sociological constructs. (Strange bedfellows)

Interestingly the links between marketing and philosophy over the last 15 years tell very similar stories, though maybe not for the same reasons. Both have moved to an increasing emphasis on the individual and their view of their world.

Marketing

In 1985 the emphasis in marketing was around the marketplace as a mass of amorphous consumers. Markets were stratified approximately into socio-economic bandings based on the job people did and how much they earned. The use of standardised testing as descriptors of capability, were accepted widely. Questions by post modernist scientists and philosophers as to the validity of such views have led to a recognition of the viewpoint of the individual.

Phenomenological psychology is as concerned for the behaviour of, for example, the 'rat in the maze', as it is to start from how the rat 'feels' about the situation. Market researchers have moved from defining consumer groups in terms of their lifestyles (eg sustainers, aspirers) to designers and market researchers alike (IDEO reported by Van Stamm 2003 page 123) focussing, through using anthropologists, on carefully targeted consumers. They are tracking

and recording the decisions of the selected individual, both at the point of purchase and during the life-cycle of its products and services.⁵ So that their designs can be more relevant to the 'particular' consumer.

Philosophy in parallel

Descartes' 'Cogito ergo sum' which for him confirmed the existence of thinking and mind, has been translated as 'I think therefore I am'. Interestingly in a world of science and philosophy which has come to doubt absolute rules, in favour of those of the individual, has resonance. Philosophers' ideas such as those of Sartre and existentialism, through to Lefevbre and Baktin's move increasingly to doubt the generalised theory and to value the ordinary, everyday and individualised experience (Baktin's prosaic) as having 'real' validity.

⁶The ideas of Barthes(1993) in his analysis of literature was questioning the position of the author with regard to the reader - preferring to see it as a dialogue not a delivered edict, when interpreted into communications and products of all kinds has seen the notional 'conversation' between products and users as important. De Certo explores notions of reality and illusion for the individual, the 'illusion' of an object or situation, as interpreted by the individual, being just as important as its 'true' meaning. To take all of this back to a more concrete example- the humble training shoe has now taken on values and meanings far beyond its original 'function'. The 'dream' or image that the object carries, becomes its meaning, and that meaning is embodied in its logo. So that marketeers have moved towards seeing 'branding' as the essence of their trade. This matches the philosophers' concerns with meanings and realities for the individual.

And what of Bronowski?

Bronowski's notion of the qualities that has enabled us as a species to develop describe ideas embedded within the activity of designing which imply 'betterment'; the desire to realise new things; the task of using what talents we have but of developing others by doing this; the desire to create, can be seen clearly in the context of designing.

Descartes on the other hand in his search to justify 'mind', looks at the unique and personal way that each of us moves towards a future and better world.

So that when Descartes met Bronowski, their imagined conversation was around the activity to achieve betterment, and how this related to the individual's perception of it, and how the individual would achieve a better world for themselves and others.

The move towards individualised views of designing have for me come from the following:

Gardner's notions of multiple intelligences led, in the context of designing, to the idea of the individuals talents and interpretations being used positively to identify differing perceptions. For example, certain individuals will work predominantly in one intelligence, but also that dominant intelligence can be used to support other intelligences which may therefore expand the range of possible ideas of 'betterment' for the designer.

Myers Briggs' ideas, developed from Jung's work, allow ways of seeing the continuum between sensing and intuition and thinking and feeling.

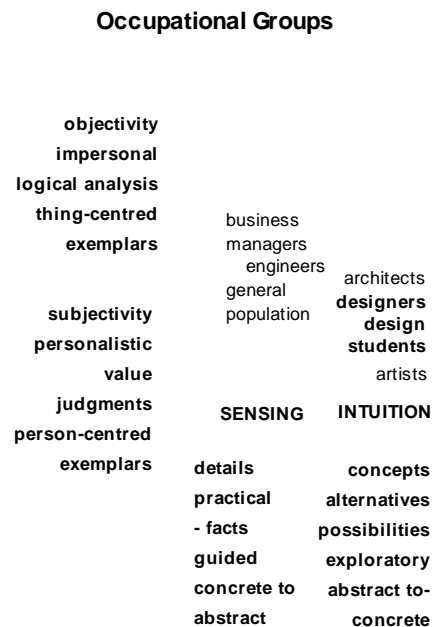


Fig 2 Myers Briggs classifications alongside occupational groupings

Riding's (1992) explorations of 'cognitive styles, and more recently Atkinson's(2005) work in the context of Design and Technology reveals tendencies in their test groups towards certain

'styles' of information processing and their correlation to success.

Neuro Linguistic Programming, (O'Connor and McDermott 1996)⁷ which is based firmly in the individual's interpretation of their own situation, and rather than styles of operation looks at levels of abstraction and reflection.

The work around metacognition Metcalf (1992) is both echoed in aspects of writings about creativity by Koestler (1964). In the context of designing, the implications for the developing of a culture of self understanding, reflection on what has been Schon(1987)and projection as to what could be give a further dimension to the understanding of designing. My previous (Lawler 2003) work combines many of these ideas significantly in the interest of exploring descriptors of individual's designing capability. It differs from previous works in that they often have sought to diagnose and pigeon-hole individuals into groups for the purpose of analysis.

My work seeks to allow personal insights into individual preferences, which give access into other styles of designing. The implication being that designing involves a combination styles and capabilities.

So where are we now?

I see us at a point where the innovation wave is firmly established and with associated values to commerce and society, yet within Design and Technology in the UK, the recognition of the importance of the activity of designing has waned. Apart from a few warning voices, academics, teachers and pupils are more concerned with delivering skills and knowledge effectively to achieve the best result (in tests and examinations). The whole system seems to have moved via concerns for accountability, away from designing and back towards a curriculum of 20 years ago. In order to be able to surf the wave we must prepare ourselves for what is to come. The recent project by the Technology Education Research Unit TERU Kimbell et al 2004 commission by The Department for Education and Skills, has been effectively to cooperate with the examining boards to explore ways of 'putting the designing back into the curriculum'. Effecting change that allows value to be given in the assessment

instrument will be a motivator to refocus curriculum interest. From the report of the National Advisory Committee on Creative and Cultural Education (1999), it was evident that other curriculum areas had less problems with the recognition and assessment of creativity. My own work with 'designing styles' shows that it is possible to make pupils and teachers fluent with their own and their pupil's ways of designing and technologising (Lawler and Howlett 2002), allowing them to get better at it quicker. If we are to accept this challenge it is important that we, work towards common agreements as to the importance of designing and creativity within our discipline and actively explore ways to encourage, record and assess these capabilities in our students. Rather than seeing them as difficult to assess in the individual, and pretending therefore they have no relevance. The future for the area of Pupils and Technology Teaching, for me indicates us having to re-embrace designing, and re-integrate them into our teaching. Remembering that as a species it has been that ability- to think and postulate how we can and do make improvements to our situation as we see it, that have been the key to our survival so far.

We think therefore we design.

Footnotes

- 1 Quango - quasi non governmental organisation
- 2 Keynote speech to Millenium Conference reported in DATA Journal Autmn 2000 Volume 5 number 3 where from three Ofsted reports, nominally 60.000 words, the word creativity was used just once and management 86 times.
- 3 Because student projectwork involves both the acquisition of skills and the application of skills in the production of outcomes, a recommended strategy in the National Curriculum was that of having short skills based tasks (focussed practical tasks) and larger and more open ended tasks (Design and Make Projects)
- 4 the collective responsibilities of those engaged in working with each other: the worker's responsibility to the employer; the employer's responsibility to the worker and their development)
- 5 All of the concepts of philosophy are from Gardiner (2000)

6 Sometimes referred to as ethnography and by Van Stamm (2003) as 'emphatic design' page 123

7 Neuro linguistic programming -a technique developed as a combination of linguistics, psychiatry and hypnosis

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