From Handicraft to Craft Design and Technology

John Penfold
Brunel University

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Supported by a wealth of statistics and self-evident buoyancy of the subject today, many are convinced that the age of fulfilment in CDT is dawning. A more cautious assessment which pays due attention to its history, would be less optimistic. A study of the ideas, policies and events which span the post-war transition years from handicraft to CDT shows a pattern that is far from orderly. The pendulum of change has swung violently, propelled by rival personalities and pressure groups, but never quite violently enough to clear all obstacles from the path.

Post-1944 Reorganisation

R.A. Butler's Education Act was a watershed in the history of secondary education in Britain. Raising the school leaving age from fourteen to fifteen when the birthrate was rapidly rising meant that an extra million children needed to be educated. This necessitated an urgent building programme and expansion in the provision for teacher training. Secondary education was restructured. The tripartite system emerged, in theory if not in practice. Elementary schools, a nineteenth century relic, were finally swept away and replaced by secondary modern schools. Technical schools, vigorously supported by Herbert Morrison and Chuter Ede, and seen as an essential element in the fight for national survival, were wedged between them and grammar schools which it was hoped would broaden their intake and not be wholly class bias. It was believed that these changes would encourage the most able children to fulfil their early promise and that the huge new investment in education would, at last, enable all children to develop in accordance with their age, aptitude and ability. Deep seated prejudices against practical work and long memories of the pattern and provision for workshop teaching within the old elementary system meant that practical subjects were relegated predominantly to the domain of the lowest strata — the secondary moderns. In Grammar schools they were generally a peripheral activity. Technical schools, which could have given practical subjects a boost, were never founded in the numbers envisaged in the 1944 Act. Difficulties associatd with the reorganisation of the secondary school structure were made worse, as we have seen, by the shortage of properly trained teachers adding another strain on to the new system. Despite this, it was in a spirit of controlled optimism that educationists tackled the enormous problems of adjusting from a wartime to a peacetime economy and responding to the ambitious requirements of the Butler Act.

Dissatisfaction with traditional craft teaching values

Very soon, however, some craft teachers began feeling that the extended secondary school curriculum, by still reflecting the values of an earlier era, was ill-suited to the changing aims and expectation of post war education. Once more disagreement mounted. On the one hand, traditionalists (not all old) elevated, taught and tested performance in manipulative skills as if they were the raison d'etre for teaching woodwork and metalwork. On the other, progressives (not all young) focused attention on questioning the *a prior* assumption that the acquisition of manual skills, of little direct relevance to the society in which the boys were maturing, had to precede educationally more fulfilling goals. In between, a not inconsiderable number found themselves trapped between hammer and anvil.

Latterly the banishment of the sorcerers of skill has, in some quarters, begun to take on almost moral overtones: craftsmanship as the unacceptable face of workshop activities. The ghost of William Morris had to be exorcised. This had not always been the reaction to craft values. As a young teacher, in a Middlesex secondary modern school for five years, the author like most of his contemporaries gained a thorough grounding in woodwork and metalwork, aspiring always towards the highest standards of skill and finish. At Shoreditch Training College and Loughborough College, the two main teacher training institutions for handicraft, Arts and Crafts values were highly esteemed. At Loughborough, Edward Barnsley continued to provide a direct link with the Cotswold 'Utopian Craftsmen'. As the majority of lecturers in handicraft elsewhere had themselves trained at Loughborough or Shoreditch, these ideals were widespread.[4]

For teachers imbued with these ideals and with only a short period of teaching practice behind them, being thrown into the hurly-burly world of secondary modern teaching was something of a culture shock. For each boy who could produce a decent row of dovetails, far more could be found discovering the doubtful joys of brummer stopping or applying a viscous paste of sawdust and glue to full up the only too obvious gaps. A backlash against the over-emphasis on standards of craftsmanship was inevitable.

Metalwork catches up

The pace of change since 1945 must not be exaggerated. Metalwork teaching, for so long the neglected partner, had much ground to make up. In an endeavour to narrow the gap, the Ministry of Education published *Metalwork in Secondary Schools.* It helped bring about a parity between woodwork and metalwork provision, but not until the sixties. The advantage of metalwork claimed the booklet was that there was no need for skill training courses in woodwork, so pupils could immediately start making useful objects. For younger pupils, tool-making projects were particularly recommended: advice that proved to be remarkably effective and long lasting. Advanced instruction for older pupils consistd of themes derived from instrument making, model engineering and hammered metalwork. It is interesting that in the fifties, whereas some woodwork practitioners were wrestling with constraints imposed by prescribed designs, metalwork teaching, with the exception of forge and hammered metalwork was being urged to adopt a policy that, for many pupils, permitted little individual response to the design of the objects to be made. Not all followed this policy.

The section on 'Design for metalwork' did not point the route that

many metalwork teachers, along with woodwork colleagues, were soon to pursue.[8] The stimulation of design awareness and considerations of functional design were certainly well to the fore but the possible direct involvement of boys in the design of their own work was only barely perceived. Design for most amounted to a consideration of 'alternative methods of construction or choice of decorative treatment enabling them ultimately to design by selection'. Only the 'more gifted boy', the pamphlet maintained, had the ability to 'plan a piece of work on paper and then to carry it through to its conclusion'. According to the Inspectorate, of even this select group, 'perhaps not more than two or three each year may possess in addition, creative imagination' from whom 'may be expected some success in design at the end of a four year course'.

Sydney Glenister, principal lecturer at Trent Park College of Education, in his book *The Techniques of Handicraft Teaching* published a year after the Ministry's pamphlet, echoed this theme, asking: 'Can the Children Design'[9] He concluded that, though some theorists had advocated children should design their own projects, 'teachers who have practical experience in this direction well know that very few children have either the skill or the aptitude for this work'. Consequently, he recommended that teachers should develop in their pupils 'a sense of good taste and an appreciation of good design . . . and to co-operate in the planning' (of their work). His own interpretation of design was somewhat questionnable but widely heeded and perpetuated an approach to furniture design which led to it being widely lampooned by professional designers. Design, instead of being taught as an entity, concentrated almost exclusively on matters of styling, shaping and decoration. Children's contribution to design, according to Glenister, could best be made through such items as handles. If a teacher designed everything connected with a box except the handle, the boys could have:

> freedom to use their own imagination in designing and making these. As each of these handles would use only a scrap of wood, no harm would be done in allowing each boy to make three or four handles of different design. This could be followed by a short discussion on the merits of each design. None of the handles any one boy made might be suitable enough to be put to practical use but at least he would have been taught the requirements for a well-designed handle.

Such an approach to design, was widely copied not least by examination boards. Many children developed design concepts that revolved round multiple premutations of tapering the inside of a leg, shaping the underside of rails.

It was time for a change. Many handicraft teachers shared a gut reaction that, despite brave words of encouragement, their subject was not making headway. Few were dissatisfied with the teaching of skills as such, but with the context in which they were used and the end products themselves. When, for example, a Ministry pamphlet suggested making a pastry cutter (essentially an exercise in tinplate work ensuring a working knowledge of safe edges and soldering techniques) plastic ones, superior in every way to the home-spun variety, were coming onto the market.

The Crowther Report

Whatever progress was being made within the subject, externally, handicraft continued much as before. In 1959 it received one of its periodic boosts from higher authority which has been a regular feature of curriculum development over the years. The Crowther Report of 1956 asked the Central Advisory Council for Education:

> to consider, in relation to the changing social and industrial needs of our society, and the needs of its individual citizens, the education of boys and girls between 15 and 18 (the school leaving age then being 15), and in particular to consider the balance at various levels of general and specialised studies between the ages and to examine the inter-relationship of the various stages of education.[11]

Crowther argued pervasively for an 'alternative road' approach to education to enable the country to benefit from the capabilities of all its young people. The Report advocated the rehabilitation of the word 'practical' in educational circles even though it was aware of its ambiguity: 'practical' carrying pejorative overtones, frequently being construed as the opposite of 'academic'. The Report strongly refuted such a view:

> The boy with whom we are concerned is one who has pride in his skill of hand and a desire to use that skill to discover how things work, to make them work and to make them work better. The tradition to which he aspires to belong is the modern one of the mechanical man whose fingers are the questioning instruments of thought and exploration.[12]

The Crowther Report was the first major post-war initiative to address itself to bridging the gap between education and industry. It met with a mixed response. Edward Semper, headmaster of Doncaster Technical High School and a dominant figure in technical education in the fifties and sixties, lead the way in the promotion of the idea of curriculum research into applied science.[13] Craftwork was taught as an 'instrument of general education' at this school. Semper was clear about the philosophy of the school:

> The Doncaster Technical High School differs from a grammar school mainly in that it has a broad vocational aim and is unashamedly science-based. The applications of science are used to bring intelligent interest to the crafts and to create an awareness of our cultural heritage as well as to vitalise the teaching of pure science. The ethos of the school is conditioned by technology which, far from restricting the process of education, provides a most engaging means of stimulating interest and sustaining effort.[14]

With the growing comprehensivisation of the secondary school system, Semper was instrumental in changing the nature and title of the Association of Heads of Technical Schools to the Association for Technical Education in Secondary Schools. The principal concern of the new association centred on securing a proper place for the teaching of young people through scientific applications, embodied in Crowther's 'alternative road' approach.

The beginnings of school technology: science or handicraft based?

In 1964 Harold Wilson became Labour Prime Minister. He declared that the 'white heat of the technological revolution' would ultimately permeate every aspect of our society. The Institution of Mechanical engineers, aware that Engineering was failing to attract a sufficient proportion of brighter pupils, sought to ascertain the extent of engineering activity in schools, and found it in less than five per cent of schools.[15] Forty of these schools were visited. Of this handful, thirteen were in the independent sector, seventeen in publicly maintained grammar and ten in technical high schools. Further information came from a questionnaire to a further 265 schools. Engineering proved to be very much the province of the science department. This survey by Graham Page dealt with a spectrum of teaching a world away from that of the great majority of handicraft teachers, but he was sympathetic to the potential value of workshop subjects to engineering.[16] The future scientist, every bit as much as the future engineer, Page claimed, needed a basic competency in skills and constructional techniques that were best taught by the craft teacher. A number of influential figures in applied science teaching disagreed. Gerd Sommerhoff, whose Technical Activities Centre at Sevenoaks School did much to put technology teaching on the map, put the case against technology evolving out of workshop subjects;

Manual skills are no substitute for creative thought. It is our belief that the traditional kind of school metalworkshop can do more harm than good to the engineering profession. It fails to attract brighter children and it leaves children with the impression that to become an engineer is the same as to become a machine operator or mechanic. This, of course, is one of the common confusions which have brought the status of engineer so much lower in this country than in other industrial countries.[17]

Sommerhoff's centre was designed as distinct from the craft department which continued to flourish independently, fulfilling a quite different curriculum role. When the centre opened in 1963, the main activities focused on 'mechanics, aeromodelling, electronics, radio controlled models, computers and automatic devices of all sorts'. Over the next twenty or so years the school considerably extended this range. By 1983 the list of basic courses consisted of: elementary mechanics and the use of Meccano, engines and how they work, the lathe, elementary aerodynamics and windtunnel experiments, model aircraft construction, and glass fibre moulding, elementary electricity and circuit design, electro-magnetism and its uses, electronics Parts 1 and 2, Boolean algebra, transister logic and integrated circuits, operational amplifiers, microprocessors Parts 1 and 2. Additionally the school runs formal courses on computer programming. A key feature of Sommerhoff's organisation was that pupils were expected to have mastered the basic principles of their subject and acquired basic practical skills before they could embark on project work. To this end he developed a range of programmed self-instruction courses combining practical and theoretical elements, each consisting of a folder of some 30-50 pages of text. Pupils did the courses individually and at their own pace, supervised by the teacher. Sommerhoff found by experience that his boys did them willingly and well. The Sevenoaks approach attracted widespread attention, finding particular favour with the Federation of British Industries which wishes to see Sommerhoff' system extended and adopted elsewhere. Others were less sure. They pointed out the highly favourable circumstances surrounding the Sevenoaks experiment — an innovative and dedicated teacher, excellent facilities, clever children who did the work as a voluntary activity out of normal school hours, good access to materials and components and the special nature of public school education.[18] Be this as it may, Sevenoaks did much to popularise technology teaching in the sixties. Gerd Sommerhoff appeared frequently on television, especially in connection with the BBC's Science Fair programmes. A book and various articles published on the school together with a film 'Creativity in School' stimulated interest in the experiment.[19]

In the maintained sector, the applied science department of Ealing Grammar School pioneered the teaching of technology at sixth form level. Dr G.T. Sneed, who became head of science, wrote to Professor Blackett at the Ministry of Technology outlining the principles of the course. His letter claimed that:

> we are the only grammar school in the country which has created a special course whose aim is to try and persuade able boys in the science sixth to take engineering degrees at the university.[20]

Like Sommerhoff, he saw a clear demarcation between school metalwork and engineering. Sneed, who developed the work at Ealing over nearly twenty years, though conversant with developments in CDT remained unenthusiastic, writing in 1983 that some craft teachers wished to 'elevate' their subject 'to the peerage'.[21]

The friction or downright hostility between the scientists and the applied scientists in one camp and those who advanced the idea of technology from a handicraft base in the other, have been exhaustively explored in a recent study.[22] The author is indebted to this source for much of the information in the following section. Dr Gary McCulloch, Edgar Jenkins and Professor David Layton have described the complex interforces which led to the wider introduction of technology into the secondary curriculum and their account should be familiar.[23]

The potential contribution that craft teachers could make to technology teaching owes much to the almost visionary thinking of Donald Porter, then staff inspector for handicraft at the DES, who believed strongly in the alternative road approach. In 1964, he spent a sabbatical year exploring ideas that would extend the teaching of technology in secondary schools. The movement to merge grammar, secondary modern, and technical schools into a comprehensive pattern of schooling made his studies especially timely. The Schools Council published Porter's research two years later,[24] and when they were considering a feasibility study for the teaching of applied science and technology, Porter wrote in a supportive background paper in which he suggested that mathematics and science teachers might be encouraged to 'tackle jobs at boy level in an

engineering way'. This required optimism not held by all.[25] Despite NUT reservations that support for engineering in schools owed more to the universities and the engineering institutions than to the schools themselves, the Schools Council launched 'Project Technology'. Its stated objective was

> to help all children to get to grips with technology as a major influence in their lives, and as a result, to help more of them to lead effective and satisfying lives.[26]

Over 500 hundred schools from all parts of the country were interested in participating. They were divided into geographical teams linked with universities and departments of education under the overall control of the project leader Geoffrey Harrison, based at Loughborough College. To underpin its curriculum development role, the Project Technology team's activities extended from the provision of attractive teaching material to supportive research programmes. These included investigating the educational value of technological project work, its assessment and evaluation, influences affecting girls' attitudes to technology and the development of creative ability but strained resources meant that this could be only superficial.

The authors of *Technological Revolution?* cast G.B. Harrison as the champion of the craft route to technology teaching. Harrison publicly disputed Sommerhoff's assertion that the technical project work at Sevenoaks School was superior to metalwork, maintaining that 'technical activities and metalwork are complementary, mutually supporting and of equal importance'.[27] Whereupon H.N. Pemberton and Brigadier J.R.G. Finch, chairman and secretary of the Council of Engineering Institutions, visited Ealing Grammar School and declared their support for its course, based on science, not craft. To reinforce the Ealing approach, vacation courses intended 'essentially for science masters, or science teachers and not craft teachers, since Sneed's work has nothing whatsoever to do with craft training' were proposed.[28] Representatives from the Association for Science Education and the Council of Engineering Institutions formed an Action Group, which had the ear of the Duke of Edinburgh. The Group aimed to advance the teaching of technology through a reform of the school science curriculum, and to exclude the 'craftsmen'.[29] Hostility was ill-concealed and attempts to reconcile the two approaches foundered because of their fundamental differences. Professor Kevin Kehohane, coordinator of the Nuffield Foundation Science Project and a member of the Advisory Committee of the Schools Council Technology Project, confided his own reservations to Lord Jackson:

> 'between ourselves I can't say I have been entirely happy. It may be doing a good job at craft level, but I feel that it is not, perhaps, likely to make an impact on the most able pupils whom all of us would wish to enter in greater numbers, to courses in science and technology'.[30]

Donald Harlow a scientist with a technological background and an official of the Science Masters' Association confirmed this view:

> It seems clear that his (Harrison's) project will not produce greater numbers of scientists. It is craft based; it uses the facilities and staff of the handicraft sections and is in many cases being handled entirely by the handicraft departments of LEAs without reference to science staffs.[31]

The relationship continued to be strained between the scientists and Project Technology and meant that valuable opportunities were lost to press for more technology teaching just when the climate for change was especially favourable. Some progress was made when the Standing Conference on School Science and Technology (SCSST) based at the Institution of Mechanical Engineers and the Science and Technology Regional Organisations were founded. The SATROs were set up to nurture contacts between schools and technological activities at local level. When Project Technology completed its five year span funding continued for a further two years. Geoffrey Cockerill, the Schools Council Secretary, professed his satisfaction with Project Technology;

> It had become widely known in colleges of education as well as schools, has produced some attractive materials, and — viewed as a research and development project — generally fulfilled the expectations envisaged for it by the Council.[32]

This account is astonishing in being totally out of touch with the perceptions of most handicraft teachers than in the schools. Science teachers were apparently expecting their territory to be occupied by a vast army of handicraft teachers led by Geoffrey Harrison and his Project Technology team. Nothing could have been further from the truth. Virtually every craft teacher was very sceptical of the claims being made for technology in craft shops if not actually opposed to it. Harrison established his technological reputation at Dauntsey Public School and encountered much criticism from colleagues in state schools. His appointment to head of the craft department at Loughborough College in 1965 caused resentment among college staff and ex-Loughborough students who saw him as a betrayer of craft education values. When Edward Barnsley was obliged to leave, this so angered some of those trained at Loughborough that they stopped recommending their old college to sixth formers. Loughborough's output of CDT teachers has never recovered. The majority of craft teachers who spent most of their time teaching average and below average boys, also found that the Project Technology material was beyond their pupils and were not even sure of their own ability to cope.

David Tawney in an evaluation of aspects of Project Technology, seems to have underestimated the resistance of most craft teachers to technology teaching.[33] Teachers participating in Project Technology were not a representative sample of craft teachers. This sample, however, was satisfied with Project Technology teaching materials and publications. A high proportion of teachers did depend on these materials for their teaching but, it is uncertain how many schools introduced or strengthened their teaching of technology through involvement with Project Technology. Many schools taking the publications did not implement curriculum change and others did not sustain the changes made. If individual teachers had been visited

by the central team, Tawney suggested that they might have felt less isolated, and been encouraged. The number of schools teaching technology within craft departments settled between one and five per cent. Yet, when Project Technology was wound up at Loughborough College the National Centre for School Technology established at Trent Polytechnic to continue the work gave the impression of being far more extensive. The cadre of teachers and lecturers were soon pouring out new material from Trent Polytechnic and developing a highly effective public relations operation which kept the teaching of technology high on the political agenda.

Average and below average pupils

Three years before the Schools Council set up Project Technology, the Ministry of Education published *Half our Future* (the Newsom Report), on education of 'pupils of average and less than average ability'.[34] The value of practical activities to the education of these youngsters featured strongly in the Report. It assessed their 'distinctive' contribution in providing opportunities of learning by direct experience and a medium of expression other than the written word. But ultimately, warned the Report:

> . . . it all depends on the quality of the teaching. Unimaginative exercises can be as dully repetitive in woodwork as they can be in English. If practical work is to be used as a means of revitalising the programme — and it needs revitalising — for our pupils, something other than a larger dose of the mixture as before is needed.[35]

Extending craft teaching horizons in imaginative ways had implications for the education of all children, regardless of ability. The Report acknowledged the pride and satisfaction pupils might feel by doing something well, but did not consider it a sufficiently enriching educational experience in itself. Learning and confidence had to be promoted by giving pupils real problems with which to grapple. Objects made in the workshop should work; if they did not, youngsters should be able to work out why. Time spent in the workshop was justified only if it

> . . . should lead to thought and expression: they are not to be regarded as a substitute for thought for the less intelligent.

Finally, the Report made a plea that craft studies should lead to a wider appreciation of manufactured objects our cultural heritage: the development of feeling for the appropriateness of materials to their use; responsiveness to colour, form and design and the enhancement of sensitivity towards the personal and social needs of human beings in relation to their environment.[36]

The Keele Project

The Newsom Report addressed itself directly to problems and opportunities consequent upon raising the school leaving age from fifteen to sixteen in 1965. Craft teachers, whose main teaching commitment had always been with the average and below average boy, were soon up to their necks with ROSLA (Raising of the school leaving age) schemes that stemmed from Newsom recommendations. In the longer term, however, the Newsom philosophy found a more cohesive and explicit outlet in the Schools Council Design and Craft Project. Early ideas for the research programme were first explored at Leicester University Department of Education under the direction of Professor G.H. Bantock. When John Eggleston, then a lecturer at Leicester University, became Professor of Education at Keele university, the work went with him. Known initially as the Schools Council's 'Research and Development Project in Handicraft', the research team soon established a working relationship with large numbers of teachers throughout the country.[37] The DES and the Schools Council may well have seen Project Technology, the Keele research and the Art and Craft 8-13 project at Goldsmith's College[38] as three curriculum development programmes that together would reinvigorate and give more purpose to workshop teaching. This may indeed have happened at the time but not many teachers saw it like that. Most regarded the Projects as tugging in opposite directions. As far greater numbers of craft teachers identified themselves with what became universally known as the Keele Project than with Project Technology. In part this can be attributed to the greater willingness of the Keele research team to visit centres throughout the country to explain their aims. More significantly, the Keele Project was more attuned to the backgrounds and aspirations of the majority of handicraft teachers than looking for ways forward. But even the Keele Project had its limits and many schools carried on as if the two Schools Council research projects did not exist.

The pilot study, *Education through the use of materials* only partially indicates the direction of the research team.[39] Craftwork, by combining the teaching of skills with the stimulation of pupils' own creative ideas, could afford a demanding and enriching educational experience. When craftwork consisted solely of making tangible end products in one material only restricted educational opportunities arose.

The Project's proposal was to look at the possible integration of craft work with other areas of the curriculum in which 'work with materials in the workshop plays a central part', naming art, home economics and technology as especially appropriate. The seeds of the circus arrangement had been sown. More immediately, an appendix associating craftwork with all-embracing curriculum objectives including intrinsic and extrinsic motivational factors, personality traits and attitudes, creative and skill development and the fostering of logical problem-solving strategies was reassuring about the educational base of their subject to handicraft teachers,[40] but wanted hard evidence to support the extensive claims being made on behalf of the subject.

Creativity — the 40s background

Professor Eggleston's team proved eclectically adroit and responsive to the characteristic creative mood of the sixties, with its explosion of talents in fashion, film and thatre, commercial photography, advertising, pop music and pop art. Terrence Conran pitched his 'Habitat style' to a design-conscious middle class. Philippe Garner aptly summed up the time:

> Consumerism was a new thrill to be judiciously enjoyed and the tastes of this public were to be nourished

> after 1962 by the colour supplements to the Sunday newspapers — first with the Sunday Times, then with the Observer. With such features as the Sunday Times 'Design for Living', the supplements, as much in their advertising as in their editorial content, provided a pot-pourri of instant consumer culture and contributed to the visual education of a very wide market.[41]

An interest in all things creative spread. It permeated space race thinking and influenced America to believe that its future society depended on the creative discoveries and innovations of its scientists and technologists. Creativity research flourished.[42] Social psychologist, Irving Taylor analysed over a hundred definitions of creativity and identified five levels of creativity into the educational vocabulary. Thus came 'expressive creativity', 'productive creativity', 'inventive creativity', 'innovative creativity', and the highest level 'emergentive creativity'. Open-ended creativity tests designed to measure performance, mushroomed. How many uses for a brick, a match stick, a paper clip . . .? High scores predicted creative potential. This led researchers — J.W. Getzels and P.W. Jackson, Carson McGuire and Irwin Flescher — to draw differing conclusions concerning the relationship between intelligence and creativity. Other psychologists directed their attention to now familiar brainstorming and synectic techniques. Much of this academic research had direct relevance for teachers. Torrence's work, for example appeared to support the thesis that educational pressures encouraged conformity in children. Education was thus held to be a powerful agent for suppresing 'divergent' and encouraging 'convergent' thinking. Liam Hudson's academic research at the Cambridge Psychological Laboratory even caught the popular imagination when he suggested in a book published by Penguin, that 'convergent' thinkers tended to be attracted to the physical sciences and 'divergent' thinkers to history and literature.[43]

Younger craft teachers proved very receptive to these stimuli; so receptive that even the appearance of many became transformed — short back and sides gave way and grew into flowing locks and sideburns and out went the time-honoured national dress of the fraternity. Well worn, elbow-patched sports coats, with top pockets of gleaming pens were discarded in favour of leather and suede jackets and coloured shirts. These trappings, emblems of the permissive society and of upwardly mobile teachers, caused consternation amongst staid members of the profession. But in reality the momentum was in the other direction. Design for craft teachers acquired new connotations.

The birth of design education

Whilst *The Woodworker* remained possibly the most widely read periodical among handicraft teachers, *Craft Teacher News* and Stanley's *Craft Education* (both circulated free of charge at first) began to include articles of wider interest. Leadership of *Design,* the more prestigious journal of The Council of Industrial Design (now the Design Council) grew steadily among workshop based teachers. During the sixties, they found much in the journal that was relevant to their work. One editorial sympathised with the movement to institute a combined approach to the teaching of design education in secondary schools but advised a realistic attitude.[44] To ignore 'the powerful and legitimate pressures' on the curriculum exercised by those brought up in a non-visual tradition, would be politically naive and jeopardise the implementation of design objectives.

Kate and Ken Baynes examined the state of design education in two articles in *Design.*[45] The first concentrated on the Leicestershire plan, where the director of education, Stewart Mason, believed practical subjects, art, drama and music, to be a fundamental part of every pupil's secondary education. The authors found that woodwork and metalwork were taught in handsomely provided accommodation but observed that:

> . . . educationally and intellectually there was an anachronistic atmosphere about the craft room and the methods used were, with the backing of conservative-minded teacher training colleges, extraordinary impervious to change . . . Only with the dissatisfaction of a younger generation of teachers, who have felt the inadequacy of the traditional teaching methods, has craft begun to grope its way along the tricky path from cosy certainty of learning known hand techniques towards a broader consideration of the construction and function of objects in an industrial society.

Their second article looked at teacher training provision for craft and design education at Cardiff, Hornsey, Shoreditch, Loughborough and Goldsmiths College. Shoreditch with an intake of 240 students in 1966 was the obvious representative of the traditional approach. Ted Sawdy, the head of the craft department, was not one to bow to the winds of change and told the Bayne's that:

> The aim of the course is to send out teachers who will teach in all ranges of secondary education, their main medium of education being woodwork and metalwork . . . The breadth of the courses is to enable them to use their specialisation as a means of educating boys to an appreciation of fine craftmanship and good design, and to give avenues for personal intellectual and emotional development.

Ken and Kate Baynes thought the teacher training college was 'the obvious place to break into the educational cycle need to bring about change, regarded Shoreditch as a major stumbling block and so did many of the younger Shoreditch staff. Yet the role of teacher training institutions in curriculum development was not as straightforward as they made out. They were more positive about developments at Hornsey and about Loughborough's tentative steps towards technology. This alerted the authors to the potential of technology within the field of design education, but this was not really happening. Design education almost universally excluded technology teaching, and still does.

Design educationalists were effective in publicising their cause. A conference held in February 1969 at the NUT headquarters assembled an impressive list of speakers, headed by Shirley Williams, then Minister of Education.[46] She told delegates that:

When it comes to the teaching of design itself, I hope very much that schools will not regard the teaching of design as being something that takes place in the woodwork class, or the craft class, or the home economics class or the arts class . . . the design approach is also just as badly needed in the engineering workshop, in the metal shop, and in the woodwork shop. It is needed beause the future technologist, or the future engineer, must be as conscious of the possibilities of design in what he is doing, as the future designer must be conscious of the limitations imposed by different methods of production.[47]

One positive outcome of the conference was the proposal to form the Association for Design Education. Sir Paul Reilly, Director of the Council of Industrial Design, hoped that the new association would stimulate teachers of children of all ages and subjects to take 'design under their wing', not as specialists but as part of the general knowledge with which all boys and girls should leave school. Only in this way would future generations 'grow to speak the language of design as fluently as their mother tongue'. Other outcomes of the lobbying are discussed below.

Design education literature

Publishers were quickly off the mark to satisfy the new demand. Books on design and design education began to roll off the printing presses. Some were trite: books with the same tired contents sold, provided the title — be it brass rubbing or basketry included the sixties buzz word 'creative'. Craft departments were eager to broaden their approach. At the time most traditionally trained teachers had never heard of the Bauhaus, and the design philosophy of Walter Gropius. Colour, shape, form, texture and pattern were not part of their vocabulary till Maurice de Sausmarez's books described Bauhaus foundation course ideas derived from Johanes Itten's teaching.[48]

Kurt Rowland's 'Looking and Seeing' series were also phenominally successful.[49] His books illuminated the principles of visual appreciation of the natural and constructed environment, providing teachers and pupils alike with a sort of visual grammar to underpin their work. James Gosling recommended this 'splendid series' to members of the Institute of Craft Education;[50] interesting since the Institute tended to be known more as guardians of good traditional practice than as trailblazers. Most books on the principles of design were written by authors with an exclusively art background, but Francis Zanker, then a lecturer at Eaton Hall, produced a book which helpfully bridged the gap with craft.[51] In refreshing style, it gave craft teachers some confident building on, not debunking their testing skills. So many craft teachers were enthusiastic about the Bauhaus exhibition in 1968 staged by the Royal Academy of Arts.[52]

David Pye, then Professor of Furniture at the Royal College of Art approached the understanding of design more analytically and was dismissive of some of the more voguish practices then in favour. It was a time when tables were no longer called tables; but were introduced in design problems as 'planes in space', and, chairs were 'structures to support the human frame'. Was Professor Pye right? It would be interesting to know how many innovative designs evolved from these unconventional approaches, but Professor Pye regarded them as 'idiotic' and declared:

> When the problem is old, the old solutions will nearly always be best (unless a new technique has been introduced) because it is inconceivable that all designers of ten or twenty generations will have been fools.[53]

This was nectar to the traditionalists and lucid thinking did bring into focus some design issues which had distinctly fuzzy edges. Soon after his book was published, Professor Pye was invited to lecture to a large audience of handicraft lecturers and teachers at the University of London Institute of Education. But the meeting was a flop. As one art colleague muttered 'they (the audience) may have picked up the odd word or two of the designer's vocabulary, but they don't understand the language' which may sound deprecating but sums up the communication problems that have led to much misunderstanding over the years.

Protagonists of design education produced books on the movement but these fell short of providing a coherent educational rationale that curriculum planners might use for future development. It may not have been what these pioneers wanted. They were primarily concerned to encourage fluidity, not to establish a possibly restrictive framework. The beginnings of design education make interesting reading. The movement arose because of dissatisfaction with art teaching training, than as a bid to revitalize workshop teaching. Teacher training departments attached to colleges of art tended to be filled with frustrated would be artists and sculptors. Course directors saw design education as a means of channelling their creative energy. This is not to disparage the work of Peter Green, head of the Teacher Training Department and Ken Baynes which made Hornsey College of Art (now part of Middlesex Polytechnic) immensely exciting. Ken Baynes, always an engaging writer, captured the spirit of the era in the contributions to his book *Attitudes in Design Education.*[54] The range of articles demonstrated the wide range he foresaw for design education. Including a piece by John Kingsland, the recently retired headmaster of Cray Valley Technical High School and one of the pioneers of the 'alternative road' approach, broadened the concept of design education to include technological teaching. Peter Green's article also emphasised the key role of technology.[55] Technological education has not, however, been widely seen as within the scope of design education. Peter Green's book, apart from an enlightening introductory section, informed by example rather than precept. Bernard Aylward, the Leicestershire adviser offered brief personal opinions about design education in the volume he edited, but his contributors to develop *their* ideas,[56] pointing out only that an integrated approach to design must be internalised within the minds of pupils and not be just an assemblage of traditional subjects, each with its own specialism. All three authors gave no more than tantalising glimpses of the vision each had for design education. The lack of a rigourously argued educational justification for its inclusion within the curriculum left design education cruelly exposed when less favourable winds

began to blow. The journal *Studies in Design Education and Craft* from 1978 *Studies in Design Education Craft and Technology* reflected and encouraged new movements within handicraft. Edited from its inception in 1967 by Professor John Eggleston, it had its roots in the Institute of Craft Education and the College of Handicraft. The journal has provided the only consistent forum for the discussion and dissemination of fundamental curriculum development ideas in the craft and design area. The 1972 Winter edition carried a number of articles on integrated approaches to design education. Professor Eggleston, commented in the next issue, that these had provoked an unprecedented response, and he devoted the whole of the Spring number to the same theme.[57] He hoped to deepen teachers' understanding of the resolution of practical design problems and, most importantly, to examine 'the underlying justification of many of the new approaches'. How influential *Studies in Design Education and Craft* was at the time is difficult to gauge. Its circulation then, of about 2,500, was relatively small, but the readership was far higher, especially among those able to exert pressure for curriculum change.

The substantive reports of the Keele Project, demonstrated clearly the influence of ideas originating in design education.[58] Professor Eggleston, wearing his hat as Project Director, oversaw the transition of a project which began with a bias towards handicraft and ended with a more broadly based curriculum study area.[59] New parameters were set out. Problem solving strategies became the order of the day. Teachers acquired a new vocabulary. Design methodologies using analytical and synthetical criteria moved logically from need identification to optimised solutions and their evaluation. Ways of extending the material boundaries of wood and metal were explored. The text encouraged teachers to look afresh at the home, leisure and community work as sources for design-based studies. The work of the Keele Project completed, Eggleston brought all the competing and complementary design education influences together in a personal account of the movement during its formative years.[60]

The response of LEA Advisers

By the 1960s, advisers had effectively lost their organiser tag and formed themselves into the Conference of Handicraft Advisers to change again in the next decade into the Association of Advisers in Design and Technical Studies. A document, *Craft Education* published initially for the Annual Conference of Handicraft Advisers, aimed at stimulating further discussion among a wider readership.[61] It gave little indication of future growth points; neither design nor technology were much featured. The authors expressed the hope that, in conducting a 'reappraisal' of 'the teaching of handicraft, there will be a clarification of objectives'. These turned out to be, in essence, a digest of the best of past practice with an infusion of ideas from recent official and Schools Council reports.

The following year, responding from pressure from a minority group to do something about design education, the association commissioned a second document, ultimately published as *Design in Craft Education* (1974).[62] Though the working party included Bernard Aylward and Joss Jocelyn, the Cheshire Adviser, both leading advocates of design education, the report lacked vitality. Again the authors would have been mindful of the fact that any recommendations had ramifications for Association members who espoused design education with varying degrees of enthusiasm. Such considerations had not inhibited the Association of Arts Advisers, who in 1973 produced a well-thought out statement on design education.[63] Considering the overlap of interest between the two, any limitation of contact smacked of parochialism, a view reinforced by the limited sources of reference listed in *Design in Craft Education.* One might agree with the adviser's dictum that books should be 'appropriate and good' without relying on the *Concise Oxford Dictionary.*

Design in General Education

With the end of the Schools Council's project, the focus of design education research switched to the Royal College of Art. In the Spring of 1974 the DES funded an enquiry at the College into 'Design in General Education', under the direction of Professor Bruce Archer. For three years (1973-76) he and his team laboured to designate Design (with a capital D) as a third area of education. They boldly claimed for design discrete characteristics which separated it from the physical sciences and the humanities. This third area comprised

> the collected body of practical knowledge based upon sensibility, invention, validation and implementation.[64]

The research team did not primarily set out to provide quantitative data detailing the extent of design education in secondary schools. Apart from recognizing the situation as being fluid, the RCA team knew itself to be 'an agency for change itself'. The RCA defined as the most important factors in the formulation and implementation of design education:

> . . . firstly, the quality and motivation of the staff specialising in design-related subjects, secondly, the practical support given by the headteacher.[65]

The investigations predictably produced mixed responses. The majority complained that only a minimal amount of teaching material stemming from the two projects penetrated into the craft shops. This may well have been the case, but if literature was reportedly lacking, ideas derived from the two projects were not. Thus ILEA's Design and Technology advisory team under staff inspector then began an 'Innovation on Craft Education' which owed much to Keele.[66] London was not alone. However, the RCA researchers identified a lack of coordination between the Schools Council's projects which was frustrating to ordinary teachers as was the lack of effective support continuing after the research programmes ended. Project Technology (as a consequence of the Trent move) came out better in this respect.

Robert Clement, Adviser for Devon and Secretary of the Association of Art Advisers was one who disagreed with the Royal College that design is a subject like other areas in the curriculum: a defined area of knowledge and

experience Clement observed that, whilst a respectable body of theory relating to design had been built up as an abstract or problem-solving activity, 'that theory, being based on modes of activity external to the school, bears little relationship to the philosophies which contribute to design'.[67] This, and other points of fundamental concern were taken up by Anita Cross from the Design Discipline of the Open University, who subjected the Royal College's research to rigorous criticisms.[68] She asserted that:

> If Design then, is to be considered as basic to general education, it must be amenable to the usual meanings of basic or general education, i.e. an education which is, *in principle,* non-technical and non-vocational. It can only achieve parity with other disciplines therefore, by:
> (a) being organised as an area of study not unlike the Science and Humanities
> (b) providing instruction in concepts and methods of enquiry appropriate to life-long learning, and
> (c) attempting to foster an understanding and appreication of the contributions that design activities and specialisms make to the individual's life and the lives of others.[69]

In Education, interaction between three differing levels of activity is important for development and progress in a particular field. These levels of activity are conducted by:—

1. Scholars and researchers who develop ideas and provide the basic research.
2. Educationists who absorb, translate and suggest ways of utilising the basic research.
3. Teachers who apply and test methods and findings and provide feedback for further research.[70]

Anita Cross demonstrated that in comparison with what was available for mathematics and English teachers, there was virtually no carefully structured reference material written for teachers of design. Though confined herself only on design education, her observations apply to all aspects of CDT teaching. 'Research' in CDT has overwhelmingly consisted of descriptive projects, their educational validity unquestioned and the structured learning stage involved almost totally ignored. The hard-pressed teacher may not find this a problem: when you have twenty pupils queueing up at the door, you want a range of projects that embody the new philosophy, not philosophy itself. It is their mentors who are ill-served.

Nigel Cross, also of the Open University, stressed this need for fundamental research in his paper 'Designer Ways of Knowing',[71] which sought to justify design's position as the 'third culture'. Though granting that '. . . there is still a long way to go before we can begin to have much sense of having achieved a real understanding of design as a discipline — we have only begun to make rough maps of the territory', he identified five distinct aspects of 'designerly' ways of knowing.

1. Designers tackle 'ill-defined' problems.
2. Their mode of problem-solving is 'solution-focussed'.
3. Their mode of thinking is 'constructive'.
4. They use 'codes' that translate abstract requirements into concrete objects.
5. They use these codes to both 'read' and 'write' in object languages.

From these ways of knowing, Cross drew three main areas of justification for design in general education:

1. Design develops innate abilities in solving real work ill defined problems.
2. Design sustains cognitive development in the Piagetian sense in the concrete/iconic modes of cognition.
3. Design offers opportunities for development of a wide range of abilities in non-verbal thought and communication.[72]

Schools swept aside this and other theoretical considerations as the momentum for design education gathered pace.

Design Council support

Three reports from the Design Council supported the movement for design education. *Engineering Design Education* (1976) and *Industrial Design Education* (1977) were concerned with post-school professional design education, while *Design Education at Secondary Level,* claimed that 'design should be an essential part of the education of all children at all stages of secondary education up to the age of 16'.[73] Ideally this third report preferred the establishment of new departments 'dedicated specifically to the ideals of design education', but accepted as an alternative 'to enlarge the design area through subjects such as art, home economics and CDT'. Professor David Keith-Lucas's working party concluded by making wide-ranging recommendations, suggesting that their implementation:

> A national body should be set up to bring together the many interests in design education and its application to life and work; and to coordinate the work that will be necessary for the effective furtherance of design education. The Design Council is probably the most appropriate organisation to provide the machinery for setting up and servicing this national body.[74]

That was in 1980. Things looked promising and by April 1982 the design promotion lobbyists had a seminar on design at 10 Downing Street. *The Designer* (the journal of the society of Industrial Artists and Designers) commented

> the occasion . . . will mark a turning point in the modern history of design in this country. We have devoted the whole of it *The Designer* to a discussion of the important initiative taken by Mrs Thatcher in identifying design as one of the crucial areas of development in the regeneration of our industrial life, and instigating an enquiry into the steps that need to be taken.[75]

Mrs Thatcher's interest in design, nurtured by Lord Reilly, former chairman of the Design Council was again evident in two BBC programmes in June, 1985, where she described herself a 'design addict'. Further programmes featuring design have followed.

Influences both inside and outside the schools kept design education schemes in middle and secondary schools expanding throughout the seventies. Design faculties became the flavor of the decade; often, alas, a bland menu of

woodwork, metalwork, art and home economics. Design educationists like John Hanrahan tried to show what the haute cuisine end of the marke could do with the same ingredients.[76] The recipe was capable of being adapted, depending whether the background of the chef from a CDT background — most common — or from art or even home economics. The last two offered a few opportunities for the promotion of women. No examples were found of science departments being integrated within a design faculty structure with a scientist as a head of faculty.

Tensions within design education

The wisdom began to be questionned of lumping subjects and departments together without appropriate bonds of understanding. From within CDT Francis Zanker bewailed the absence of a specific body of knowledge that could be identified with design education.[77] He rejected the idea that design education had a 'self proclaimed right' to subsume all matters of an environmental nature. From outside CDT circles, Colin Tipping of Middlesex Polytechnic attacked everything and everybody that moved, especially if they had college or education blood in their veins.[78] His scepticism that design education objectives stood little chance of being fulfilled with the existing composition of the teaching force was well founded. But his radical remedies however desirable would have left design education in even worse disarray. Phil Roberts of the Design Education Unit at the Royal College of Art, in a critique of the Design Council's *Design Education at Secondary Level* criticised the relationship between CDT and its partners in design education, disputing CDT's assumption to the senior position, which the Keith-Lucas report appeared to support.[79] The bias detected by Roberts was unsurprising in view of the number of CDT experts on the committee. Roberts concluded that the identification of design with CDT had to be regarded as tendentious. Robert Clement concurred with efforts being made to bring different disciplines together but emphasized that the newly-formed departments lacked the homogeneity of traditional subject groupings as in the humanities, the sciences and languages:

> There has perhaps been too much emphasis with the Design Education movement . . . upon the establishment of a design rationale or process to which constituent subjects should *conform,* rather than seek for ways to rationalise and balance the different contexts within which the teaching of craft may take place.[80]

All this internecine fighting exasperated Ken Baynes, one of the founding fathers of design education. He lamented

> I want to look towards social and cultural aspects of design education and away from the debate about the content of the curriculum. I am disenchanted with it. It seems to me that it has rapidly become sterile. The irony is that an enterprise originally undertaken to bring together a variety of subjects has only resulted in even greater fragmentation. Like it or not, justified or not, the label 'design education' has become strongly identified with a particular way of grouping school subjects and the reform of content in teaching of woodwork and metalwork. Beyond that, progress is hopelessly embroiled in considerations of professional pride and the defence of established subject boundaries. The birth of a 'third area in the curriculum' looks in danger of being aborted because the midwives have resorted to punching one another on the nose.[81]

It is ironic that the publication of *Design Education at Secondary Level,* instead of launching a concerted drive for the wider dissemination of design education in the nation's schools, marked it high water mark. Professor Bruce Archer, who works so tirelessly at the Royal College of Art, for the 'third area' of the curriculum, was forced into early retirement and his Design Research Department lost its individual identity. It is too early to write an obituary for design education. However, John Pilkington, who recently did a one year retraining course in CDT teaching, spoke for many of his colleagues in a sad epitaph in the *TES:*

> 'Coming from Goldsmiths' which could be said to be the original home of the design-based approach, I had not realised that an alternative approach even existed. The most damning sentence I heard was from an ex-Goldsmiths' graduate who said: "come from Goldsmiths' do you? Well, that approach went out 15 years ago" '.

Can the contributions of Goldsmiths' to CDT teaching in the 60s and 70s be so dismissed. Regrettably there are indications that design education's hey-day, if not past, is on the wane.

Educational links between design and craftmanship

This is not the place to assess the achievements and weaknesses of design education overall but its influence on CDT has been considerable. Within the subject many were never more than luke-warm supporters of a well-rounded design education approach and opposed the CDT circus. Not for them the desperate effort to encapsulate all the world's problems — be they environmental, conservational or pratical — at the expense of what most regarded as the kernel of their teaching: the end product. These CDT teachers appeared to be wedded to the idea of making, a rite performed in the workshops that surpassed all other activities. Design for them was quite specific: product design.

This presented difficulties. According to David Pye those with a craft training had the impression — he regarded it as an 'illusion' that 'every craftsman is a born designer'[83] Professor Pye believed that whilst 'there are no born designers', it was possible to acquire the attributes of a designer slowly by much practice. Without wishing to argue for or against Pye's precept, it was one that many CDT teachers shared. Most are pragmatists at heart and aware of their strengths and limitations: craftsmanship on the credit side, design on the debit. They could see that when it came to designing — often equated with the presentation of ideas on paper — they often trailed behind their art colleagues. When it came to skill, that was different. Unfortunately, however, there were subversives in their own ranks. Because it was difficult to evaluate precisely the educational values

stimulated and sustained by practical work — judgements being so subjective — critics tended to deny whatever could not be proved Craftwork was disparaged as 'mere skill learning', consequently even those values inherent in 'mere skill' became discounted. This never happens to musicians. To raise this issue today is to risk being accused of educational ludditism. Too much was at stake to dispose of valued making activities for educationally seductive but unproven alternatives; essentially the view taken by HM Inspectorate in *Craft Design and Technology in Schools.*[84] Their examples of good design practice were restricted to linking designing with the making of an artefact, albeit by a variety of ways and means.

In the rush to devalue craftmanship, the opportunity to capitalize on the educational advantages (previously recognised) of physically making something, were deliberately overlooked. A clearer distinction should have been made in school design between 'real' and 'abstract' design; the former suggests direct contact with things that could be made and the latter with the idea of things only. As Avigdor Cannon, the scourge of woolly CDT thinkers used to tell his students:

> Since design implies a projected change of some sort, it would be seen wise for the pupil to deal with change in circumstances and situations of which he can claim knowledge. All those changes in form, structure, articulation etc., which comprise a proposed design are made in response to the various controls of function, materials behaviour, fashioning appearance etc. Without an understanding of these factors, the rationality of design is lost and it becomes a series of happy accidents. Is it worthwhile, for instance, to set pupils to work on a motorway flyover, even with the preliminary study of traffic statistics? The knowledge of concrete structures, road form and so on are not likely to be available and the design produced under these conditions is therefore more akin to sculpture than to function. This may be an extreme case but it does go some way to point the weakness of abstract design.

Designing should be seen as a heuristic activity. It calls for a variety of skills — motor skills, communication skills, evaluation skills among them. At a fundamental level it has to do with thought and feeling. It involves both linear (logical) and lateral (creative) thinking. Design education has assisted CDT in making these more explicit. The nineteenth century women pioneers would sympathise with design educationists who feel they have been stripped of their ideas by the CDT lobby, and deserted. Latterly official encouragement has helped CDT to acquire educational respectability. This could prove superficial and short-lived. As Anita and Nigel Cross warned, the educational underpinning for establishing design the (same could be said for CDT) as a third area of the curriculum, on the same footing as other subjects, has barely begun.

The drive towards technology

Despite the excellence of much of Project Technology's teaching material for CDT, many claim that it was in only a tiny minority of schools. Yet, of CDTs three components, technology has the appropriate depth of subject knowledge potentially to wrench CDT from its nineteenth century origins and make it meaningful study for today's pupils, especially the academically more able. Its chances are not helped by the tensions between the scientists and some CDT factions.

Within CDT, there were identifiable growth points for technology teaching. The staff of the National Centre for School Technology at Trent Polytechnic, first under Professor Geoffrey Harrison and latterly, Geoffrey Shillitoe, struggled to get their message across to a wider cross-section of schools. In Bedfordshire, Ron Denny's technology bus brought technology to under-funded and under-staffed schools which individually could not afford it. Dr Ray Page and John Peele, at the Avon Science and Technology Centre, developed with west country teachers a modular course in Technology then taken up by the School Technology Forum's Working Party on Curriculum and Examinations.[85] Following advice from the Schools Council's CAST Committee, the initiative was extended to incorporate Hertfordshire and West London authorities where teachers were pursuing similar curriculum objectives.

Elsewhere other enterprising developments could be cited but, overall, progress was quiet rather than spectacular. During the years 1975-78 HM Inspectors surveyed a record 384 secondary schools in England, and found that workshop activities though listed in the index under CDT, were generally referred to throughout the text as 'craft' or more occasionally, as simply woodwork and metalwork.[86] The inspectors observed that most craft departments worked in isolation. A mere seven per cent of schools with GCE candidates made any effort to establish links between mathematics and CDT — an essential prerequisite, one would have thought, for the development of technology teaching.[87] And only three per cent of science departments made substantial use of Project Technology material. Eighty-six per cent regarded it as of 'little or no use'.[88] Craft continued to be identified with the less able pupil, academic high-flyers dropping it after the first two or three years.

At the same time as this HM survey, the department published *Curriculum 11-16.*[89] Intended to stimulate professional discussion, in CDT circles it was greeted with mute, deferential respect — the new commandment, complete with explanatory text, received unquestioning obedience. The separation of technology from CDT passed almost unchallenged. The SCSST welcomed the report, obviously regarding technology as within its own province. Similarly the Art Inspectors' submission which incidentally sandwiched CDT between art and technology delineated areas of overlap, devoting one section to the relationship between art and 'making' and 'inventing' activities. Design, in the design education sense, did not feature anywhere. Design in any capacity hardly fared better. It appeared CDT had apparently been subsumed within the 'aesthetic and creative' areas of experience if one is to judge from the advice on constructing a common curriculum. Bob Doe in *The Times Educational Supplement* criticised the document as 'Vague, inconsistent, platitudious . . . of little help'.[91] At least his article contained some comfort for CDT in the photograph of a youngster

with the steam engine he had conceived and made from scratch. The boy's teacher saw this as epitomising 'the sort of confidence boosting work that can be achieved in years four and five if there is no rigid insistence on a common core'.

Not surprisingly, when the DES published *A Framework for the School Curriculum* CDT failed to make the big time. It was not included in the proposed core curriculum, which consisted of English, mathematics, science, a foreign language, religious and physical education. However, in connection with preparation for adult and working life, the inspectors embraced everyone in the field:

> Schools contribute to the preparation of young people for all aspects of adult life. This requires many additions to the core subjects in areas such as craft, design and technology; the arts, including music and drama, history and geography . . . moral education, health education . . .[92]

The reasons for CDT's exclusion from the core curriculum are not difficult to discover. Comprehensive schools, though vastly better equipped than those they replaced, usually continued to sustain within their structures the same stratifications of ability ranges. CDT foundation courses behind them, curriculum pressures deterred academically able children from continuing with practical subjects. The currency value of CDT examinations remained low. Within the inner sanctums of CDT, more time and energy was devoted more to the impact of metrication, the implications of the Health and Safety at Work Act and the chronic teacher shortage than to curriculum development issues. Above all the majority of CDT teachers had neither the enthusiasm nor the expertise to teach technology, thus effectively limiting its development.

Reinforcement of education — CDT links

All this was to change in the aftermath of Prime Minister James Callaghan's 1976 Ruskin College speech. Was this the first step of an increasingly interventionalist and centralist DES or the gut reaction of a socialist prime minister that schools were failing children and the nation. Upon resigning from Parliament he declared the turn-around in our education system to be one of his proudest achievements.

CDT was at centre stage in the 1976 'Green Paper' which recommended that:

> More attention should be given in initial teacher training to the national importance of industry and commerce, to helping them (the prospective teachers) in their responsibility for conveying this to their pupils.[93]

Sir James Hamilton, DES Permanent Secretary stressed the necessity of closer education-industry links in his speeches. Addressing the SCSST in April 1979, he professed still to favour the idea of a protected core curriculum but it did not include CDT. Sir James was speaking about the relationship between manpower planning and education.[94] He agreed that forecasting had 'not been good' in the past, but said that the atmosphere 'is now better than it has ever been for moving ahead on this front'. Dr A.J. Pope, then Vice Chancellor of Aston University in a talk to the School Technology Forum,[95] said he was amazed that more youngsters were not queueing up to study engineering, seeing that 'the whole of the toy industry is biased towards engineering and technology'. The question, according to Dr Pope was not 'how do we turn on more able young people to science and technology?' but rather 'what is there in the educational system that turns them off?'

When Sir James returned to address the Standing Conference on 'Perspectives and Priorities'[96] Margaret Thatcher had become Prime Minister. Education-industry links continued to be given high priority, reinforced in HMSO publications. Speaking of *The School Curriculum,* Sir James was critical of the 'tortuous discussions' that preceded attempts to reform the curriculum, but which it seemed impossible to circumvent.

Though he was encouraged to hear that:

> from all the evidence, the business of links between schools and industry is booming and will continue to boom',

Sir James expressed a 'very personal view' that he did not believe

> that we have in the school curriculum moved as far and as fast as we could towards what I might call a pre-vocational approach to the educational of 14-16 year olds. Now let me make it clear that when I talk about pre-vocational education I am now asking for a system that produces ready-made fitters or welders at 16. That way lies disillusionment of a very high order. Nor am I talking about the process of putting those people who have been turned off by conventional approaches to education, on to tinkering with aged motor cars just to keep them out of mischief. What I have in mind is an approach that, without yielding an inch on rigour, recognizes the need for some young people to learn from doing, through practice, through action, rather than by more the conventional academic canons which had dominated school education for so long.[97]

The dust-gathering Crowther Report had not been entirely forgotten.

Sir Alex Smith, then Director of Manchester Polytechnic, did not mince his words at the 1980 Stanley Lecture at the Royal Society of Arts:

> We are at a crisis now in our history. I call it a crisis, but even that is too bland a word to describe our condition. A crisis has about it the nature of an emergency which can be corrected by emergency measures. What we are experiencing is properly called a climacteric, a prolonged period of steady decline which needs much more profound measures to correct it. It is a less common word, however, and so I will continue to call our predicament a crisis. The crisis is one of our capacity, our ability to earn a living amongst the community of nations.[98]

On another occasion, Sir Alex criticised the Finniston Report for not affecting change in the school curriculum, recommending that:

> Every child in every school, every year, should be required to design something and make it . . . Education through designing and making is a basic need, even if our industries were blazingly successful, which they are manifestly not.[99]

Mrs Thatcher became an effective proselytizer for design. She presented the prizes to the winners of the Design Council's annual Schools Design Compeition, so drawing the attention of the national media. The annual design competition cannot, however, be seen as a reliable measure of the health of design activities in the nation's schools. At the time entries ranged between 200-300. Fewer still entered for the Young Engineer for Britain competition — from over 5000 schools. Latterly the number of entries for the design competition has risen, especially from art departments.

Newspapers — popular and quality now regularly carried articles on education — industry links. *The Times,* for example, reported the visit of sixteen senior industrialists to King Edward VI Comprehensive School in Northumberland,[100] and their view that children should 'have a broad education and be able to analyse problems and express themselves'.

Under the aegis of the SCSST Sir Denis Rooke, Chairman of British Gas, gave a lecture on the topic of 'Education and national economic effectiveness',[101] in which he challenged how effectively education could respond to industry's needs:

> Education is certainly changing now in response to external pressures, but will it ever be able to change fast enough to reflect the vocational needs of each cohort of future students? Would attempts at early specialization be any more successful in matching the output of our schools and universities with needs in the future than it has been in the past? I believe that the answer to these questions is 'Emphatically No!' And yet clearly we have to improve the system.

Certain solutions he considered well intentioned but somewhat simplistic. He singled out TVEI

> The controversial Technical and Vocational Initiative is a brave experiment introducing a vocational element into education at an early age as low as 14. It is intended that this should improve 'relevant and transferable skills'; and be about helping students 'learn to learn!' But at this age who makes the selection? While endorsing what I understand to be many of the principles involved, yet I would urge caution. Can we be sure that youngsters specialising in a technical and vocational course are those who might ultimately be the most suitable for craft, or technical training? More importantly, will it provide a source of future innovators, as distinct from technicians? While the first industrial revolution was led by men of practical skill, the foundation of knowledge and experience required for innovation today is now both considerably higher and broader.

Vocational initiatives

Few in the CDT fraternity have any such reservations, yet it is not impossible that this road could take the subject right back to where it started a century ago. The purpose behind TVEI is essentially to provide industry with skilled workers, as they understand 'skills'. White coats may have replaced the dungarees of the nineteenth century, but the destination is the same and again the edges between education and training are being blurred. Lord Young in the *Times* dismissed the division between the two as 'sterile', arguing that he trained as an accountant, as do some architects, surgeons and so forth.[102] But to equate the training of professional people in their twenties with youngsters in their formative years is hardly to compare like with like. Moreover, as John Mann, former chairman of the Schools Council pointed out in the Joseph Payne Memorial lecture:

> Vocationalism may be an appropriate response to an immediate crisis but as Donald Schon observed, 'A man who defines himself as a chemical engineer, a shoemaker or a specialist in internal medicines, runs in increasing risk of building his identity on an unstable base'.[103]

As already seen, most CDT teachers until recently believed firmly in teaching their subject for educational and not vocational reasons. It is time to reopen these old Victorian files and refresh memories. Headmasters who valued manual instruction at the time still believed their charges to be better served by continuing with a broad general education that would enhance not limit eventual career choices.

Secretarial courses for girls are the best example of vocational training at secondary level. A high percentage of their teachers had commercial experience incidentally. Taught correctly, secretarial subjects can have much educational as well as vocational validity, yet how many academically able girls were encouraged to pursue these courses, courses which led to an employment stratification from which few escaped? Wage rates may have been relatively high and working conditions pleasant but too many able women ended up employed in propping up male bosses. The pattern of secretarial wage levels has implications for the wider introduction of vocational training within CDT. When the word processors came in, women with word processing skills at first commanded high rates. As the supply increased, rates fell. There has always been an element of vocational preparation with the CDT and the popular image of workshops subjects always has hazy associations with industrial employment. Craft teachers, especially those with industrial experience often ran courses geared to employment in local industry, helped by the Associated Examining Board's Engineering Workshop Theory and Practice examination. Similarly, booming City and Guilds foundation courses gave some indication of the size of the market that could be tapped.[104] The vocational nature of these courses most attracted pupils: disenchanted youngsters were regularly reported to be working with 'enthusiasm' and 'motivation'. Despite this, these examinations were cold-shouldered by the CDT establishment, whose own efforts to reform practical subject examinations took an entirely different route. It was feared that early specialization might restrict general education opportunities. Some teachers were reported to be 'angry' at the City and Guilds Institute for acting opportunistically and so threaten the success of some of the more broadly based GCE and CSE examinations. The Institute replied that new vocational courses were developed solely in response to demands from schools and colleges.

The Engineering Industry Training Board — a cautionary tale

The pitfalls of gearing school courses too closely to the needs of industry are encapsulated in CDT's dealing with the Engineering Industry Training Board's proposals to reform apprentice training. Its research document *School Learning and training* was enthusiastically received in CDT circles. The Boards' findings revealed

> . . . trainees who had taken craft subjects at school tended to perform better in training than those who had not, even though at the start of training the people who had taken craft subjects did no better in the test of intelligence, arithmetic, spatial ability and planning skill. This finding accords with the general opinion of instructors, who mostly prefer craft trainees who have some experience of craft subjects. The finding that technicians who had taken craft subjects tended to get a better assessment in their training than those who had not was less to be expected. It does, however, highlight the importance of experience of practical subjects for all school pupils, not just those regarded as academically 'less able'. It can indeed be argued that practical work should be part of any balanced curriculum[106]

Subject specialists preened themselves upon learning that apprentices with a craft background out-performed those who had taken science in respect of 'planning skills'. Ironically no one commented that aprentices in the sample would generally have taken traditional metalwork examinations — precisely the type the CDT hierarchy was busily trying to demolish! However, the love affair between CDT and the Engineering Board grew stronger.

Bench and machine skills, the Board proposed, should be taught in the schools, not by industry.[106] Its proposals were hailed as an historic contribution to craft education. The Minister of Education, Shirley Williams, greeted them with enthusiasm, but she and the Board had miscalculated and the CDT establishment even more so. Traditional craft teachers remained the only loyal suitors. The relationship faltered and was replaced by a modular system. Trainees who had completed an appropriate technical/practical option at school were to be given special dispensation that would speed their basic training course.[107]

Hardly had the print dried on the Engineering Board's modular course than apprentice recruitment fell to crisis levels as manufacturjng output collapsed. One can imagine what would have happened to the 'enthusiasm' and 'motivation' of youngsters in the fourth and fifth forms had school courses been more closely tied in with industry. In 1984 — only three years after the introduction of the modular course — the Engineering Training Board decided to change the whole basis of its training courses to meet the new technological skills demanded by engineering and electronic firms. Where it would have left schools that had geared themselves to meet Board requirements? This is probably not an isolated episode in education-industrial cooperation. As the pace of technology quickens how can schools — desperately short of staff and resources — continually adjust to the changing demands of industry?

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