

# Developments in Teacher Education for Design and Technology: An Integrated Approach

George Shield

School of Education, Sunderland Polytechnic

In an article published in this journal in 1987<sup>1</sup> the value of the Two Year B.Ed. for educating potential CDT teachers was discussed. The discussion ranged across the limitations imposed by the shortened time span together with the problems of the disparate backgrounds of the students. It also appraised the value of the maturity of outlook they bring to their studies.

The course under discussion was one of the first in the country to be validated by the CNAA and has now been revalidated after its first three cohorts have graduated. This course however is only one part of the expansion of provision for Design and Technology education which is taking place within the Polytechnic.

This article looks at the way Sunderland Polytechnic has responded to the shortage of CDT specialists through the development of an integrated approach to both initial (see figure 1) and in-service training and what this has meant in terms of accommodation and resource provision generally.

Whilst it is well known that nationally the supply of CDT teachers over the last ten to fifteen years, has not met demand, the provision of specialists in the north east has been particularly poor. This institution up to 1984 was providing some five to ten teachers per year through its One Year Certificate course divided between those who saw their careers in Physics and those in CDT. As can be imagined this output even when combined with that of other institutions in the area could not meet the demand made by regional LEAs.

Seventeen students were recruited for the Design and Technology option of the Two Year B.Ed. in its first year of 1984 and this number has now risen to a total of seventy two, spread over the two years.

The quality of the students continues to impress, not only in terms of initial academic qualifications and experience but also in enthusiasm. The ability to recruit students of this quality may, in part, be due to the lack of industrial career opportunities in the north east but it is also refreshing to find how many have given up responsible well paid jobs to enter what they perceive to be a more fulfilling career.

The north east is well known for the low number of 16-18 year old students who stay at school. Some of the students who leave school early are, without doubt, capable of benefiting from further study and these routes into teaching offer such an opportunity. (It is, of course too early to see the implications of recent training initiatives.)

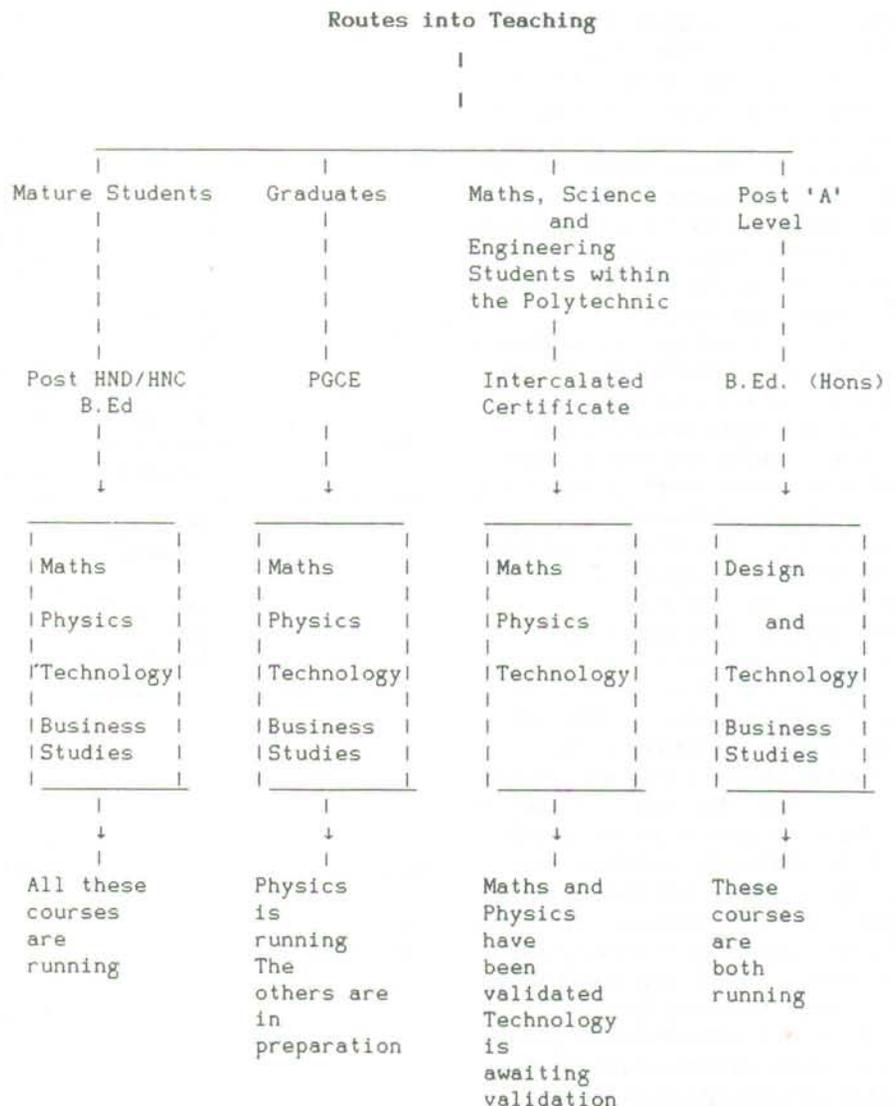
This course is one option in a two year B.Ed. programme which originally prepared students to teach either Technology or Business Studies, it now also caters for students who wish to specialise in Maths or Physics. Other routes into secondary teaching have also been initiated. Figure 1 shows the range of courses which are either operational or are in various stages of development.

## Routes into Teaching

Within the area of Design and Technology, together with the two year B.Ed. mentioned earlier CNAA has just validated a four year B.Ed. (Hons), and under development is a teaching certificate intercalated with the B.Eng., and possibly, in the future a PGCE.

What we feel is unique about our programme is how the students from different disciplines, with a range of entry qualifications and levels of maturity are integrated, to the advantage of the student and the institution.

The sort of integration which takes place includes for example, maths, physics, business studies and design and technology students working together in their generic teaching studies



programme. The maths and physics students share some common 'subject' teaching. The physics PGCE students are taught at times with the physics students from the 2 year B.Ed.

As well as this integration within the School of Education common teaching takes place with other faculties and schools within the Polytechnic. The B.Ed. Business Studies students are taught for part of the time with the B.A. Business Studies students, and other students on teaching courses are taught alongside students on B.Sc. Science and Maths degrees.

The intercalated certificate and the four year B.Ed. degree courses are also designed to be part of this programme. By careful selection of available modules from the B.Ed. programme the third year of the intercalated certificate (which is largely 'generic') will in the main, be taught alongside the two year B.Ed. and the four year B.Ed.

The intercalated certificate route has already proved successful in educating maths and physics teachers through a course which ran concurrently with the B.Sc. degree, the extension of this approach to include B.Eng. students and specialists in Design and Technology is well under way. Figure 2 gives the structure of this course.

The main advantage of this approach over the more traditional PGCE is that students devote a small amount of time during their first and second years to education studies thus allowing them time to assimilate the preparatory work, before the more concentrated requirements of the third year full time course which is devoted to teaching skills and their theoretical underpinning. The fourth year is designed to synthesise major elements of the B.Eng and Teachers Certificate particularly in the management and implementation of project work.

School experience takes place during their first year when they are introduced to the organisation and philosophy of schools, during the second year when students will work with small groups of pupils, and again during their third year, for two block practices, with provision for research work in their fourth year.

As can be seen from figure 2 the structure of the third year is designed to extend the professional expertise of the student by relating generic studies to

specialist subject teaching studies in four key areas. These key components are also common to most initial teaching courses in the school of education and common teaching can take place in some areas.

Students will not be committed to the intercalated certificate until the end of their second year. They will have enjoyed an extended 'taster course' which does

not prejudice their subject option or preclude other career choices.

### Structure of the Intercalated Certificate Course

It has always been recognised that this intercalated course will not provide a large intake of entrants to the profession but a route dedicated to the student who wants to teach from the outset was

Structure of the Intercalated Certificate Course

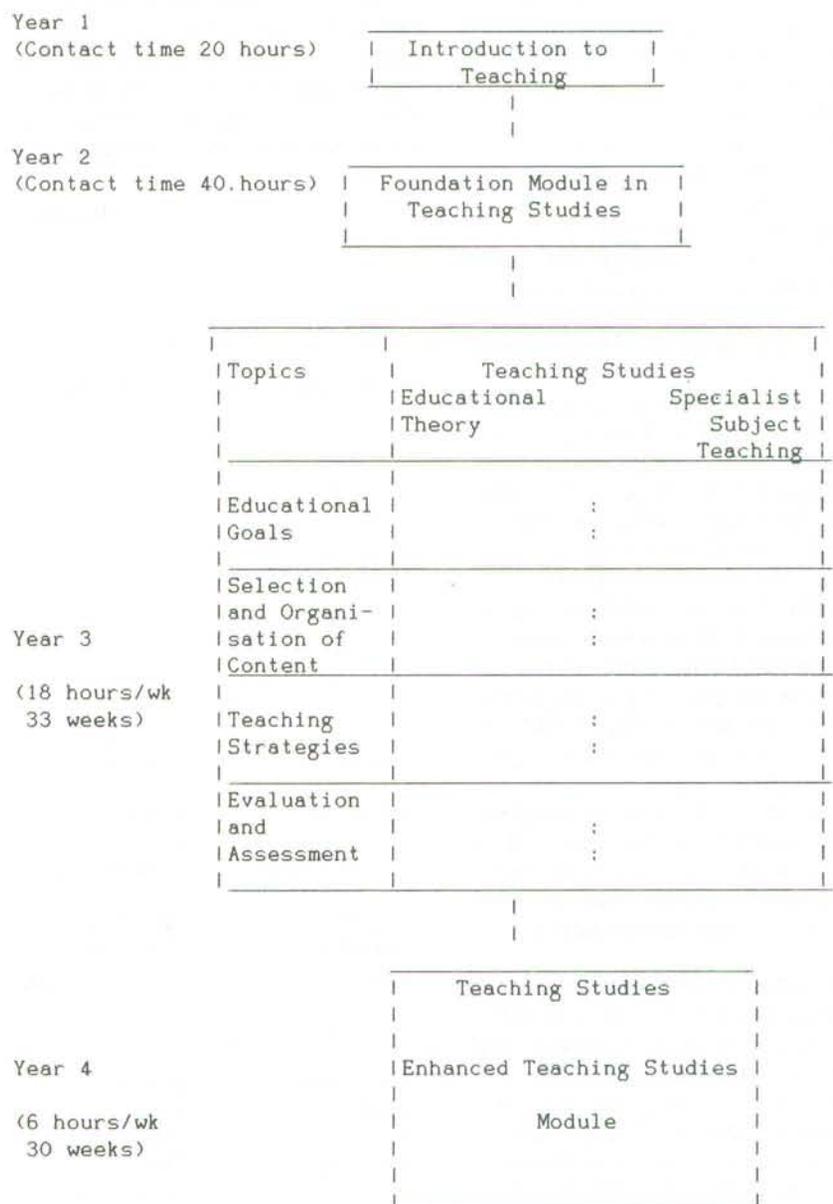


Figure 2.

thought to be desirable. Consequently the development of a four year B.Ed (Hons) course was seen to be a priority.

A major consideration born in mind when the need for a further course was recognised was the requirements of the regional LEAs. Schools were finding it difficult to recruit women teachers of CDT and also the teachers were older than other new entrants. This was not surprising as our entry qualifications were industrially orientated, and also, by definition the students were 'mature' with the average age being thirty three. We felt that a course aimed at recruiting younger students would be highly desirable. Our four year route which has now been validated will attempt to redress this distortion.

The normal 'A' level route to teaching has not supplied sufficient teachers for design and technology in the past, so with demographic trends indicating an increasing shortfall of eighteen year olds, it was decided that alternative sources of supply must be tapped.

As well as the traditional 'A' level student, other applicants, such as those with vocational qualifications, e.g. B.TEC, which are not high enough for shortened courses will be actively sought. The Polytechnic also recruits from well established access routes to a full range of courses. We have contacts with eleven F.E. colleges, and we aim to encourage specific design and technology inputs to these pre-degree programmes.

This proliferation of courses could be seen to be uneconomical, leading to small groups of students with adverse resource implications.

The integration, mentioned earlier, helps to overcome this problem. We are rationalising provision through a modular system of course design. Teaching of common elements takes place, not only in design and technology courses but also with students in the other options.

Examples of modules which can be taught in common include:

'Technological concepts'

'Aims, objectives and course design. Selection of content'

'Aims and Objectives in Design and Technology'

'Refining planning skills. Motivating

pupils. Pupils thinking. Language and learning'

'Assessing the pupil and evaluating courses'

The dangers of modularisation are well known. There are problems of fragmentation of 'knowledge', problems of assessment, (can a student following an 'ordinary' degree course be assessed alongside a student following an 'honours' course and those working for an 'intercalated certificate' with the same set assignment?) and problems of timetabling.

Most of these drawbacks can be overcome.

Modules must be written so that the links are made explicit. It obviously requires a degree of collaboration within the course team but perhaps more importantly the course team itself must have considerable understanding of the philosophy of the subject as a whole and particularly within the secondary school. For example the 'technology' element must be perceived within the needs of the broader programme of CDT activities. An abstract consideration of the laws of physics will not be sufficient to equip students to teach technology. And likewise 'crafts' and 'graphics' must also be placed in context.

Problems of assessment can be overcome through the strict applications of the relevant assessment criteria. Considerable advances have been made in recent years in criterion referencing, particularly in school work, and these techniques are capable of handling most of the problems which arise.

Because students have some common lectures it doesn't mean that their assignments have to be common. Honours degree courses demand a greater degree of analysis and synthesis on the part of their students and these requirements should be built in to the assessment programme.

The most important safeguard to ensure coherence must however be some form of structured integratory module or component which can synthesise the experiences of the students in terms of progression within the academic programme and also the subject content itself.

The advantages to be gained in teaching post school students alongside

mature students, and business studies with maths and design and technology students are substantial. An industrial view of education is an eye opener to some students straight from school. And the freshness of the younger students have been known to inspire some of the old hands. Some of the more mature students have doubts about their ability in coping with academic life after time away from study. Mixing with the younger students helps to develop their confidence.

The practical approach to technology which is common in CDT is often appreciated by physics students who may, for the first time in their life, begin to understand industrial applications. The use of graphics as a form of communication is again frequently new to students of some disciplines.

The significant advances being made in initial teacher training have been supplemented by the provision of opportunities for in-service work.

Our approach has been on two fronts. By rapidly establishing long part-time courses we have provided in-depth work for those teachers who not only want to update their subject knowledge and skills but also have a desire to enhance their qualifications. We have also responded to the more immediate needs of teachers and LEAs by providing short courses aimed at enhancing subject expertise.

The Diploma in Professional Studies in Education: Design Education is of two years duration and offers the opportunity to teachers who are interested in the wider issues of our work, to explore them in some depth. The development in some parts of the region of faculty systems of school organisation has made this course particularly appealing to teachers who have been trained in the more content-dominated or skills-based traditional disciplines. A very pleasing side product of this course has been the integration of teachers who work in subject areas which have been predominantly single sex orientated. This may be one way to break down the gender barriers still existing in much of our work.

The possession of a diploma will qualify the holder for entrance to Masters courses, either M.Ed. or M.Phil., providing the diploma has the other required qualifications. Another

alternative is to take the third year of the B.Ed. (Hons) in-service course if the diploma prefers this first degree.

Our second major part time course is the in-service of B.Ed. (Hons). Within a year an applied education module based on CDT was written and validated by CNAA. This course appeals particularly to those teachers who, through the lack of opportunity during their initial training have found their career options blocked through lack of paper qualifications.

The CDT content of this course is only 50% and consequently whilst teachers are enhancing their background within the subject area they are also following the wider educational issues. This approach, it is hoped will, provide our graduates with the expertise necessary to improve their work in schools and will help their promotion prospects outside their immediate specialism. The course takes three years to complete with the third year consisting mainly of tutor supported independent study.

With the full co-operation of the LEA, this course has also been 'outposted' to a teachers' centre some thirty miles away. It is staffed by Polytechnic lecturers who travel weekly and it is based in a school and the teachers' centre.

This course is now in a transitional phase as the CNAA have recently validated a new B.Ed. (Hons) degree which allows our students to work for a certificate, diploma and finally an honours degree in a form of credit accumulation, normally spread over the equivalent of three years. This also allows us to give credit for past performance in this and other institutions providing the qualifications gained satisfy the relevant criteria.

These long-term courses are not of value to all teachers. Some teachers may feel that they don't want to devote the time such a commitment demands, others find that it is only in certain areas that they need updating. Some of the more modern technologies are particular examples of this need.

Under the new funding arrangements for in-service training much of this type of work has been commissioned by LEA advisers and we are finding an increasing and varied demand being made on our services. An example of

this approach is a package which we have devised to meet the needs of one LEA. We provide an input of seven days full-time, and three long weekends. This is followed by twelve half-day seminars or school-based tutorials. This type of arrangement ensures the greatest benefit for course participants through contact with college staff and their own peers over a long period of time and it also fits in with the requirements of the teacher's schools.

This type of course can now contribute to the new B.Ed. (Hons) in-service degree.

#### **Resources**

A rapidly expanding programme of the nature outlined here has obvious resource implications.

After successfully piloting the new two year B.Ed. through the validation procedure the leader of the original one year course retired. This resulted in the immediate appointment of a CDT specialist and then the rapid recruitment of an additional five lecturers, all with very recent experience of school work. These staff now cover the full range of competencies with a conscious school-based bias.

By drawing on the staffing resources of the Polytechnic as a whole we are in the very favourable position of being able to offer a good range of high level subject expertise as well as that related to our professional concern. It is a firm belief of the course team that the vast majority of our work is directed towards work in schools, work which has a direct relevance to practising teachers.

The work of the core group is supported by a team of three technicians as well as A.V. and other support staff when required.

The development of the physical resources has been equally rapid. In September 1984 the subject base consisted of one room which was equipped, in the main, for design and drawing work with limited facilities for technology. April 1986 saw the opening of a new workshop, housed in portable buildings, to supplement this base, and provided, for the first time facilities for three dimensional design work.

Portable buildings are not seen as ideal structures for workshops. They do however have advantages, in that they are quick to erect and provide space cost

effectively. Their other major attribute is that they are built on a modular system.

This latter virtue was exploited when a further development of facilities enabled us to move some modules and then wrap around the original workshop three additional workshop/studios as well as five staff studies, technicians rooms and a seminar room. These rooms are now fully equipped to afford the full range of facilities necessary for CDT work.

One of the new rooms is equipped as a drawing and design studio with equipment which will allow us to prepare our students for some of the GCSE work in Design and Communication such as air brush work and modelling.

The Technology workshop is also furnished to cater for the new work being asked of all CDT teachers. The room contains equipment for computing and micro-electronics as well as the other 'new' technologies such as pneumatics and the use of CAD/CAM equipment.

Together with these two specialist rooms there are also two well equipped multi-media workshops containing all the machinery required for handling the materials found in schools, as well as welding, casting of metals and the forming of plastics.

This development has involved considerable investment by the Polytechnic. An investment which has been particularly difficult in the very hard times facing education and reflects a commitment to our work which is appreciated in the region. As well as the finance found by the Polytechnic there has also been substantial funding from the MSC which has facilitated the extension of the workshops as well as helping with staffing.

#### **What of the future?**

Our major effort will be in the provision of an M.Ed. degree orientated towards teaching Design and Technology. Work is under way with the 'core' identified and other content and methodology being discussed.

Higher degrees are essential if we are to sustain both the interest in the subject area at an advanced level but also to develop the research base needed to

● *continued on page 109*