An analysis of a developing partnership between ITE and schools in the training of secondary D&T teachers

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Citation: RUTLAND, M., 1996. An analysis of a developing partnership between ITE and schools in the training of secondary D&T teachers. IDATER 1996 Conference, Loughborough: Loughborough University

Additional Information:

- This is a conference paper.

Metadata Record: https://dspace.lboro.ac.uk/2134/1492

Publisher: © Loughborough University

Please cite the published version.
Introduction

National Curriculum Technology was introduced as a foundation subject for all pupils aged 5-16 in England and Wales in The Education Reform Act (ERA) in 1988. Although the subject technology had not appeared previously on school timetables, it can be argued that it is not a new subject: rather it was a stage in a developmental process that had spanned a number of years. The document *The curriculum from 5-16* including technology as an area of experience and learning and a ‘particular form of problem solving concerned with bringing about change, of designing in order to effect control’. Black and Harrison thought technology was not mere academic study, it was concerned with ‘human capability for action’. It was always called upon when practical solutions to problems were needed.

The introduction of National Curriculum Technology was a landmark in that it formed a compulsory subject from the traditional practical subjects for all pupils aged 5-16, based on the *design process*. Baker, Secretary State for Education, stated that he wanted to prevent boys and girls opting out of technology ‘even those who are academically gifted will have to roll up their sleeves and learn some craft’. However, schools encountered problems implementing National Curriculum Technology and concerns were expressed regarding the quality of Design and Technology (D&T) activities. These related to breadth and depth of subject content, development of knowledge and skills, balance between designing and making activities, progression and manageability in the classroom.

In 1992, following a decision to rewrite the Technology Orders, there was a period of discussion, confusion and delay. It was not until 1995 that the Revised Orders for National Curriculum Design and Technology* were finally published with Information Technology, as a cross-curricular subject, having its own separate Orders. The Design and Technology Orders are now slimmer but generally they have been welcomed by schools and teachers. It would not be surprising to find teachers with
low morale and lacking enthusiasm. They have adapted and coped with a Technology curriculum that has changed around them, with schools now requiring teachers who can teach the New Orders for Design and Technology in a positive and constructive manner.

Initial Teacher Education (ITE)

Teachers of Technology trained before the introduction of the National Curriculum, as today, have a range of main and subsidiary subjects. In the Design and Technology Association (DATA) survey of the qualifications of D&T teachers in 1994\(^4\), of the qualifications judged to be appropriate for teaching in this curriculum areas, 27% were in technology (General Technology, Design and Technology, Craft Design and Technology, Art, Design and Technology) 36% in home economics, 16% in handicraft subjects and another 17% in art and design subjects. Originally, these were the subject areas listed as contributing to D&T in the National Curriculum\(^10,11\). However, in the latest Orders\(^8\) pupils are expected to develop their design and technology capability by working with a range of materials, including resistant materials, compliant materials and food and control systems. Therefore, it would seem wise to reconsider the suitability of qualifications for future teachers of D&T.

The education of teachers has been traditionally the role of HE and the requirements of Circular 9/92 (England) and 35/92 (Wales) (CATE, 1992)\(^12\) have added another dimension to the design, organisation and management of ITE courses. It is now required that schools shall play a much larger part, with students spending more time in schools during their courses. The accreditation of ITE courses\(^13\) includes the expectation that providers of ITE form partnerships to ensure a more effective school-base for training. It is required that experienced teachers from schools shall be involved in planning and evaluating courses, the selection of students and the supervision and assessment of students’ practical work, with teachers invited to make contributions, as appropriate, to lectures, seminars and other activities on the course.

Context of the Study

It was these developments which led to the introduction of the PGCE Secondary Technology course at RIL in September 1992. The original rationale arose from the introduction of the National Curriculum Technology, the need to train technology teachers and the move to school and competency based ITE. The required outcomes for the first year was a technology course developed and organised by a teacher, seconded from school for two and a half days, which developed a partnership between schools and HE. The course was based at RIL, used a school workshop, was taught by a college education tutor and a practising Technology teacher, with an HE lecturer and teacher covering school experience supervision.

In 1993 the seconded teacher returned to school and a teacher, with advisory teaching experience, was appointed as a full time senior lecturer to organise and tutor the course. In addition, a head of technology was recruited to tutor students for resistant materials workshop sessions based in a school. RIL provided a resource base, lecture and seminar rooms, IT facilities, textiles and food workshops, a science laboratory and graphics facilities.

In the Spring of 1995 it was decided to evaluate the developing PGCE course and identify future modifications. Changes had already taken place but essentially the requirement, of a course built on partnership with schools, planned and taught by HE staff and practising teachers, using HE and school facilities remained the same. The refined rationale for the course at RIL is:

The course intends to develop D&T teachers best able to meet the requirements of National Curriculum Design and Technology. By the end of the course each student should have the competency to use the knowledge, understanding and skills of their main specialism to teach at least Key Stage 4, including GCSE, GNVQ and A Level. During the course students will also gain the knowledge, understanding and skills
to teach at least *one other area of specialism at Key Stage 3*. The course and experience in schools will provide competency in a core of designing and making knowledge, understanding and skills and a broad overview and understanding of the specialist subject areas. The ability and knowledge of how to use IT effectively in D&T will be developed by all students.\(^\text{14}\)

### Methodology

Students on the course and teachers in schools involved in the partnership scheme contributed data for the research. Initially, an analysis was made of the initial subject specialist areas and backgrounds of the members of each student year group since the introduction of the course. The views of these students were also gathered through an analysis of their evaluations, to indicate where course changes had been made as result of their views and perceived needs. The responses, completed at the end of each stage of the course, were grouped into strengths of the course and suggested changes for the future.

Finally, in February 1996 a questionnaire was used to collect the views of heads of departments and subject professional tutors, working with students as part of the partnership between schools and RIL. Thirty teachers were sent the questionnaire and sixteen replied. The topics addressed in the questionnaire were the areas and range of subject specialisms expected of a newly qualified teacher (NQT), the considered level of importance of D&T areas covered by the RIL course, the importance of industrial experience, general weaknesses of an NQT from a PGCE background, strengths of the RIL course and suggested changes for the future. The teachers were asked to comment on the main effects on them and their schools of increased shared responsibility and partnership. They were asked for suggestions, with possible constraints, for additional involvement.

### Analysis of results

#### Students' initial specialist areas

In 1992/3 (Figure 1), the first year of the PGCE Secondary Technology course, ten students were enrolled. Their initial specialist areas included architecture, building, electrical engineering, mechanical engineering, technology and consumer science, textiles and fashion and 3D design, with 10% of the students lacking commercial or industrial experience.

The following year, 1993/4, twelve students started the course with the additional specialisms of hotel catering and technology, and 25% of the students lacking commercial or industrial experience. The student group in 1994/5 was thirteen and the range of specialist areas had further increased to include aeronautics, computer science, food and consumer science, graphics and furniture design, with a rise to 33% in the number of students with no industrial experience. Figure 2 indicates that the range of subject areas had widened further by 1995/6 when twenty students enrolled, with slight rise to 36% of the students with no industrial or commercial experience.
The analysis of the students' initial specialist areas highlights the important relationship between the entry characteristics of the students and the intended exit status. It is essential that the course structure and content takes into account the strengths and weaknesses of students and the D&T specialisms they wish to teach as an NQT. The information on subject specialisms does not present a complete picture when assessing at interview the potential of a student to teach D&T. There is a need to take into account qualifications and experience from additional courses, including Diplomas, O-Level, A Level and GCSE, as relevant workshop experience is frequently found below degree level. Industrial and commercial experience, though not a requirement, is valued by schools, and the reduction of students now joining the course with industrial experience is probably due to fewer applications from mature students looking for alternative careers.

**Student Evaluations**

These have been used regularly to identify the students' perceived needs and make course modifications. As is illustrated in figure 3, major issues raised by students in 1992/3 were the need for a restructure of the course, more resources and practical workshop sessions and a course mentor based full-time at RIL. These concerns were taken into account in course planning for the next year. The subject evaluations for 1993/4 showed an appreciation of the broad based knowledge and skills, with the students wanting increased workshop/IT skills sessions, additional resources and a design project earlier in the course.
In 1994/5 (Figure 4) students saw the main strengths of the course as the broad based knowledge and skills input, tutor support and introductory sessions across specialisms. The use of the school workshop was valued and the development of workshop skills, resources and IT seen as a priorities. Education and subject sessions, as with other PGCE subjects, have been separate, and following the suggestion by the students that they could be integrated, a pilot is in place for 1995/6.

**Teachers’ views**

Figure 5 indicates the teachers responses to Question 2:

An NQT in Technology/D&T with a specialism in one of the following area (electronics & control, food technology, graphics, IT, resistant materials and textiles technology) has applied for a post in your school - How many other specialisms would you expect the NQT to be able to teach at Key Stage 3, 4 and 16+?

The responses indicated that 94% of the teachers expected the NQT to be able to teach at least two additional specialisms at Stage 3 (ages 11 to 14) and Key Stage 4 (14-16). This is a high expectation for an NQT, but it is important to note that the question was asked at a time when schools were teaching to the first set of GCSE Design and Technology examination syllabuses containing a core of resistant materials. Such courses ideally required all teachers to be able to teach their main specialism, for example textiles and food, and resistant materials. A teacher in the survey commented that he felt it was not satisfactory for non-specialist teachers to be teaching at this level. The new GCSE examinations beginning in September 1996 have a core of designing and making, rather than resistant materials, and pupils will be able to specialise in depth in any one material or aspect. These courses will now require teachers with single rather than dual subject specialisms, a change.
that may affect the number of specialisms expected by schools for a teacher of D&T at Key Stage 4.

Teachers cited a wide range of preferred specialist subject combinations for an NQT. The most common combinations suggested were electronics & control, resistant materials, graphics & resistant materials and food & textiles. It was suggested that all NQTs should have expertise in graphics and IT. A high percentage of the teachers, 77%, considered that no combination of specialist areas was unsuitable, as the needs of departments would vary and flexibility and range was required. The remaining 23% of the teachers thought there were unsuitable combinations, with one teacher commenting that at the present time 'hard technologists had no expertise in food & textiles and vice versa, but adding if they were given some expertise there would be no problem'. It was not clear how much expertise this should be.

Question 2 also asked teachers:

Please rate by level of importance the areas of D&T subject specific knowledge covered in the PGCE. (Figure 6)

The majority of the teachers gave a high equal rating of importance to communication and IT, followed by technological concepts, products and applications and awareness of industry. Some teachers considered that communication was extremely important and a small number gave a low rating to awareness of industry.

When asked about the importance of subject application, not surprisingly for teachers, teaching and learning in D&T scored well, as did health and safety. The nature of D&T was thought to be moderately important, with 31% considering that industrial experience for an NQT was important at Key Stage 3, rising to 68% at Key Stage 4 and 88% at post sixteen, with a special reference made to vocational courses. It was suggested that industrial experience can cause over confidence and a preconception that teaching 'is easy'. These results reflect an emphasis on classroom practice, which is good, but the lack of appreciation for the nature of D&T and industrial, business and community application are causes for concern.

It can be argued that effective teachers of D&T require an understanding of the philosophy underlying the subject rather than a narrow view of their own specialism, with courses, particularly at Key Stage 4 and above, enriched by the establishment of links with industry and commerce. Subject knowledge was considered to be a general weakness, particularly at Key Stage 4, for an NQT with a PGCE qualification. It was thought that there was insufficient time during the year for students to improve weak areas, for example lesson planning.

Teachers were asked, as were the students, for their perceptions of the strengths of the RIL course and future modifications. Teachers highlighted its ability to respond to the needs
of the school, the inclusion of an overview of technology, the provision of new ideas, good preparation and relationship with students and the inclusion of food and textiles. The mature approach of students towards learning, enthusiasm and willingness to listen to advice was commended. Suggested modifications for the future included more time for each specialist area, more practical workshop sessions, a resistant workshop area at RIL, increased course time for food and textiles specialists and more school visits by tutors.

When teachers were asked about the main effects of the shared responsibility and increased partnership with ITE, they cited opportunities to reflect on and improve their own practice, initiate new ideas and develop an increased understanding of students. The increased workload and lack of identified time for mentoring students, especially if the students were weak, were seen as problems. The response to suggestions for additional involvement was not positive as it was thought that additional involvement would depend on RIL requirements and money. The reasons put forward for this included lack of time, lack of financial incentive, pressures in schools and an inability to attend sessions at RIL.

Conclusions
The aims of this study were to consider past developments and identify future modifications for the PGCE Secondary Technology course at RIL. This study was a small piece of research into a course based on a partnership between HEI and schools, planned and taught by HE staff and practising teachers using HE and school facilities. It was part of an on going process of evaluation, review and modification to provide a course that would train future D&T teachers, using the strengths and expertise of members of the partnership.

The conclusions were that:
- Students were generally satisfied with the course
- The qualifications and initial specialist areas of students need to be carefully monitored, as they provide the basis for the National Curriculum D&T main specialist area taught by an NQT.
- Students were concerned regarding their level of knowledge, understanding and skills as future teachers of D&T.
- A minimum core entitlement for all students on the course is required, regardless of subject specialism areas, which includes graphics, generic designing skills, knowledge, understanding and knowledge of control and the ability to use IT effectively.
- Students need to specialise in one specialist area, which they can teach to at least Key Stage 4, including GCSE, GNVQ and A Level. They should then develop at least one additional area of specialism to teach at Key Stage 3, from the groupings of resistant materials, control and systems, food technology and textile technology.
- The views of the teachers in partner schools and the introduction of new examination syllabuses, indicate changing attitudes regarding the acceptable combination and number of specialisms expected of an NQT D&T teacher.
- Teachers expressed concern over the depth of students subject knowledge.
- Teachers value the opportunity for shared responsibilities and partnership with ITE, but have conflicting demands on their ability to take on additional roles.

Recommendations for the future
- The title of the PGCE course should be changed from technology to Design and Technology.
- The D&T facilities at RIL should be redesigned with additional resistant materials workshop space suitable for both secondary and primary students. This will be in addition to the use of secondary school workshops.
- The audit of students' D&T capability should be revised to take into account the need for increased depth in their main D&T specialism.
• The course should have more in-depth specialist sessions.

• The subject panel of teachers, already in existence, should continue to provide tutors to teach on, advise and support the course.

• Additional research is needed into the concept of 'partnership' between HEI and schools to clarify roles and responsibilities.

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