

Primary Design and Technology Subject Specialism at Nottingham Trent University

Abstract

This paper explores the approach to subject specialism in design and technology within the BA (Hons) course in Primary Education offered by Nottingham Trent University.

introduction

Developing subject specialist provision to meet the demands of DfEE Circular 4/98 has taxed many in higher education over the last two years. This paper explores the approach that has been developed at Nottingham Trent. The BA (Hons) Primary Education (Specialist) with QTS is a four-year undergraduate programme. To contextualise the subject specialist provision, I include a brief overview of the course in general.

The course is premised on two beliefs about the nature of training for primary teaching, namely:

1. primary teachers are generalists that need to be highly competent in all aspects of the National Curriculum
2. subject specialism is crucial to maintaining high quality teaching in the breadth of subjects that the National Curriculum requires.

Striving to achieve these two key elements results in a course that attempts to:

"enable students, through the interaction of the teachers, the learner and the curriculum, to develop an understanding of the processes of education and to be able to critically reflect on their experiences.

The course team aims to foster the development of autonomous, thinking teachers capable of maximising the potential of the children they teach. Primary school teachers will play a central role, through partnership arrangements in the planning delivery and assessment of the course." (Mission Statement from the validated course document.)

This statement brings with it consequences that impact on all aspects of the course.

Course overview

The course is a BA (Hons) in 'primary school education' and the education element is strongly to the fore within the course concept and structures. Subject specialism is seen as one element, albeit an important element, within this context. Further, we believe in offering a broad course where students have some choice based on their personal interests and preferences. Consequently, the course team have set out to provide a range of options that enable maximum flexibility within the constraints of DfEE Circular 4/98.

Students indicate on application their focus of study - Advanced Early Years Strand or Primary Strand and within the Primary Strand their **two** curriculum specialist subjects, one from the core and one from the foundation curriculum. However, there is an opportunity, based on their experience of the course and within the constraints of resources and 4/98 regulations, for students to confirm or change these during the second year. Students are not required to have an A' level in their chosen subjects. They undertake one of these subjects as a major - Subject Leadership and one as a minor - Subject Specialism. Both are planned to meet government requirements for subject specialism.

The design allows maximum opportunity for the students to decide for themselves, based on experience of teaching, the focus of their training. We offer this approach because we believe that being a learner in a subject is not the same as teaching it. Opting at the end of the second year, having experienced teaching in two key stages across the breadth of the primary curriculum, allows choices based on knowledge rather than perceptions formed outside the profession. Our experience is that allowing students to choose after this kind of experience produces more specialist teachers in shortage subjects, including design and technology, than would be the case if candidates were required to decide on entry. Further, it provides the profession with qualified teachers who have an extensive understanding of teaching children either from 3 to 8 or from 5 to 11 years of age, but also with a broad understanding of the totality of children's educational experience 3-11.

Course choices include:

Advanced Early Years Strand (3-8) or
Primary Strand (5-11)

For Primary Strand students:

the opportunity to select two National Curriculum Subject Specialisms, one of these at subject leadership level (engaging with aspects of the TTA Subject Leadership Requirements: TTA 1998)

the choice of Key Stage 1 or Key Stage 2 age phase emphasis.

These choices are made in the second year.

For all students a choice, in the third year of an:

Education Studies Elective.

These choices are made in the third year.

The diagram below (Figure 1) illustrates these options.

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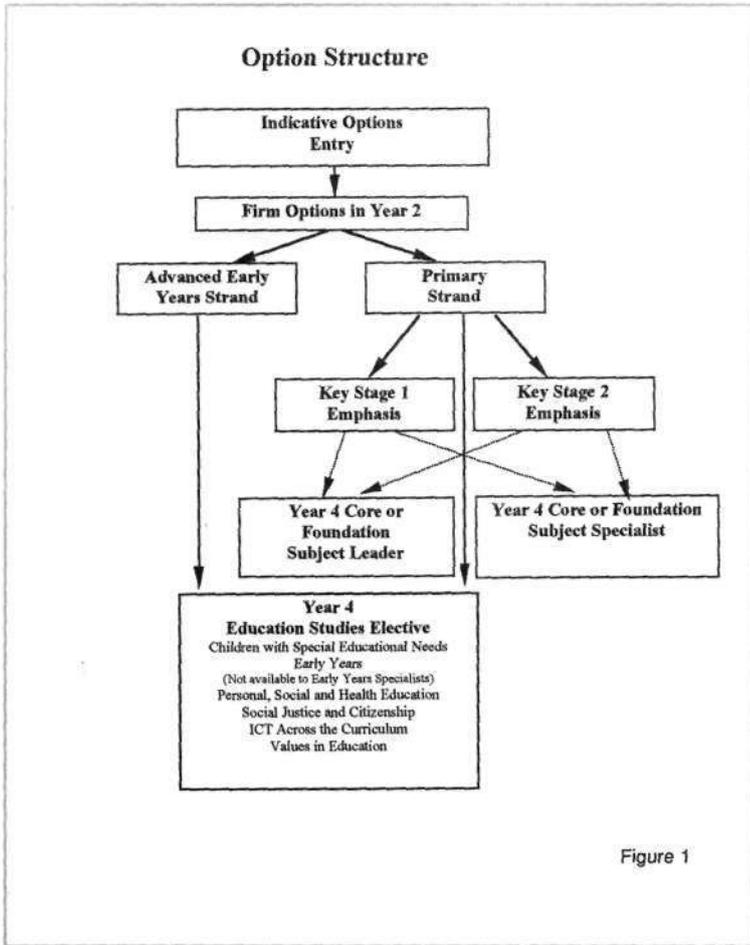


Figure 1

Figure 1.

The course has been constructed with School Experience and Education Studies as central pillars around which the curriculum components have been designed. In the first three years the core subjects are taught separately and the foundation subjects are grouped in the following way:

- Humanities: History, Geography and Religious Education;
 Technology: ICT and Design & Technology;
 Creative and Movement Education: Art, Music and Physical Education.

The following diagram (Figure 2) outlines the course structure.

Below: Figure 2: BA (Hons) Primary Education (Specialist) with QTS.

Key: CME - Creative and Movement Education. CE - Creative Education. D&T - Design and Technology. Geog - Geography. Hist - History. ICT - Information and Communication Technology.

PE - Physical Education, OAAA Outdoor and Adventurous Activities.

RE - Religious Education.

Shaded area = Elements common to both strands

BA (Hons) Primary Education (Specialist) with QTS

Year 4	Subject Leadership/Early Years 1 module 30 credits			Placement Experience 4 Phase Specific 1 module 40 credits	Education Studies CORE 1 module 1 module 20 credits	Education Studies ELECTIVE 1 module 20 credits	Subject Specialism or Early Years 1 module 20 credits	
Year 3	English 3 1 module 10 credits	Maths 3 1 module 10 credits	Science 3 1 module 10 credits	Placement Experience Phase Specific 3 1 module 40 credits	Education Studies 3 2 modules 10 credits each	Humanities 3 (Hist/Geog/RE) 1 module 10 credits	CE or PE 3 (Art/Dance/Music) or Gym/Games/OAAA Dance/Athletics 10 credits 1 module	Tech 3 (ICT & D&T) 1 module 10 credits
Year 2	English 2 1 module 10 credits	Maths 2 1 module 10 credits	Science 2 1 module 10 credits	Placement Experience 2 1 module 40 credits	Education Studies 2 2 modules 10 credits each	Humanities 2 (Hist/Geog) 1 module 10 credits	CME 2 (Art/Gym/Dance) 1 module 10 credits	Tech 2 (ICT & D&T) 1 module 10 credits
Year 1	English: 1 1 module 10 credits	Maths: 1 1 module 10 credits	Science: 1 1 module 10 credits	Placement Experience 1 2 modules 20 credits Each	Education Studies 1 2 modules 10 credits each	Humanities 1 (Hist/Geog/RE) 1 module 10 credits	CME 1 (Art/Games/Swim/Music) 1 module 10 credits	Tech 1 (ICT & D&T) 1 module 10 credits

Key
 CME – Creative and Movement Education. CE – Creative Education. D&T – Design and Technology. Geog – Geography. Hist – History. ICT – Information and Communication Technology. PE – Physical Education, OAAA Outdoor and Adventurous Activities, RE – Religious Education.
 Elements common to both strands.

Figure 2.

The focus of this paper is the primary strand and the design and technology options within it.

The specialist course

Subject leadership in design and technology

The implications of this pattern for subject specialism are considerable. As students in the first three years undertake modules in design and technology, this aspect of the course must be seen as both making a strong contribution to subject study and providing a complete course for those not going on to study as subject specialists. The advantage of this approach is that all students undertake an extensive course covering the basic requirements to meet 'Level 7' in the foundation areas as defined by Circular 4/98.

"for any non-core, non-specialist subject covered in their training, have a secure knowledge to a standard equivalent to at least level 7 of the pupils' National Curriculum. For RE, the required standard for non-specialist training is broadly equivalent to the end of key stage statements for Key Stage 4 in QCA's Model Syllabuses for RE¹" (DfEE Circular 4/98, Annex A Section A2g: 5)

This approach also provides the specialists with a firm foundation from which to carry out more in-depth study. However, to strengthen the subject specialist element students are required to undertake teaching in the second year on in their preferred subject areas, they may have to work with a class other than their own to achieve this. We are moving towards a position where the placements are with the school, rather than with a class. If they are uncertain about their final decisions they are encouraged to negotiate teaching in all of their possible choices and discuss the subject with school-based subject leaders. In the third year students are again required to undertake teaching in the subject specialisms. In addition, they undertake a serial placement where they are required to undertake a number of school-based tasks focused on in specialisms. For the next academic year we will also be running a 'specialism week' where the normal timetable will be suspended and activities which will be focused on developing subject knowledge will be carried out.

The majority of students follow the primary strand (126 out of 146 students in the academic year 2000-2001). All of these students, by the end of the fourth year, will be expected to have reached the standard required for subject specialist knowledge as

defined by Circular 4/98 in both of their subject specialisms:

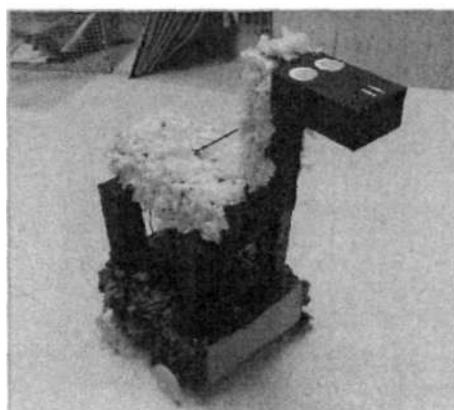
"for any specialist **subject(s)**, have a secure knowledge of the subject to at least a standard approximating to GEC Advanced level in those aspects of the subject taught at KS1 and KS2". (DfEE Circular 4/98, Annex A Section A2f: 5)

In planning the fourth year modules our key concern is to develop the skills and understandings which are central to the nature and methodology of the subject. Students work at an advanced level within the subject, but, as the degree is in primary education, are also required to consider the pedagogical implications of their activity.

To attain the advance level equivalence a 'syntactic' approach is taken - 'What is it to be a mathematician/artist/historian/scientist/geographer etc.?' With this approach to subject knowledge the student is well placed to be able to teach the subject and to act as subject leader. Once they have this kind of understanding at their disposal they can acquire additional specific content knowledge, using the processes of the 'discipline'. Further they can teach children how to acquire that knowledge because they understand the processes of the subject rather than just be able to demonstrate finite amounts of subject knowledge. However, this approach does not

1 "Where providers offer more limited coverage of subjects than the required non-core, non-specialist subjects, e.g. a few hours of taster training in a foundation subject, safety training in PE and/or design and technology, the nature and extent of such training can be recorded on the newly qualified teacher's TTA Career Entry Profile."

CURRICULUM



The photographs illustrate some of the activities associated with a project on 'moving toys' from the 1999-2000 academic year.

disregard subject knowledge; rather it sees subject knowledge as indefinite. The National Curriculum defines a knowledge set that is relevant currently and we deal with this comprehensively within the course. However, the nature and relevance of this knowledge is time dependent, without a syntactic understanding of the subject the ability to assimilate new knowledge is restricted.

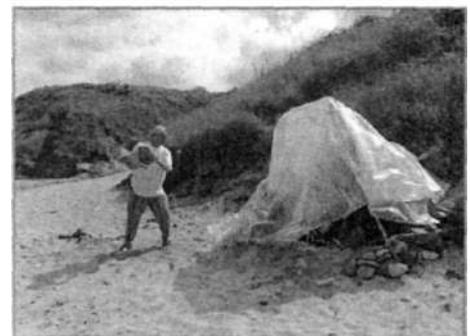
This approach to knowledge also provides a bridge between 'subject specialist' knowledge and 'pedagogical' knowledge. This accords well with our understanding of the education degree that students are studying and with the needs of subject specialists in the primary school.

Subject leadership knowledge and skills

During the final year, students select one of their specialist subjects in which they begin to develop their expertise of subject leadership. They conduct an extended school-based study, tutored by subject specialists in the primary department and feeding back to staff in the partnership school. Also, as part of an Education Studies module, students work alongside subject leaders in partnership schools and compile a portfolio of school-based evidence, which demonstrates their understandings and achievements. The development of subject leadership abilities in Year 4 extends the range of student competence and establishes continuity between the course and the Teacher Training Agency's (TTA) *National Standards for Subject Leaders* (1998).

Year 1

The course is comprised of a lecture programme and a series of workshop sessions during which students are provided with the opportunity to develop their understanding of the nature of the subject and their own practical capability. In Year 1 there is a particular focus on 'Designing'. Students are provided with opportunities, which will



Year 1 field work.

Table 1.

Year 1

Project work and focused tasks related to the following areas:

Textiles - Focused Task

Food - DMA

Electric's - Focused Tasks

Computer control - Focused Tasks

Powered vehicle project - DMA and Focused tasks

ICT links

Demonstration and use of the 'Poem' machine and software (CAD/CAM)

None

Modelling circuits and recording using software. Use of 'Draw' to create symbol bank for use in circuit diagrams.

Use of control software (Contact)

None

encourage the development of their own design skills such as techniques for developing and communicating ideas. Students are also encouraged to evaluate examples of practical work with a view to providing constructive feedback. The ways in which these experiences can be translated into the classroom are discussed and a school-based task in design and technology is required.

Students work with a range of materials including recycled materials, paper and card, wood and food. Health and safety issues are discussed in relation to tools materials processes and the classroom environment. Through a series of practical tasks students will begin to develop an understanding of: the process of designing and making, the range of tasks which together help to develop children's practical capability (as defined by the National Curriculum), the knowledge and skills which underpin designing and making.

Students will be encouraged to use ICT to support the development and communication of design ideas. Table 1 outlines the projects and ICT links planned for the academic year 2000-2001.

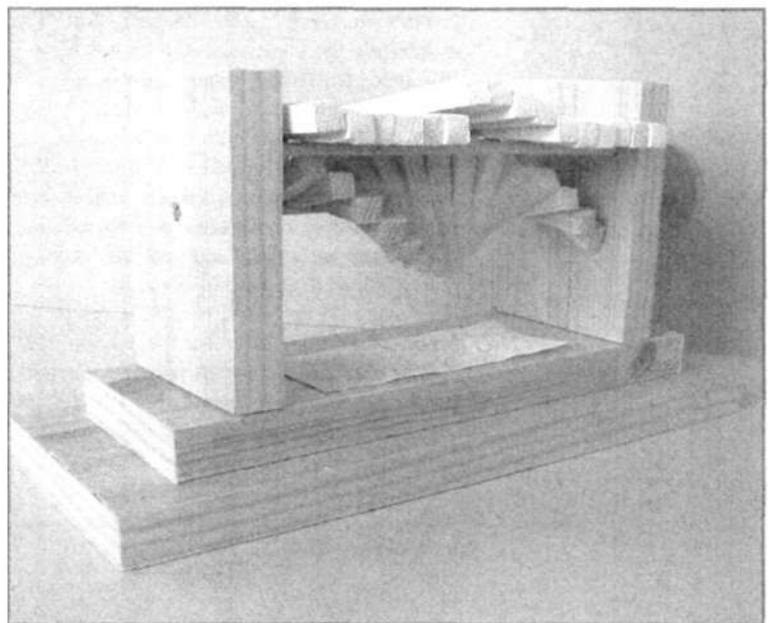
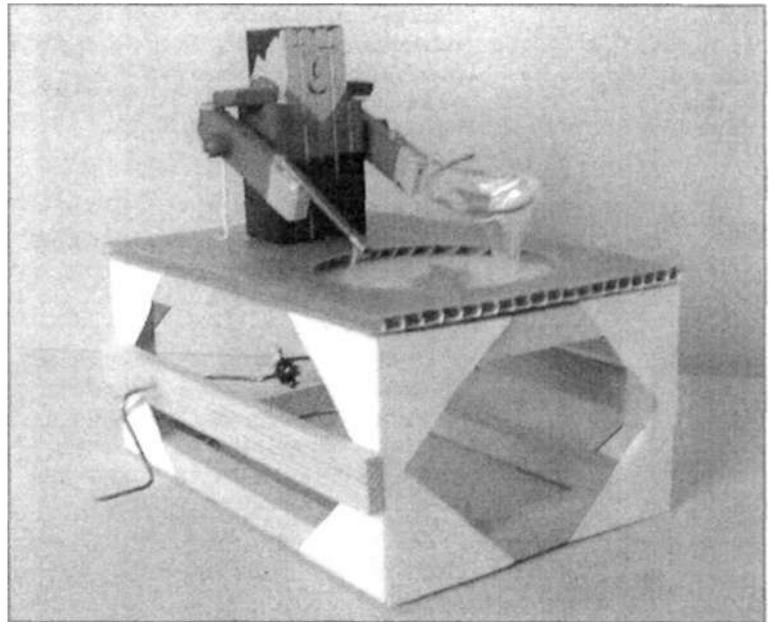
ICT content

This set of ICT competencies is ongoing throughout the course.

Assessment of this component of the course is through the products and folios above and by a test.

Field week

Part of the Year 1 Placement Experience module includes a field week, which has traditionally been camping at Anglesey with primary school children and teachers. The camp offers an insight into the organisation and management of field trips with an emphasis on science, design and technology and humanities. Students participate in planning and teaching for three days, which emphasises both subject and pedagogic knowledge. Year 3 students who opt for this



Year 2 automata project carried out in 1999-2000.

Year 2

Textiles: DMA

Moving toy: DMA

Interactive display with movement

Evaluating products activity planning

ICT links

Use of heat transfer from computer generated images. (CAD/CAM 'Stika')

None

Modelling circuits and recording using software (Dedicated Package)

Use of control software

Use of graphics and sound recordings

Use of ICT to develop pupil resources to support activity

Table.

work as their 'Special Programme' (see Year 3 details) manage the camp. They are supported in this activity by academic staff. The design and technology is focused by the theme of survival (often apt, given the weather conditions!).

Year 2

In Year 2 the course seeks to build upon and develop existing skills and knowledge by engaging the students in a series of independent practical projects based in the following areas: textiles, mechanisms, energy systems. Students continue to work with materials and processes that are appropriate for the primary age phase but it is anticipated that they will operate at a much higher level in terms of the procedural aspects of the subject and this will be evidenced by design folios which communicate how their ideas have developed.

Students will begin to analyse the National Curriculum requirements for design and technology and audit their own knowledge and understanding to support their own personal development. Medium Term Planning for teaching within design and technology will be introduced and there will be an opportunity to examine and evaluate planning resources that are now available to schools and early years settings. Guidance is given on how to support children in developing design ideas, creating a design proposal and evaluating their own work. ICT will be used throughout the course to support learning in a variety of ways and will include the use of software for modelling electrical circuits and the Internet for developing design ideas. Students will also be introduced to techniques for assessing children's design and technology capability. Table 2 shows the planned projects for 2000-2001 and ICT links.

Assessment of this component of the course is again through the practical project work and design folio plus a formal assignment associated with the development of a medium term plan for Year 2 teaching practice.

Year 3

Computer control project: Fairground project:

Focused Task and DMA

Pedagogy

Year 3

In Year 3 students will undertake three projects within design and technology. One project will be concerned with developing students' practical capability and knowledge within the area of computer control. Students will engage in a project that draws particularly on their knowledge of electricity and mechanisms. The second project will be a teaching package for design and technology that seeks to identify opportunities for work presented by local 'centres of technological interest'. Students will produce teaching support materials including plans and artefacts based on their choice of starting point. Issues of progression will be addressed. The third project is an intensive designing and making activity carried out over two days. Table 3 shows the planned projects for 2000-2001.

The folio and practical outcome of the control project is assessed and students are required to make a presentation on this work. Students also produce a group based 'teaching pack' associated with planning a visit to the centre of technological interest which is presented and peer reviewed.

Special programme

In the later part of Year 3, students get the chance to undertake the 'Special Programme' which offers the opportunity to broaden their experience by undertaking work with children in a variety of contexts, e.g. school for the deaf, working with an educational psychologist, working in a hospital school, etc. Year 3 students may also participate in the Field Studies week as leaders, those going on the Field Studies week have responsibility for helping Year 1 students plan the design and technology activity.

Year 4

In Year 4 students develop their personal capability in design and technology through practical project work to a level at which they will be confident to operate as a specialist subject teacher of design and technology. They also consider the broader role of design and technology within the whole curriculum and develop a critical understanding of the processes and products of design and

ICT links

Modelling circuits and recording using software

Use of control software

Use of graphics and sound recordings

Use of ICT to develop formats for planning and supporting learning. Database use for planning

Table 3.

technology activity, and their wider effects both within the curriculum and in society. In addition Year 4 students extend their subject knowledge through the exploration Subject Leadership Knowledge and Skills. They begin to develop their expertise of subject leadership by conducting an extended school-based study, tutored by subject specialists in the department and feeding back to staff in the partnership school. Also, as part of an Education Studies module, students work alongside subject leaders in partnership schools and compile a portfolio of school-based evidence that demonstrates their understandings and achievements. The development of subject leadership abilities in Year 4 extends the range of student competence and establishes continuity between the course and Teacher Training Agency's (TTA) *National Standards for Subject Leaders* (1998).

The assessment has two elements:

Element 1: Practical coursework which will result in a high quality functional product supported by a design folio - Subject Specialists and Subject Leaders undertake this assignment.

The purpose of this project is for students to communicate skills and knowledge through engaging in the process of designing and making a product. The product must meet a perceived need or opportunity.

Students are required to produce the following:

1. a functional product which can be tested in action and a design folio
2. an oral presentation supported by the folio and practical work.

Element 2: A written paper exploring an issue relevant to the teaching of design and technology - Subject Leaders only. The focus of the paper is a personal choice.

This is an action research project, which is developed from an issue identified on final teaching practice. The focus of this work is improvement in the quality of teaching and learning. Crucially students must:

- analyse and comment on their own learning
- be able to say in what ways their action has informed and refined their practice

- ensure any claim to knowledge is justified by evidence derived from their actions.

It is this personal reflection on learning that should be the key feature of the work.

The ICT element becomes project related in Year 4.

Conclusion

The approach to subject specialism discussed above provides for the kind of subject expertise that best meets the needs of primary schools. Planning specialist provision within a generic course is a complex and demanding task. Placing the specialism in this context also makes high demands on students and staff. However, the course team believe that it is crucial to maintain the breadth of generic course if children are to be taught well by practitioners who have not only the technical competence to work in the classroom, but also understand education, and have cultivated views about curriculum issues.

Year 4

Project Based

ICT links

Building on the above specific to the project