Articles

The Nature and Provision of Technology Education in Ireland

Anthony Carty and Pat Phelan

Introduction

In an increasingly technological world, technology education programs designed to meet the needs of the demanding technological environment must be planned and coordinated efficiently. In response to this changing technological environment, the provision of technology education in Ireland is currently undergoing development. The educational process in Ireland is government driven, as in other European countries. Technical subjects have been included in the Irish curriculum since 1885 as manual instruction and educational handicraft. These subjects were entitled Metalwork, Woodwork and Technical Drawing. The introduction of Technology as a subject in its own right occurred in 1989, based on the rationale that technology education was seen important for economic success.

The introduction of Technology as a subject enabled schools that did not already offer such subjects the opportunity to provide a less resource intensive version of the subject than those already offered; namely, Metalwork/ Engineering and Woodwork/Construction studies. Initially £5000 was allocated for the purchase of equipment per school, however this proved inadequate with over 50% of schools spending between £10000 and £58000 for initial setup (McGuiness, Corcoran, and O' Regan, 1997). The coordination of its introduction was conducted quickly between 1987 and 1989. McGuiness et al (1997, p.83) recommended that a "*longer and better sequenced programme of preparation be planned for the extension of Technology (the subject) to the Senior Cycle….*" During this period the Irish economy was realigning under a National Recovery Programme. Resulting in the '*Celtic Tiger'* era that saw an increase in gross domestic product and a decrease in unemployment rates.

Anthony Carty (anthony.carty@ul.ie) is a Teaching Assistant and Pat Phelan is Head, Department of Manufacturing and Operations Engineering, College of Engineering, University of Limerick, Ireland.

Irish Educational System Overview

The Irish educational system is divided into three levels, primary (ages 4-12), secondary (ages 13-18) and third (ages 18+). The focus of this paper is concerned with the provision of technology education within the secondary level that is compulsory. Secondary level education is divided further into two cycles, with national certification awarded upon successful completion: the Junior Certificate (ages 13-15), also known as the Junior Cycle, and Leaving Certificate (ages 16-18), also known as the Senior Cycle. Compulsory schooling age is 16, or the completion of three years of post-primary education, whichever is the latter (Education [Welfare] Act, 2000).

To attain a Junior Certificate at least eight subjects must be examined. They include Irish, English, mathematics, history, geography, and civic social and political education (CSPE), as well as at least two other approved subjects. The Leaving Certificate subjects are broken into domains: languages, sciences, business studies, applied sciences (including technology subjects) and social studies. Candidates are required to include not less than five subjects, of which Irish must be one, but due to high competition it is recommended that seven subjects be examined (Rules and Programmes, 2002, p. 7-11).

Technology Education Curriculum Design

Technology education is provided through four subjects at the Junior Certificate level. The subjects are offered at two levels, Higher-Level (HL) and Ordinary-Level (OL). To date three of these subjects are continued into the Leaving Certificate. At the Junior Certificate, 75 hours per year are allocated to a single technology subject and 95 hours for a subject at the Leaving Certificate level. Table 1 displays the technology education subjects that are offered in the Irish curriculum, assessment weightings, year that the syllabus was last updated, and the revised or new syllabi titles along with the implementation dates.

De Vries in Layton (1994, p. 33-35) outlined eight categorized approaches to technology education in Western Europe. The category that best fits Ireland presently is the "*craft-oriented approach*" with a possible movement towards a "*design approach*" in some subjects. It may be argued that the approach can be different for each individual technology subject offered at the school depending on teacher pedagogy and resources available in the technology room.

The aims of technology education in the Irish educational system cannot be ascertained from specific subject aims, but from a more holistic view of all technology subjects within the curriculum. The aims listed below are extracted from a Consultation Document on technology education at Junior Certificate level.

- To contribute to a balanced education, giving students a broad and challenging experience that will enable them to acquire a body of knowledge, understanding, cognitive and manipulative skills, and competencies, and so prepare them to be technologically literate and creative participants in society.

- To encourage and enable students to integrate such knowledge and skills, together with qualities of co-operative enquiry and reflective thought, in developing creative solutions to technological problems and needs—using appropriate materials, equipment and resources to produce artifacts and systems—with due regard for issues of health and safety
- To facilitate the development of a range of communication skills, which will encourage students to express their creativity in a practical and imaginative way and in a variety of forms, including verbal, graphic and model, and involving the use of appropriate media
- To provide a context in which students can explore and appreciate the impact of past, present and future technologies on the economy, society, and the environment.

NCCA Consultation Document, 2003, p. 2

Table 1
Technology Subjects Offered at Secondary Level Education and the Assessment Procedures (date of last revision shown in parentheses)

Junior Certificate 75 hrs./yr./subject Approx. age 13-16	**Leaving Certificate** 95 hrs./yr./subject Approx. age 16-18
Materials Technology (Wood) *(1989)* Assessed 300 Total points Theory 100, Practical 200 = 130 project + 70 portfolio HL 150 project + 50 portfolio OL	**Construction Studies** *(1985)* Higher level 600 Total points 300 theory + 150 practical skill test + 150 design project Ordinary level 500 points 200 theory + 150 practical skill test + 150 design project
Technical Graphics *(1989)* Assessed 300 Total points 120 short questions 180 long questions Both HL and OL	**Technical Drawing** *(1985)* Assessed 400 Total points Paper I 200 Paper II 200 Both OL and HL
Metalwork *(1985)* Assessed 400 Total points Theory (written) 100 HL/OL Practical = 300 points 150 practical project + 150 practical test HL 300 practical project OL	**Engineering** *(1985)* Higher level 600 Total points 300 theory test + 150 practical skill test + 150 points design project Ordinary level 500 points 200 theory test + 150 practical skill test + 150 points design project
Technology *(1989)* Assessed 400 Total points Design task 200 + Theory 200 HL Design task 240 + Theory 160 OL	**Equivalent in Planning** New Syllabus forwarded to the DES for examination in 2009

Note: OL refers to Ordinary Level and HL refers to Higher Level

Management of Technology Education in Ireland

The Department of Education and Science (DES) provides all syllabi documents. The Minister of Education and Science is responsible for the enactment of educational policy and direction. The DES delegate's curriculum development, teacher guidelines, and syllabi production to a statutory body named the National Council for Curriculum and Assessment (NCCA). In 2003 the DES passed the responsibility of examinations to the State Examinations Commission (SEC). The SEC prepares examination scripts, assessment material, corrections and the publishing of results and statistical data. Coordination of these bodies according to Gleeson (2004) has been fragmented, leading to tensions within the DES, which is further reflected in the syllabi as being separate from implementation and assessment.

Recent Developments in Technology Education in Ireland

Technology education is undergoing substantial planning and re-evaluation in Ireland. It must be stated that technology education subjects are not compulsory in Irish secondary schools. In England, for example, Design and Technology is included in the foundation (statutory) subjects at Key Stages 1-3 (ages 8-14) and is an entitlement in Key Stage 4 (ages 14-16). Likewise, Craft studies are listed as part of the core curriculum for Finland. An examination of technology education at both Junior Certificate level and Leaving Certificate level is presently occurring.

Junior Certificate

A Board of Studies was formed by the NCCA to "review all technological subjects at Junior Certificate level" (a total of four) by order of the Minister for Education in 1998. In March 2003 the Board published an interim consultation document. This document outlined the rationale for technology education in the Junior Cycle and possible framework configurations of subject content and learning outcomes. The framework was comprised of a core and options selection. Feedback from the consultation process was limited. After the consultation period the Board reported back to the NCCA. The NCCA recommended that special consideration be given to subject teacher associations' response to ensure that the response by the Board to the NCCA was consistent with the limited views expressed in the consultation period.

The Final Report published in September 2004 displayed and compared different framework configurations all based on the same concept of core and option. This model reflects the proposed revised Leaving Certificate syllabi for technology. The document focused on content outcomes and subject matter organization. The Junior Certificate interim consultation document listed the partners involved in the review process; which were drawn from subject teacher associations, teacher unions, school management bodies, the DES Inspectorate, and members from the NCCA. The stakeholders of technology education using the categories proposed by Layton (1994, p. 13-18) are economic instrumentalists*,* professional technologists, sustainable developers, girls and women, defenders of participatory democracy, and liberal educators. A comparison between the NCCA's Board of Studies membership and Layton's stakeholders' reveals a difference.

An issue emerged following the publication of NCAA's Final Report (2004, p. 11) in that Technical Graphics was excluded from their review. The Board recommended that Technical Graphics be considered as a stand-alone technology subject, specifying that it should be revised in parallel with the other three technology subjects.

Leaving Certificate

Three revised technology education syllabi for the Leaving Certificate and a new Technology syllabus were forwarded by the NCCA to the DES. Lynch (2004), Director of the NCCA, wrote in a letter to the subject teacher associations that the delay of implementation may lead to a systematic approach and that the Minister has recognized the major budgeting costs associated with it. The experience gained from the introduction and implementation of Junior Cycle Technology (subject) outlined by McGuiness, Corcoran, and O'Regan (1997) for a longer and better sequence of events leading to the implementation of future technology subjects is occurring. In December 2005 the Minister announced funding for new technology equipment and the introduction of the Leaving Certificate in the subject of Technology and the revised Technical Drawing renamed Design and Communication Graphics, which will first be examined in 2009 (see Table 1).

International Comparisons

Finland and England were selected to form the international perspective in contextualizing Ireland's curriculum as they have high levels of technology education research and are within the European Union. England is Ireland's nearest neighbor and their technology education system differs significantly from Ireland's. Finland's educational system is similar to Ireland's in some respects, the population is similar, and they are currently implementing a new National Core Curriculum, which is consistent with the policies of the NCCA in Ireland.

England

Design and Technology is the umbrella name given to the suite of subjects (7) offered at General Certificate of Secondary Education (GCSE) Key Stages 1-4 in England (Table 2). Design and Technology is listed in the foundation subjects for Key Stages 1-3, therefore the subject is compulsory. The educational responsibility rests with the Department of Education and Skills (DfES) and is compulsory until the age of sixteen at the end of Key Stage 4. The DfES sets attainment targets (levels 1-8) that are to be achieved; they are effectively a statement of what the pupils must know. The Qualifications and Curriculum Authority (QCA) is a statutory body advising the Secretary of State for Education and Skills in relation to curriculum matters and setting accreditation levels. The DfES is not involved in licensure as this is performed externally by awarding bodies such as the Assessment and Qualifications Alliance (AQA), Edexcel Foundation, and the City and Guilds of London Institute (CGLI). These bodies arrange and develop syllabi documents in accordance with the specifications of the curriculum, design exam scripts and marking schemes, and are responsible for corrections/grading.

Table 2
Design and Technology subjects offered in England

Subject	Notes
Electronic Products Food Technology Graphic Products Product Design Resistant Materials Technology Systems and Control Technology Textiles Technology	Assessment • 40 % Written/Theory • 60% Project/Practical • All subjects These subjects are offered at two tiers called foundation and higher. Subjects are also offered as short courses that are worth half a complete subject in the GCSE exam. Specifications are updated annually.

Finland

Technology education in Finland is taught through "*craft*" (EURYBASE, 2005), in the national core curriculum. The craft subjects are organized into two main subdivisions, technical work and textile work. The curriculum states that students in grade 3-7 (age 9-13) must receive an integrated education of both technical and textile work, though Lavonen and Autio (2003) question this implementation. Compulsory education in Finland is from age 7-16 (9 years) and ending with grade nine. The teaching is split similarly to the division between primary school and secondary school in Ireland. One teacher teaches all subjects up to grade 6 (13 years), individual subject teachers deliver instruction after grade 6. According to Lavonen and Autio (2003), 310 hours are spent on "handicraft" in compulsory education, in comparison to 225 hours in Ireland.

The Components of Technology Education

The key components of technology education in Ireland as outlined by the NCCA are design and communication, materials and processing, energy and control, health and safety, and technology, society, and the environment. These key components are necessary to form a broad and balanced technology education. The Final Report of the Board of Studies (2004) suggested that more emphasis or "significant weighting" (in assessment points) must be placed on materials and processing with the integration of other subject areas. From these key components, a technology education model may be formulated.

Technology Education Models

Technology education has evolved from the technical and manual instruction subjects of the early 1900's (Durcan, 1972). The mode of technology education currently employed in the Irish curriculum is subject oriented. Subjects in the curriculum are broken into knowledge domains, technologies, sciences, and humanities. This approach is similar to the arrangement in England and Finland to a certain degree. It separates the subjects of science and mathematics from technology, although they are fundamental components.

Heywood (1986, p. 234) proposed a model for an inclusive approach for technology education in Ireland and is shown in Figure 1. The composition of value systems, economics, technologies, and society, integrated into the educational system was derived from a comparative study of developments in Europe, such as the development of school engineering science in the UK. The study was financed by the Christian Brothers. Marino Curriculum Services requested the Minister to finance a pilot project through which practicing teachers used Heywood's model during an in-service program, but financing was not provided. The in-service diploma required the development and evaluation of a technology education program for Transition Year pupils (the year between the Junior and Leaving Certificates). This was the only year in the curriculum in which innovation could occur without reference to the Department. Steffens (1991) of the Berlin Technological University was requested to evaluate the diploma, and noted in his paper that this initiative was unrelated to the developments by the Department of Education at this time.

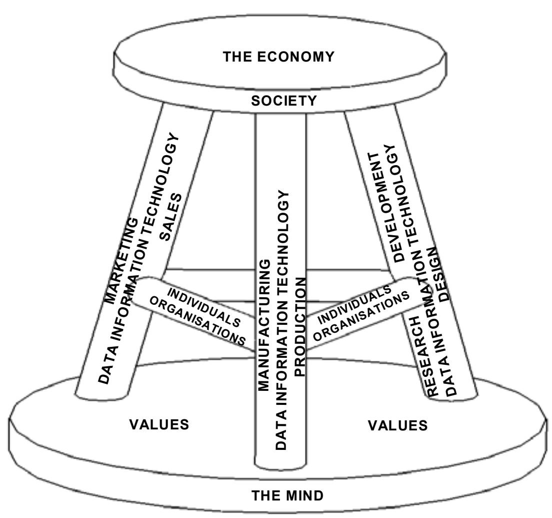

Figure 1. Heywood's (1986) technology education model

The model in Figure 2 of technological capability found in the Junior Certificate Technology Syllabus (1989, p.12) displays that knowledge and skills are derived from four areas, craft and materials, communications, energy and control, technology and society. They lead into the task loop of design, production, and evaluation, hence resulting in technological capability. The dichotomy between processing skills and designing is evident in the model. Hennessy (2000, p. 50) commented that the emphasis on the acquisition of facts and development of fixed material processing skills is passive, and that this content-process model of teaching with the "after-the-fact fashion" of design in which pupils modify a component, usually concerned primarily with appearance issues, distorts the fundamental principles of both technology and design. Kimbell (1982) wrote that pre-specified processing skills teaches attitudes of obedience and conformity, "the very qualities that the design course demands will be crushed out of the child by the emotional and intellectual constraints" (p. 49).

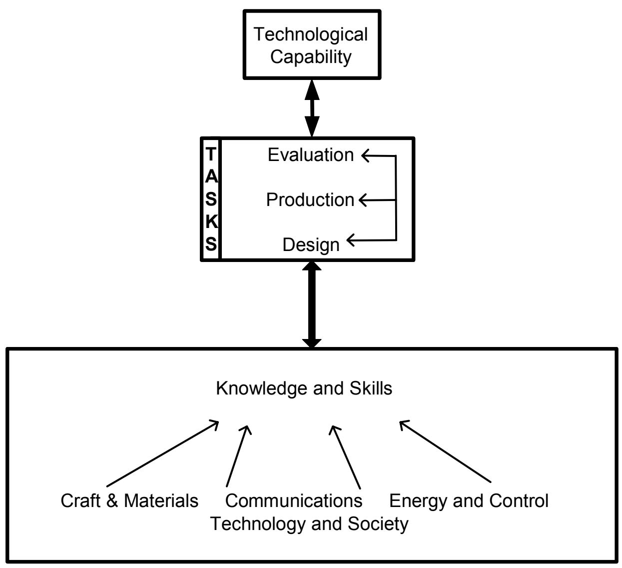

Figure 2. Current technological process model in Ireland

The conceptual model proposed by Savage and Sterry (1990, p. 21) for technology education in Figure 3 is well recognized internationally. This model is similar in content and design with the proposed content framework model proposed by the NCCA in Figure 5. An analysis of the Savage and Sterry model displays that it understands technology education to be a '*doing*' activity as opposed to a body of knowledge or an applied science.

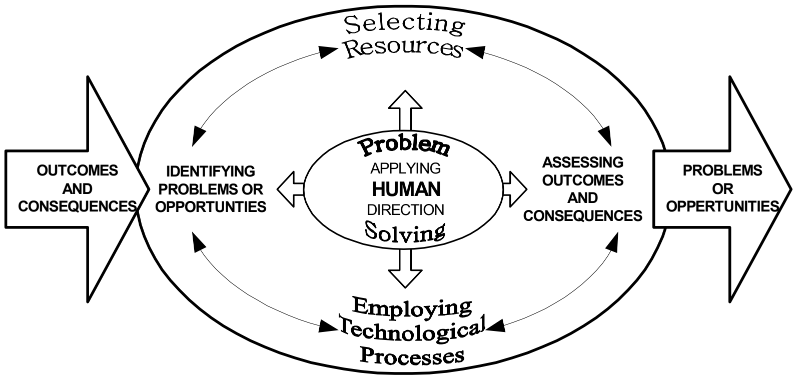

Figure 3. Savage and Sterry (1990) technology education model

Black and Harrison (1986, p. 134) offered another concept and model of technology education based on Task-Action-Capability known as TAC (Figure 4). The task is dependent on the resources of knowledge, skill, and experience. The vertical arrows display the interaction between knowledge and concept (content) with the skills of construction and design (process). The parallel arrows display the interaction between this and the task. Outside the task box is influencing factors such as inquiry and inventiveness, which are personal, as well as intrapersonal factors such as judging and valuing. This combination allows for “development of capability and awareness”, from the “experience of tackling tasks” which Black and Harrison deem essential.

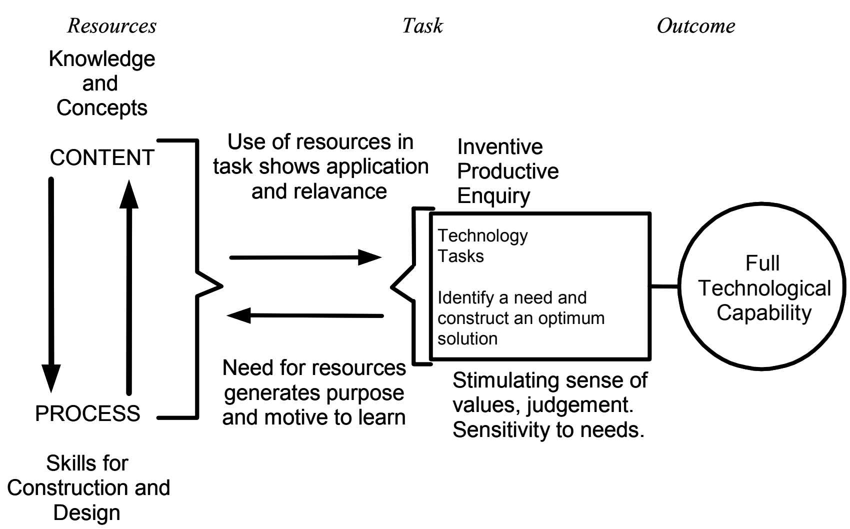

Figure 4. Black and Harrison’s model of technology education

The National Council for Curriculum and Assessment (NCCA) model in the sanctioned Leaving Certificate for Technology syllabus bases a central construct on a design-based approach in technology and society as well as health and safety, with specific content areas interconnected. This model is shown in Figure 5. The content areas, seven in total, reflect the contemporary human-made environment. The process of design is a content block within the core and an emphasis on design is evident throughout the syllabus.

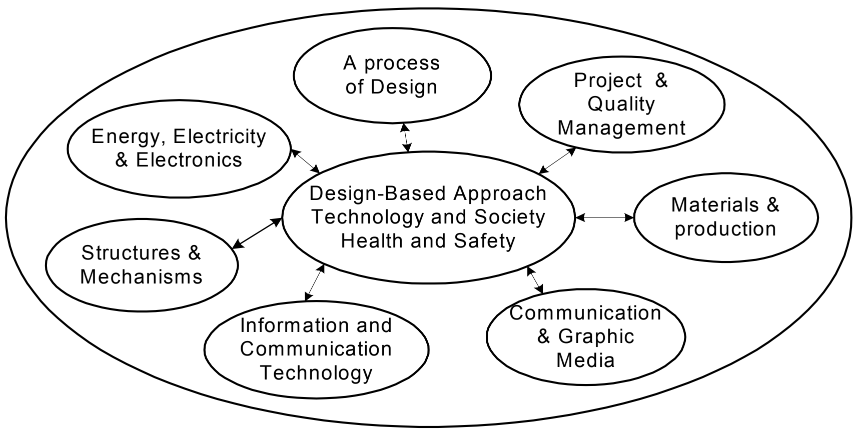

Figure 5. NCCA proposed model for Leaving Certificate in Technology

From a visual inspection of the technology education models, it can be noted that Heywood's model for an inclusive holistic approach through the integration of subjects does not reflect the current or proposed models for Technology Education. Comparing the current model (Figure 2) with the proposed model (Figure 5), a shift towards content is evident. However, the emphasis on design is made explicit. The concept of "total design" is not consistent in present or proposed revised or new technology syllabi. The proposed Leaving Certificate syllabus for Engineering Technology (2006) is an example of this case where the Ordinary-Level project is assessed with the pupil undertaking a given "dimensioned project from a drawing with an element of design" (pg. 10).

Technology Teacher Education Programs

Ireland

There are currently three programs of technology teacher education in Ireland. The University of Limerick is the sole technology teacher provider in the Republic of Ireland to date. The University of Limerick offers two well-established undergraduate courses, Bachelor of Technology (Education) in Materials and Engineering Technology/Construction Technology. One course is offered with two options at postgraduate level entitled Graduate Diploma in Education (Technology). Both fulltime undergraduate courses are of four years duration inclusive of teaching practice, six weeks in the second year and ten weeks in the fourth year.

The fulltime undergraduate course is four years in duration including six weeks of teaching practice in the second year and ten weeks in fourth year. Applicants apply through the Central Applications Office (CAO) and credits obtained in the Leaving Certificate may be applied toward the degree. Mature (non-traditional) applicants apply directly through the University and are accepted based on their credentials and an interview.

The fulltime postgraduate course accepts candidates who have a primary degree in a cognate subject area and complete a skills test in material processing (wood/metal) and manual board drawing. Candidates must successfully complete both skills tests and an interview. The course lasts for 30 weeks, split between two semesters, with 100 hours of teaching practice. In both routes to completion the courses are interdisciplinary and shared across various academic departments within the University. Enrollment numbers in both programs fluctuate due to reasons beyond the scope of this paper.

England

Concurrent and consecutive models of technology teacher education are also available in England at third level institutions. Undergraduate degree study requirements vary from two to three years, depending on experience and qualifications. Degrees offered include Bachelor of Sciences/Arts/Education, with some courses guaranteeing Qualified Teacher Status (QTS). The Teacher Training Agency (TTA) funds the initial training of teachers to ensure highly trained teachers. The (*concurrent*) undergraduate teaching directed degree in England was geared principally for the primary school and the postgraduate (consecutive) model was geared towards secondary school teachers. However this has changed and undergraduate degree programs for secondary level D&T teachers are now available.

The postgraduate options vary in duration from one-year fulltime to five years part-time. A Postgraduate Certificate (PGCE) in Secondary Education is awarded upon completion. About a dozen universities provide technology teacher education in the United Kingdom (UCAS). Entry requirements to these courses vary depending on the teacher training institution. The minimum entry requirements to all programs is that candidates must have GCSE English and mathematics at grade C or higher. Mature applicants are reviewed based upon merit. The final selection involves an interview, literacy, numeracy, and information/computer technology skills test, designed by the TTA.

Finland

Technology education teachers are trained within two groups in Finland: the class teacher (minor) and the subject teacher (major). A master's degree is usually completed as a requirement of teachers in general education. Entrance to the technology teacher education program is selective and specifies a written examination, an interview, practical skills test, and a technological reasoning test (Alamäki, 2000). Four Finnish universities provide handcraft teacher education (major), two universities provide teachers for textile craft, one for technical craft, and one for technical craft in the Swedish language. The latter admits students every other year.

Technology Education in the Curriculum

The reality of technology education in Ireland is that the subjects are predominantly male dominated. The technology teacher population is over 95% male. Student statistics from 92-94 and 01-03 can be seen in Table 6 (DES, 2006).

Table 6
Gender imbalance in the technology subjects in Ireland

Program and Course	**Percent of Girls Enrolled by Year**			
	1992-93	**1993-94**	**2001-02**	**2002-03**
Junior Certificate				
Materials Technology (wood)	5	6	16	16
Metalwork	4	5	15	14
Technical Graphics	7	8	17	18
Technology	34	30	33	33
	1992-93	**1993-94**	**2001-02**	**2002-03**
Leaving Certificate				
Engineering	5	5	5	6
Construction Studies	7	9	7	7
Technical Drawing	7	7	7	7

Note: Directly comparisons by year are not possible since the data are note made available each year.

This gender problem has existed for a long period and to date has not being effectively resolved. The Women's Studies Association of Ireland made a submission to the Curriculum and Examinations Board (CEB, 1985), now the NCCA, in relation to gender imbalance. The report stated that, "the predominance of boys in technical subjects and the 'hard' sciences and of girls in languages, art, music and home economics continue limitation and distortion of the developing potential of both sexes" (p. 17-18). Technology as a subject within the technology education curriculum has the greatest proportion of girls, with a ratio of approximately two boys to one girl. Table 1 also shows the gradual percentage shift over the ten-year period. Gender imbalance is also evident in Finland, with boys typically selecting technical craft and girls selecting textile craft. Lavonen and Autio (2003) offered reasons for this including teacher shortage and course scheduling. The issue of female participation also exists in England as highlighted by Sayers (2002) and Harding (2002). The reason for gender imbalance include the timing of subject choice, availability of information on subject content, scheduling practices, and gender stereotypes (Darmody and Smyth, 2005, p. 171).

Schools differ in the timing of subject choice; some schools require selection of subjects before entry, or pupils are enrolled in "appetizer" courses, allowing for actual course selection later. Schools that enroll only girls are the poorest providers of technology education subjects, with none of these schools providing Metalwork (DES: Statistical Reports). Scheduling is an issue in most schools. Traditionally, technology subjects were scheduled in conflict with humanities subjects and this practice continues today.

The status of the technical subjects has been problematic since their inception. The problem originates from the social class conflict between technical and classical education extending from the early 1900s. Heywood (1983) described the perception of technical subjects as "infra-dig" (p. 226). Eventually the status problem in England was eradicated by making the subject compulsorily. According to Reen (1984) the subject metalwork was perceived to have shortcomings, reducing its efficiency as an educational medium. He exclaimed that "metalwork has enjoyed a status lower than that which its potential educational value merits from erroneous notion. It is basically concerned with lower elements of the taxonomy [Bloom's Taxonomy]" (p. 2). Darmody and Smyth (2005) found that designated disadvantaged schools are significantly more likely to provide Metalwork and Material Technology (Wood).

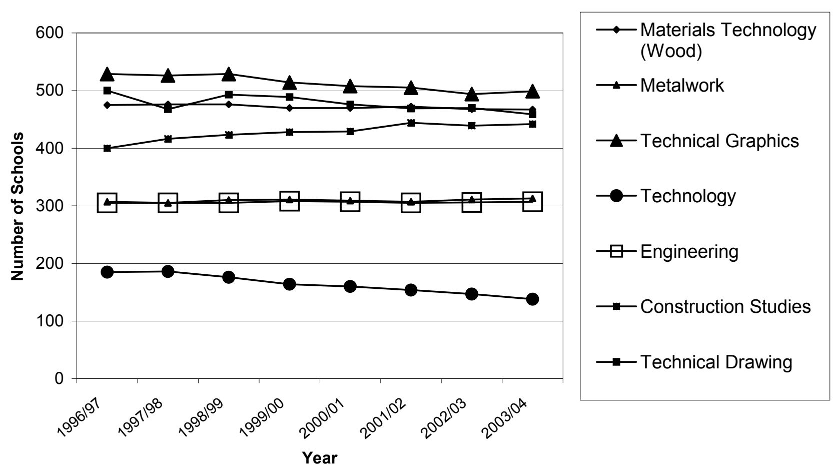

Figure 5. Current trends in technology education subject provision

The trends in subject provision can be seen in Figure 5. The largest decrease is in Technology (185 to 135) whereas Construction Studies gained (400 to 442). Metalwork and Engineering remained nearly constant over the years.

Student perceptions and misconceptions of technology subjects vary. The image problem is being currently addressed under initiatives such as the STEPS (Science, Technology and Engineering Programme for Schools), which is a partnership between the Institute of Engineers of Ireland and the DES. They aim to address misconceptions, increase participation rates of females in engineering, and provide clearer information on engineering as a career.

Technology Education Assessment

"Assessment is the tail that wags the curriculum dog" (Hargreaves, 1989). Students ask, "Does this count?" "Will I get marks for this?" Therefore the assessment procedures affect the classroom pedagogy and the orientation of subject content. Assessment is a rather poignant issue for metalwork teachers, as the syllabus was last updated in 1985 but the exam topics, content, and structure have all developed and evolved. Therefore, the exam papers have effectively become the unwritten syllabus.

The assessment of technology education may be categorized into three different areas: the project, practical skills test, and the written examination. The relative weights for each are dependent upon the particular subject. The practical skills test (Day-Exam) is conducted in the technology room. Three subjects have a skills test: Metalwork at the Higher-Level and Engineering and Construction Studies at both levels. Metalwork, Woodwork, and Engineering projects and practical skills tests (where specified) are graded in schools by SEC examiners. Construction Studies differs in that the class teacher who supervises the project work grades the completed project under close moderation by the SEC, catering for candidate equity. The written examinations for the above and Technical Graphics/Drawing are conducted by the SEC and are scheduled with all other subjects each year in June. The correction of written (theory) papers is conducted by examiners after a marking conference, with examiners correcting exams in bulk under the close scrutiny of advising examiners."

Materials Technology (Wood) is assessed through a written paper focused on theory and a practical project. One hundred points are allocated to theory and, dependent on the level the subject is taken, a different breakdown of the points is made for the project and portfolio. If a candidate is taking the subject Metalwork, a skills test will only apply if that person is a Higher-Level candidate. The skills test is worth half the points allocated to practical work (37.5%), while for a student taking the subject at Ordinary-Level the project will be worth 75%.

England

Assessment in Design and Technology subjects in England is also divided. The two modes are coursework (project) and theory. The breakdown of points applies to both levels. The course work project accounts for 60% and 40% allocated to theory. A direct comparison between the Irish and English assessment method is not possible, though a relative comparison can be seen in Figure 6. The amount of practical work is determined by the assessment procedure, comparing Ordinary-Level with Higher-Level in the Irish situation, practical work equates to 75% in both cases. However the Higher-Level element includes a practical skill examination assessed upon the completion of a device. The comparison shows a 75% practical element in Metalwork in Ireland compared to a 60% practical element in Design and Technology in England.

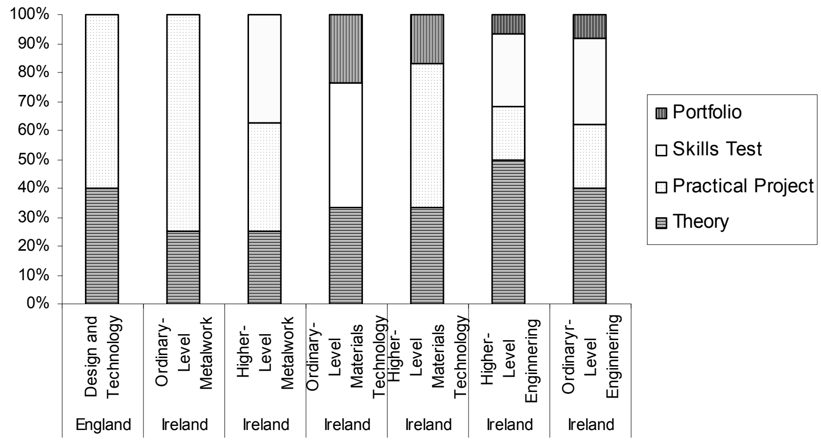

Figure 6. Assessment percentage weightings

The performance of pupils in the courses, as indicated by the percentage of "A" grades they earned, is reported in Table 7. The performance of students in the Resistant Materials course of the Design and Technology course in England are provided for comparison. The proportion of "A" grades appear to be about the same across subjects, with the proportion higher in Technical Graphics and Mathematics.

Table 7
Proportion of students earning "A" grades by subject.

Subject (year)	**Percent "A" Grades**
Metalwork (1999)	7.5%
Technology (1999)	9.1%
Technology (2002)	9.3%
Technical Graphics (1999)	13.5%
Materials Technology (wood) (02)	9.6%
Resistant Materials D&T (2002)	8.9%
English (2002)	7.1%
French (2002)	7.5%
Mathematics (2003)	12.9%

Key Features of Technology Education Assessment Ireland

Metalwork requires a skills test at Higher-Level whereas for Materials Technology (wood) a skills test is not required. Different numbers of points are allocated for the project and portfolio. The subject Technology is examined as follows, Higher-Level 50% practical and 50% theory compared to Ordinary-Level 60% practical and 40% theory. Engineering for the Leaving Certificate requires a skills test at both levels. Construction Studies specifies a written paper worth 50% for Higher-Level and 40% for Ordinary-Level. The class teacher grades the project with external monitoring similar to Design and Technology in England.

The teaching approach to technology education is dichotomous between theory and practice. This division is more prominent in Leaving Certificate Engineering Technology due to increased complexity of subject matter. The revised syllabus caters to this division with areas of the syllabi referred to as "support theory." Williams (n.d.) argues that "Students should perceive technology as a thoroughly integrated activity, not one which can be separated into content and process, or theory and practice." This is not currently the situation in assessment nor is it anticipated to occur in the future.

Final Comments

The experience of other countries must be considered when planning and implementing new syllabi and reforms. In England, Design and Technology is compulsory and thus the perceived status of the subject is no longer a problem. The recognized importance of technological literacy in providing a broad and balanced education highlights the importance for the inclusion of technology education in the core curriculum. Technology education is provided at an early stage in Finland where pupils receive an integrated approach similar to Heywood's model. In England, Design and Technology is listed as a core foundation subject from Key Stage 1. The provision of technology education at the primary level seems logical and essential.

The technology education models of Ireland and other countries display a variety of approaches and philosophies. Two consistent features evident in the models included herein demonstrate that content and activity are inseparable. The "indissoluble alloy" of "content and activity" and "theory and practice" is needed in both the teaching and learning of technology education.

The recommendations from gender studies need to be enacted. The differences in participation rates between boys and girls need to be addressed before new and revised syllabi are implemented. In Ireland the largest loss in enrollment has occurred in the Technology course. At the same time, this course has the greatest proportion of girls enrolled. The cause of this phenomena needs to be investigated.

Entrance testing for the consecutive postgraduate model of technology teacher training in the University of Limerick is a new development in Ireland's technology teacher education. This method of entry is consistent with the highly selective nature of Finnish and English universities. The results need to be monitored for this approach over time.

Presently the universal goal of technology education appears to be technological literacy and capability. Alamaki (2000) noted how difficult it can be to achieve a balance between cognitive content and practical work in achieving this goal. Rasinen (2003) noted that the same issue of "breath versus depth" in his analysis of the curricula of six countries.

Connolly (1986) concluded his chapter in Heywood and Matthews, which focused on changes and planned changes of technology education at the time, with a quote from Nuttgens' (1978) speech in the first Stanley Lecture. "The challenge for us is to discover a more rewarding education in which thinking, and doing, and making are melted together and fused into a concept of living and learning."

Some have considered the notion of internationalizing the technology education curriculum. This is a concept that may appear to be practical in theory but not in practice. As is true in most countries, there are a lot of issues, ideologies, and philosophies that must reach compromise before progress can be made. Ireland is an example of such a country.

Abbreviations

CEB	Curriculum Examinations Board
DES	Department of Education and Science (Ireland)
DfES	Department for Education and Skills (England)
IBEC	Irish Business and Employers Confederation
NCCA	National Council for Curriculum and Assessment
QTS	Qualified Teacher Status
SEC	State Examinations Commission
TTA	Teacher Training Agency

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