



The Role of English and Maths in Technical and Vocational Education: Looking back to look forward

Dr Nuala Burgess
King's College London

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Introduction

The aim of this paper is to provide an historical overview of the role of English and Maths within technical and vocational education and training (TVET) in England. It examines how the perceived value attributed to English and Maths, both together and as individual academic and applied subjects, has developed over time.

A belief in the fundamental importance of English for the moral and social development of the individual, found in policy reports dating from the early 19th century right up to Bullock (1975), seems almost quaint compared to the focus on literacy *skills* of recent years. The status of Maths, on the other hand, has never wavered. Its importance to the nation's economy guarantees its significance. This is especially evident with the current focus on 'STEM' (Science, Technology, Engineering and Maths) and their 'crucial' role in post-Brexit productivity (House of Commons Committee of Public Accounts

2018, p. 3). Indeed, the shortage of STEM skills in the workforce is given as one of the UK's 'key economic problems' (*ibid*). The privileging of Maths is also suggested by the fact that while we have Centres for Excellence in Mathematics (CfEM) there is nothing to compare to these for English.¹

Nonetheless, policy documents focused on the teaching of English and/or Maths have rarely made any reference to technical and vocational education. Similarly, in the field of academic and professional research, the role of these key subjects within TVET in England remains relatively under-researched. Casey et al.'s (2006) wide-ranging and informative study of embedding literacy, language and numeracy in post-16 vocational programmes and their subsequent guide for teachers (Casey et al., 2007) appears unique. Generally, more research attention has been paid to post-16



¹ The 21 Centres for Excellence in Maths (CfEM) were part of a DfE-funded five-year national improvement programme (concluded in March 2023) aimed at delivering improved Maths outcomes for 16–19-year-olds in post-16 settings



Maths teaching and learning. Even then, much of our current literature focuses on evaluating the 'GCSE resit policy' (e.g. Higton et al., 2017; Noyes, Dalby and Smith 2020; Harrop et al., 2021). The Education and Training Foundation (ETF) (2014) and Dalby and Noyes's (2016) studies of Maths as an integral part of TVET, rather than a GCSE subject studied alongside TVET programmes, are therefore significant.² Other than studies which focus on GCSE resits for both English and Maths (Ireland, 2019; Rodeiro, 2018), the role of English as an integral part of TVET, both in the form of language skills and as a subject which encourages critical thinking and interest in worlds beyond learners' immediate experience, has been largely neglected by academics as well as within policy discourses.

The language used to describe technical and vocational education and training changes over time. As far as possible, this historical overview of policy documents and academic and other literature reflects contemporary terminology. At different times, it seems the words 'technical' or 'vocational' has been more fashionable in educational discourses. Generally speaking the term 'technical education' is more commonly found in earlier policy documents. For example, Samuelson (1884) uses 'technical instruction' and 'technical education'. Newbolt (1921) uses technical education when referring to particular subjects and institutions but uses 'vocational education' when discussing non-academic education more generally. Spens (1935) refers to 'technical education'. In later policy documents, such as those from

the 1980s onwards, it is more common to find vocational education. Terminology used in documents produced by the Further Education Curriculum and Review Unit (FECRU) (1979 and 1982) for its post-16 pre-employment course, uses 'vocational preparation', 'vocational sector' and 'vocational interests'. The recent introduction of T levels, has seen a return to terminology referring to 'technical education'. Generally speaking, however, the two terms are interchangeable and there is little to distinguish between the pedagogical approach when teaching English and Maths for subjects described as either 'technical' (e.g. plumbing, engineering) or 'vocational' (e.g. childcare, social work). As this overview will show, an embedded or integrated approach is proposed in some of the earliest policy documents right up to present-day academic research. Where the discussion lends itself to more general observations about the teaching of English and Maths, reference is made to both technical and vocational education to ensure the broadest range of subjects is included.

This history of English and Maths within TVET is not definitive. However, it hopes to offer some insights into the teaching of English and Maths over time and the reasons for the many shifts, developments and occasional volte face which have determined the status of these two key subjects, both in their own right, and as part of technical and vocational education.

² Although the scope of this paper does not extend beyond England, Hodgen, Wake and Dalby's (2017) comparative study of mathematics in technical education in six different countries is a particularly interesting study (see especially pp. 6-9).

The structure

This review is constructed around a selection of key policy documents, roughly organised by time period. The absence of education policy documents dealing specifically with the role of English and Maths within technical and vocational education has meant drawing on policy documents which discuss English and Maths more generally, but only where these can be shown to have relevance to technical and vocational education.

Reports and research papers produced by interested professional bodies and educationalists to help illuminate contemporary debates about the role of English and Maths also inform the writing. The different sections trace a history of policy concerned with the teaching of English and Maths starting in the late 19th century with the 1884 Samuelson Report. Although Samuelson stresses the importance of science and drawing over English and Maths, his report contains the first formal definition of what technical education should include and therefore feels an appropriate starting point. The section which follows moves to the early 20th century and focuses on proposals made in the Newbolt Report (1921) and the Spens Report (1938), both of which contain some surprisingly progressive approaches for teaching relevant to the teaching of English and Maths for technical and vocational subjects today. In the next section, the discussion focuses on

developments in teaching following the 1945-settlement with the significant developments in Maths teaching of the 1950s and 1960s. It was also the era of the personal growth movement in English. The discussion then moves to the 1970s, a time of relative economic decline which prompted a change in direction for education policy and an emphasis on 'skills' for employment. The section which follows covers the development of vocational qualifications during the 1980s through to the 1990s and New Labour's National Skills Strategy. A policy focus on literacy and numeracy skills during this period meant English and Math as subjects in their own right do not feature in any significant way. In the final section, the paper presents some of the debates which surround current policy on post-16 English and Maths, in particular the debates concerned with the value of applied English and Maths in the form of functional skills versus 'academic' English and Maths. The paper's conclusion summarises some of the key influences on the teaching of English and Maths as an integral part of TVET over time. It ends by suggesting that although not reflected in current educational policy, it seems some of the more engaging ways of integrating English and Maths into TVET being carried out by practitioners today reflect recommendations made by enlightened thinkers from the past.



The late 19th century – the birth of a formal technical and vocational education system

A focus on science and drawing

The promotion of STEM subjects and recent reforms in England's post-16 education landscape share some interesting similarities with late 19th century anxieties over Britain's declining economic power and industrial competitiveness. The need for a formal system of technical education was established by Sir Bernhard Samuelson and his committee who set out to compare technical instruction in England with other European countries, the United States, Australia and Canada, as part of the Royal Commission on Technical Instruction (1881-1884). Not surprisingly, Samuelson and his committee's

findings confirmed that underpinning some of the most advanced industrial countries lay a formal structure of technical education. The committee records observing lessons in a wide range of academic subjects and applied skills with special attention paid to art (technical and 'ornamental' drawing), geometry, the sciences and foreign languages. The resulting Samuelson Report (1884) states that the 'best preparation for technical study' is a good secondary education (Samuelson, 1884, p. 516). It also recommended the establishment of schools, or departments within schools, 'in which the study of natural science, drawing, mathematics, and modern languages [took] the place of Latin and Greek' (Samuelson, 1884, p. 538). Samuelson

prioritised the teaching of Science, Mathematics and Art, with no recommendations that English literature or language should be included in 'technical instruction'. This is in spite of Samuelson and his committee observing a 'general literary education' being taught alongside technical instruction in several countries. For example, in a French higher elementary technical school, the report describes a curriculum which includes French language and literature and an attempt being made 'to establish a better balance between the literary and the scientific training' (Samuelson, 1884, p. 72). The absence of 'literary' subjects seems puzzling, but is possibly explained by the fact that 'English' as a subject studied at university level was in its infancy, with far greater attention paid to the teaching of grammar and composition in schools.



Early 20th century – progressive approaches to English and Maths

English and literacy feature strongly in two key 20th century policy documents both of which argue the fundamental importance of English for all subjects and in education generally. The first and of particular interest to this paper is the Newbolt Report (1921) because it makes recommendations specifically for the teaching of

English in technical education. The second is the Spens Report (1938). Spens's proposals for a cross-curricular or interdisciplinary approach to subject teaching suggest approaches to classroom practice which apply equally to academic and technical subjects, and which some schools use today.³



³ For example, the XP school in Doncaster and School 21 in London both use project-based learning. For more on project-based learning and the benefits of this teaching approach for learners, see <https://www.edge.co.uk/edge-future-learning/project-based-learning/>.

The Newbolt Report

Newbolt's report, *The Teaching of English in England* (1921), remains 'a powerfully relevant voice' (Aldridge and Green, 2019, p. 195) in the teaching of English, both as literature and language and identifies key tensions about the place and purpose of English which remain relevant to this day (Perry, 2019, p. 1). Newbolt warned of the problems associated with a knowledge-based curriculum and the smothering of an 'instinct for humanism' in order to meet the demand for measurable results, 'especially the passing of examinations' (Newbolt, 1921, p. 55). Most significantly, however, Newbolt included a chapter devoted to the teaching of English in 'commercial and industrial life'. As a government-commissioned policy document for education, the inclusion of a chapter concerned with technical and vocational subjects suggests the Newbolt Report's uniqueness. In making his recommendations, however, Newbolt was sensitive to the practicalities of including English in technical courses, as well as to the need to engage learners:

the introduction of a training in English into every technical course...[should be] carefully planned [to form] an integral part of the course and to have a close and obvious connection with the profession or craft for which the students [are] preparing themselves.

(Newbolt, 1921, p. 153)

Newbolt was also sensitive to the difficulties of integrating English into part-time and evening courses where students expect to study only subjects directly related to their profession or trade. Although tentatively argued, he believed that just as a technical institution would insist on a student studying 'the sciences connected with his special craft...he should be compelled [to] study English as an integral part of his course' (Newbolt, 1921, p. 154). Newbolt concludes, 'What is required is not so much non-vocational classes in the Technical Schools as more English in the vocational classes' (Newbolt, 1921, p. 352).

Newbolt's recommendations suggest his belief that English should be an integral part of (embedded into) vocational classes. There is little to compare with his unabashed proposal 'That English itself, even literature' should be made relevant 'to the life and work' of learners (Newbolt, 1921, p. 352) until more recent studies advocating the embedding of English and Maths into technical and vocational programmes (Eldred, 2005; Casey et al., 2006). At the heart of Newbolt's passionate promotion of English is his belief that English is 'the essential basis of a liberal education for all' (Newbolt, 1921, p. iv). Although Spens (1938) and Bullock (1975) share Newbolt's belief in the fundamental importance of English to all subjects, and for the role it plays in the social and moral development of the individual (Spens, 1938, p. 218; Bullock, 1975, p. 125), Newbolt's significance within the history of education policy is that he argued specifically for the importance of English as an integral part of technical education. His arguments for a socially inclusive approach to teaching English and the value he attributes to teaching English using an approach rooted in 'reality' rather than relying on 'convention', anticipates more recent thinking about embedded English and Maths (Eldred, 2005; Casey et al., 2006; 2007; Dalby and Noyes, 2015).

The Spens Report

The Spens Report (1938), *Education with Special Reference to Grammar Schools and Technical High Schools*, was wholehearted in its support of the Newbolt Report and the fundamental importance of English, both for the skills it provides as well its lasting social value:

The reading, discussion and reflection which this study provides and stimulates are capable of exercising a wide influence upon the life and outlook of the adolescent, more general and lasting in its effects than that normally exercised by any other subject in the curriculum.

(Spens, 1938, p. 218)

Nonetheless, the significance of the Spens Report lies chiefly in its proposals for a tripartite education system which included the creation of Technical High Schools (a precursor to recommendations in Norwood, 1943 and the Butler Act, 1944). Some of Spens's arguments for the wider benefits of technical education feel uncomfortably idealistic. However, when Spens states that the 'extreme accuracy of working necessitated by many forms of workshop training can scarcely fail to provide a real moral and intellectual discipline' (Spens, 1938, p. 269), his ideas align with key thinkers on the development of vocational education in Germany. For example, Georg Kerschensteiner (1854-1932), Aloys Fischer (1880-1937) and Eduard Spranger (1882-1963) all believed in work forming an essential part of personal self-development (Hinchliffe, 2022).



More importantly for the purposes of this paper, and in the absence of policy documents focused on Maths within TVET during this period, are Spens's proposals for the teaching of Maths. Until Spens, debates about Maths teaching appear to be conducted exclusively among the teacher members of the Mathematical Association (MA), a body formed in 1897. Although the MA's General Teaching Committee produced several reports, including ones focused on Geometry (1923 and 1938), Mechanics (1930), Arithmetic (1932) and Algebra (1934), (Combridge, 1972, p. 7), the emphasis was on teaching and examination, with Maths studied as a purely academic rather than practically-applied discipline. In this context, it is especially interesting to find in the Spens Report proposals which suggest a more progressive approach employing the 'problem' or 'project method' for all subjects, including Maths.

It is striking how modern, even familiar, some of Spens's ideas for the teaching of Maths feel today. Stressing the essential attractiveness of Maths and Science 'when properly presented', Spens warns against the 'arid technique and the excess of detail' which he believes stultify these subjects (Spens, 1938, p. 158). All subjects 'should be pursued actively and not merely assimilated by memory and understanding' (Spens, 1938, p. 159), and for Mathematics and Physical Science,

the "problem method" should be the standard mode of procedure - practical questions of wide interest and utility being made the occasion for the introduction of new mathematical or scientific knowledge or technique.

(Spens, 1938, p. 163)

Spens also suggests a type of 'interdisciplinarity' as part of his project method, a key feature of contemporary project based learning (Harmer and Stokes, 2014, p. 6), whereby learners draw on knowledge from other subjects to solve a research question or problem. Spens argues that intellectual growth can be nourished

by presenting the scholar with problematic situations to be dealt with by means of ideas and methods which may now have the historical character, now the mathematical, now the physical or biological.

(Spens, 1938, p.160)

The progressive spirit which runs through the Spens Report is suggested, finally, by its insistence on the 'complete parity' of subjects (Spens 1938, pp. 169-70) and school types, especially 'in regard to the relative position of the Grammar Schools and the proposed Technical High Schools' (Spens, 1938, p. 274). Significantly, Spens's recommendations for teaching and learning suggest technical and grammar schools should share parity of esteem.



Post-1945 - structural reform

The post-war period saw significant structural reforms in England's secondary education system involving both the introduction of the tripartite (in reality, a bipartite system of grammar schools and secondary moderns) and, in the 1960s and 1970s, the growth of comprehensive schools.

The 1956 White Paper on Technical Education introduced a restructuring and expansion of Further Education (FE) colleges and Colleges of Advanced Technology (CATs) which offered the Diploma of Technology (Dip. Tech.), a degree-equivalent qualification based on a full-time course of two or three

years duration or a sandwich course with periods in industry (Evans, 2009, part 12). Between 1969 and 1973, 30 polytechnics were created through the merging of local technical colleges with colleges of art and commerce. These polytechnics were designed to meet the 'ever-increasing need and demand for vocational, professional and industrially-based expertise, especially in the face of international competition' (Parry, 2022, p. 2) and were a major development for technical education.⁴ The polytechnics' offer was distinctive for its focus on degrees in technical and vocational subjects which could be studied either full or part-time, or as 'sandwich' courses with a placement in industry (Parry, 2022, p. 2).



⁴ A further four polytechnics were created in England between 1989 and 1991 (Parry, 2022).

The Crowther Report

Although the Crowther Report (1959) does not provide any details of a suggested curriculum, it reflects the ethos of the 1944 Butler Act in its assumption that learners on technical and vocational programmes should continue with their basic education but that this should be 'with a vocational bias where appropriate' (Crowther, 1959, pp. 195, 302 (d)). Crowther is not unsympathetic to the claim that the type of education provided by FE colleges should meet the needs of industry, but argues that 'educational considerations' have a stand-alone importance and should not 'always be subordinate' to considerations of employment (Crowther, 1959, pp. 365, 523).

Crowther pays more attention to his proposals for broadening the academic 'specialisation' in school sixth forms; in particular, his recommendations for creating numerate arts students and literate science students (Crowther, 1959, pp. 270, 401). 'Short cuts', such as arts students taking a science subject and science students an arts subject, or the addition of a 'General Studies' course to A level programmes, are rejected (Crowther, 1959, pp. 274, 408). Instead, Crowther proposes a sixth-form curriculum which includes 'complementary elements' designed to include literacy and numeracy. Crowther's descriptions of what constitutes 'literacy' and 'numeracy' make clear that they are viewed as skills separate from academic English and Maths. Except that Crowther's conceptions suggest higher order literacy and numeracy skills, rather than the functional literacy and numeracy skills of today, his proposals appear to anticipate calls for the inclusion of 'core' skills in every post-16 programme by future Education Secretaries Kenneth Baker (1986-9) and John McGregor (1989-90).⁵ In addition to basic English and Maths skills, Crowther's conceptions of literacy and numeracy encompass a broader cultural and social appreciation of the world than A level specialisation generally allows. For example, 'literacy' is defined as meaning both verbal and written communication 'for adult purposes' (Crowther, 1959, p. 282 (e)) as well as 'the development of moral, aesthetic and social judgement' (282 (e)). Credited as being the first not only to define 'numeracy' but to describe it as the 'mirror image of literacy' (e.g. Goos, Dole and Geiger, 2012, p. 3), Crowther explains numeracy as 'the ability to reason quantitatively' as well as having some understanding of 'scientific method' and knowledge of 'the achievement of science' (Crowther, 1959, p. 282 (e)).⁶ Crowther's coupling of literacy and numeracy as essential skills needed in *addition* to academic (A level) arts and science subjects, appears to make his report the first policy document to consider literacy and numeracy as key areas to be included in learning beyond lower secondary. Crowther's conception of numeracy has been described 'a relatively sophisticated level of what might nowadays be called scientific literacy [designed to] bridge the perceived gap between literary and scientific cultures' (Coben, 2003, p. 12). It would take the Cockcroft Report (1982) to define numeracy as something more 'user-friendly' and practical.

⁵ In his examination of the development of core and key skills, Green (1998) points out that education and business organisations had different 'inventories' of core skills. By general agreement, however, they were taken to mean competence in 'communication, numeracy, IT and problem-solving' (23).

⁶ Numerous studies cite Crowther (1959) as the first to define 'numeracy', and as a partner to literacy e.g. O'Donoghue, 2002; Swain et al., 2005; Maddison and Steen, 2008; Hoogland, Kelly and Diez-Palomar, 2019.

Developments in Maths teaching

Other than the Crowther Report's proposals for the introduction of literacy and numeracy to academic programmes in school sixth forms, there appears to be little by way of policy which deals specifically with the teaching of English and/or Maths during the 1950s, let alone as an integrated part of Technical Education. Nonetheless, a single Ministry of Education (MoE) pamphlet on the teaching of Maths suggests a desire to encourage the breaking down of divisions between 'academic' and 'practical' Maths taught in grammar and technical schools respectively. The pamphlet argues that 'many pupils, at all stages, are more interested in the use of the methods of Mathematics than in the underlying theory' (MoE, 1958, p. 89; *author's emphasis*). It also suggests that it would be helpful if secondary school teachers had a knowledge of the type of Maths needed for technical courses offered by local FE colleges or needed in local industries, to decide the focus of their teaching (MoE, 1958, p. 30). Although the recommendations do not appear in any other policy documents of the time, they do chime with contemporary thinking. Both the recent Skills and Post-16 Education Act (2022a) and guidance set out in the DfE's (2022b) Local Skills Improvement Plans include recommendations that post-16 technical education providers work with employers to ensure 'provision is more responsive to employer needs and those of the local economy' (DfE, 2022b, p. 11).




The 1960s saw significant developments in the teaching of Maths, some of which were anticipated by proposals made in the MoE (1958) pamphlet. Although it suffers from outdated categorisations of 'able' and 'ordinary' (lower achieving) students, other areas of the pamphlet discuss ideas for Maths teaching which later appear in a more fully formed way in the 'New Maths' educational movement (also referred to as Modern Mathematics). For example, the MoE pamphlet emphasises the importance of classroom discussion and problem-solving (p. 124) as well as individual assignments, projects and practical work (p. 125). Also stressed is the importance of Maths as a 'tool' which can be used to formulate problems as well as 'suggesting further problems or in predicting new phenomena or developments' (p. 30). The New Maths educational movement of the 1960s would see new approaches to teaching and the introduction of new content at both primary and secondary level. These new approaches were an attempt to make the content 'more in tune with' a wide range of abilities and interests (Breakell, 2001, p. 12). Breakell (2001) argues that New Maths saw a transition from the limited study of arithmetic and its applications to an examination of a much wider range of topics, some of which were 'exciting and intrinsically interesting' (p. 12).

New Maths inspired a number of projects including the School Mathematics Project (1962), the Mathematics for the Majority Project (MMP) (1967) and the Nuffield Primary Mathematics Project (1964). Although the focus was on the teaching of Maths in schools, both the MMP and the Nuffield project recommended approaches to Maths teaching which remain highly relevant to technical education. All advocate a pedagogy based on *doing* to help 'promote concept formation, an understanding of mathematical relationships, and the role of mathematics in everyday life' (Breakell, 2001, p. 101). Rappaport (1971) describes observing classes involved in the Nuffield Primary Mathematics Project (NPMP) where learning was taking place 'through active involvement with real situations and real material' (Rappaport, 1971, p. 297). Through doing, Rappaport explains, learners discovered mathematical relations (p. 296). In spite of being aimed at younger learners, the NPMP's employment of questioning, discovery and problem-solving through *doing* is applicable to all stages and types of Maths, and echo Spens's (1938) earlier descriptions of the 'project method' for older learners.


Although the language of embedding does not appear in the literature of the time, examples of 'subject interplay' described in *Mathematics for the Majority* point to the use of embedded Maths as part of the 'integrated courses' aimed at the final year of school for early school leavers. Maths content is clearly embedded in the cross-curricular, individually themed projects such as 'family community and work' and 'questions of our time'. As well as working with 'matters of national, civic and personal finance' students are expected to undertake the gathering of 'statistical data and its presentation, both graphical and otherwise' (The Schools Council, 1967, p. 11). The use of embedded Maths can also be seen in action in the documentary footage of schoolchildren taking part in a lesson inspired by the Nuffield Primary Maths Project (*Practical Approaches to Education Nuffield Maths*, Huntley Film Archives) with children undertaking problem-solving tasks 'through things they can do, handle and touch', such as discovering the best way to measure the circumference of a ball and using trial and error to estimate weights and measurements.⁷

⁷ See <https://www.huntleyarchives.com/preview.asp?image=1006770> 2:15



The personal growth movement in English

Although the Maths community appears more active, the 1960s also saw a significant development in English teaching in response to the Personal Growth movement (Goodwyn, 2016). Harris (1991) describes a 'Copernican shift from the view of English as something one learns about to a sense of it as something one *does*' following the Dartmouth Conference of 1966 (p. 631). Dixon's (1967) report on the proceedings, *Growth Through English*, describes a desire to move away from traditional teaching centred on 'the transmission of skills (composition) and knowledge (literature)' to a focus on the experiences of students and how these were shaped by their uses of language (Harris, 1991, p. 631). Critics of the growth model argued that the approach devalued literature, denied learners access to their cultural heritage and reinforced divisions between English teaching and research. Although flawed, advocates of the growth model felt it democratised English (Harris, 1991, p. 643). Reviewing Dixon's updated version of *Growth Through English*, Goodwyn (2016) describes Dixon's 'political and social awareness' referencing Dixon's belief in the need for teachers to understand the real lives of students (p. 14). In his analysis of Dixon's new chapter, Goodwyn points to the author's desire to 'encapsulate the social purpose of texts in relation to audience' (Goodwyn, 2016, p. 14) and a more relaxed approach to the use of 'formal and correct' English for effective and public communication (Goodwyn, 2016, p. 14). The battles over English and the use of the growth model appear to be between traditionalists who feared the loss of literary heritage and progressives who argued for the 'emancipatory heart of English' (Goodwyn, 2016, p. 19) and the need to make English, in all its forms, relevant to learners' lives. There appears to be little written about the growth model being used for the teaching of technical and vocational subjects in England. Nonetheless, the ethos which underpins it may be seen in any teaching which encourages student agency and uses social and cultural resources and 'real world' contexts, in order to make English and Maths meaningful and relevant to learners' lives.



The 70s – a new focus on ‘skills’

The appetite for finding innovative and inclusive ways for the successful teaching of academic and applied Maths and English would all but disappear during the 1970s, a period of deep political and economic crisis (Gamble, 1990).

Interest in these key subjects was replaced by a focus on skills for employability, with policy discourses linking education and the economy usually attributed to Labour Prime Minister James Callaghan's 1976

Ruskin speech (Hayward and Fernandez, 2007, p. 218). In his Ruskin speech, Callaghan described basic literacy and numeracy as 'essential tools' of education, although numeracy appears his greater concern. Citing 'complaints from industry', Callaghan argued that there was a 'case for a professional review of the mathematics needed by industry at different levels'. Two years after Ruskin, Callaghan would commission such a review resulting in the Cockcroft Report.



The Cockcroft Report

Mathematics Counts (the Cockcroft Report) (1982) was the product of a wide-reaching enquiry into the teaching of Maths 'with particular regard to the mathematics required in further and higher education, employment and adult life generally' (Cockcroft, 1982, p. ix). As well as devoting sections to the teaching of Maths in schools, assessment and exams, Cockcroft addresses employers' concerns about standards of numeracy and the 'mathematical needs of adult life' (Cockcroft, 1982, p. 5). The Report states that 'Mathematics is not only learned in mathematics lessons' but is encountered beyond the classroom as a naturally occurring part of other disciplines:

A great deal of mathematics is used and learned in science...and in technical drawing. In these subjects, not only is mathematics learned and practised in a practical context, but the message is conveyed that mathematics is useful in the technical, scientific and employment worlds.

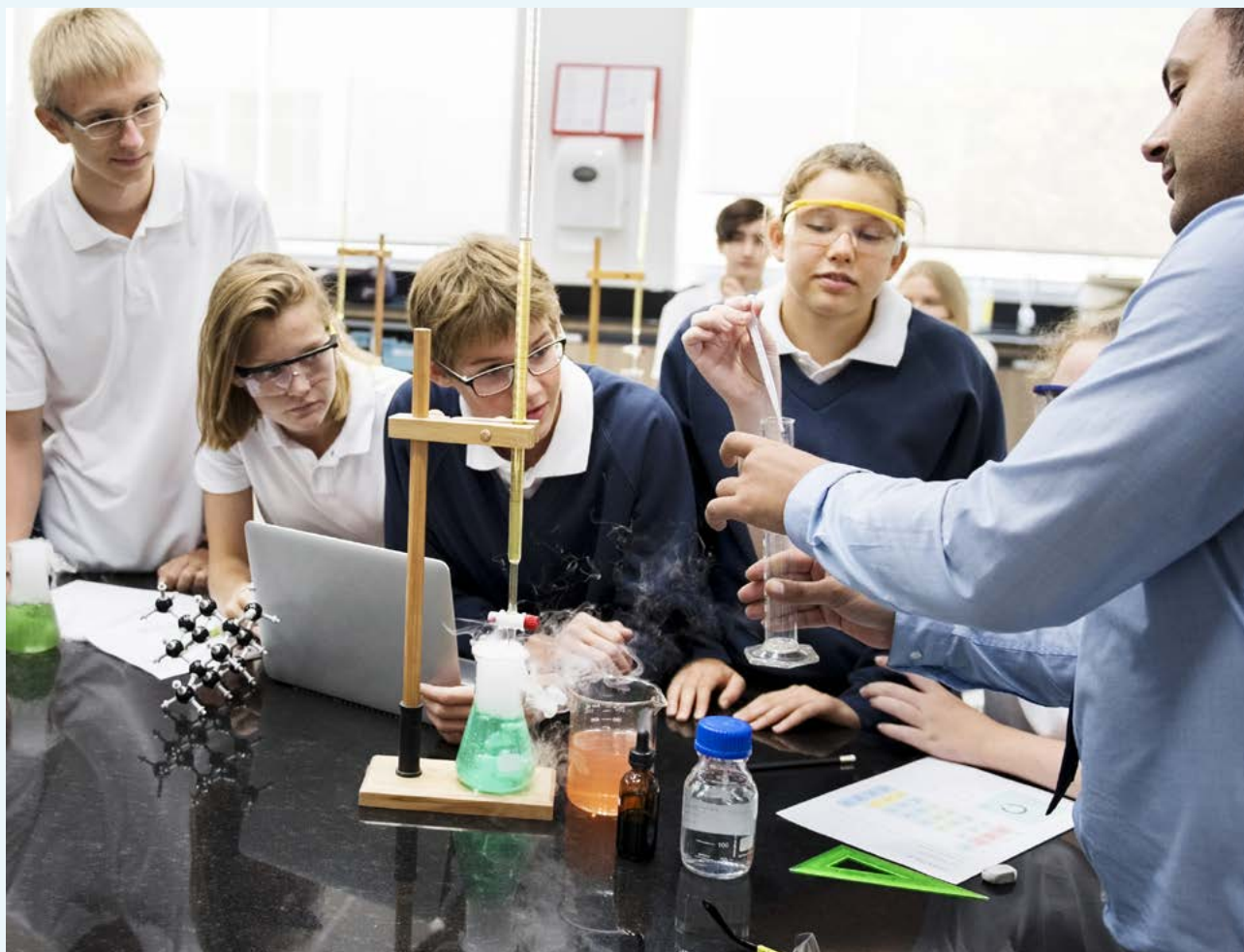
(Cockcroft, 1982, p. 281)

Cockcroft's recommendations for the teaching of Mathematics are strongly inclusive. There is much evidence in the report to suggest that Cockcroft and his committee valued Maths as an academic subject studied for its own sake as well as a naturally occurring part of technical and vocational subjects, and also in the form of everyday numeracy. Although some of Cockcroft's more imaginative examples are aimed at lower attaining learners, his proposals for drawing on learners' extracurricular activities such as sailing and orienteering to help develop their understanding of mathematical concepts (Cockcroft, 1982, p. 141) share similarities with Dalby and Noyes's (2015) work on 'connecting' Maths to students' vocational development, values and culture' (p. 46), and the NPMP's learning through the discovery of mathematical relations. Cockcroft states there should be no 'definitive' way to teach Maths, but advises that classroom practice of 'successful mathematics teaching' for learners of all ages should include:

- exposition by the teacher;
- class discussion;
- practical work and consolidation and practice of 'fundamental skills and routines';
- problem solving, including the application of mathematics to everyday situations;
- investigational work.

(Cockcroft, 1982 p. 71)

The recommendations for problem solving, the application of Maths to everyday contexts and investigational work are similar to ones made by Spens (1938) and Nuffield (1964). They also occur in the type of Maths undertaken for project-based learning used in today's T level classwork (Burgess and Winch, 2022).



In the sections devoted to adult numeracy, Cockcroft's proposals point to New Labour's National Skills Strategy (NSS) with a focus on numeracy skills for employment. As if in anticipation of the NSS, Cockcroft gives a definition for 'numeracy' which is noticeably more inclusive and broader than Crowther's concept. Cockcroft's conception is one we recognise today. Comprising two attributes, the first is described as an 'at-homeness' with numbers, and an ability to make use of maths skills to cope with 'the mathematical demands of everyday life' (Cockcroft, 1982, p. 11). The second is an ability to have an 'appreciation and understanding of information presented in mathematical terms' such as graphs, charts and tables, and what is meant by a percentage increase or decrease (Cockcroft, 1982, p. 11). Cockcroft's list of the mathematical skills needed for adult life - to estimate, count, weigh and measure, to pay for purchases and give change, to understand simple timetables, graphs and charts and to tell the time (Cockcroft, 1982, p. 10) - stress the naturally occurring nature of Maths in everyday life. They also highlight the usefulness of being able to apply Maths in ways required by future Key and Functional Skills qualifications, discussed further on.



The Bullock Report

It seems possible that the impact of the Ruskin speech, 'often presented as denoting the end of consensual policy-making in education' and a prefiguring of Thatcherite educational policies' (Batteson, 1997), explains why the Bullock Report (1975) on English was largely overlooked. The collaborative spirit of many of the recommendations in *A Language for Life* includes a whole-school approach to literacy and co-ordinated adult literacy programmes involving local authorities, trade unions and industrial training agencies (Bullock, 1975, p. 541-2). Bullock's key recommendation, that every school should have 'an organised policy for language across the curriculum, establishing every teacher's involvement in language and reading development throughout the years of schooling' (Bullock, 1975, p. 514), echoes Newbolt's (1921) belief that 'every teacher is a teacher of English, because every teacher is a teacher *in* English' (p. 348; *Newbolt's emphases*). Described as 'reasonable-sounding, apparently straight-forward and certainly cheap' Bullock's proposals proved difficult to implement (Robertson, 1980, p. 7). They were, in any case, out of step with the general reframing of the aims and practices of education which characterise the 1980s during which responsibility for education shifted from educationalists to politicians. Certainly, criticism by English teachers of the newly introduced National Curriculum in 1989 suggests Bullock's recommendations were largely ignored (Higgin, 2013, p. 37).

Nonetheless, although focused on the teaching of English in secondary schools (specifically, 5-16 year-olds), Bullock contains several recommendations for the teaching of English language which remain especially useful for technical education. For example, he advocates encouraging reading for information and purpose instead of setting comprehension exercises from textbooks (Bullock, 1975, p. 120). He also stresses the value of critical reading and evaluation – including the critical evaluation of textbooks (Bullock, 1975, p. 121) – and recommends the use of different reading strategies according to the material being read and the purpose for reading. Bullock points out that schools expect students to 'read all material fairly intensively' whereas an 'efficient reader' will 'glance through selectively or scrutinise in detail' and know when different approaches are appropriate (Bullock, 1975, p. 122). Such strategies suggest the type of practical reading skills which now form part of current Functional Skills English (DfE, 2018a; City Lit.ac.uk) and which some argue are of more use to vocational learners than GCSE English (Belgutay, 2018; Ireland, 2019; Ryan, 2018; Sezen, 2019). Many of Bullock's recommendations suggest his feeling for English as something useful, which can be applied, as well as a subject to be appreciated. A considerable section is devoted to the teaching for literature which while not immediately relevant to English within technical education, confirms Bullock's desire to see English as a subject which should be accessible as well as enjoyable. Although he believes that the tradition of teaching literature 'is one which aims at personal and moral growth' (Bullock, 1975, p. 125), he is under no illusion. Citing Sampson (1921), Bullock states, 'Let me beg teachers to take a sane view of literature. Let us have no pose or affectation about it. Reading Blake to a class is not going to turn boys into saints.'⁸

⁸ George Sampson was a school inspector and author. His book *English for the English* contained the assertion 'every teacher is a teacher of English' (Barton 2013).



The Manpower Services Commission

Nonetheless, the practical recommendations for the teaching of English contained in the Bullock Report and Cockcroft's inclusive approach to Maths were quickly overshadowed by the policy shift focused on skills for employment driven by the Manpower Services Commission (MSC) (1974-1988), a non-departmental public body of the Department of Employment. It has been argued that the MSC represented the 'single best condensation of Labour's education policies' during the 1970s (The Centre for Contemporary Cultural Studies (CCCS), 1981, p. 228). Taking up some of the themes of Callaghan's Ruskin speech, in particular the need to meet the demands of employers, the MSC set up a series of training schemes focused on school-to-work transitions 'beyond the reach of' the education system and which 'translated the relation between schooling and employment into a new language of training' (CCCS, 1981, p. 228). Hillier (1988) states that the failure of many of these schemes was largely down to the substantial number of trainees with literacy or numeracy problems (p. 77). Commenting on *Literacy and Numeracy, the MSC's Response* (1987), she says the MSC admits to being uncertain of the scale of help needed and its ability to meet it within existing programme funding (p. 78). Literacy and numeracy appear to have been of secondary concern to the MSC since its Youth Training Scheme (YTS) prioritised the acquisition of general or transferable skills and competences to ensure a flexible workforce (Jones, 1988, p. 58). In addition to Hillier's observations about the MSC's failure to address trainees' literacy and numeracy skills, Jones highlights the lack of obligation on employers participating in YTS to offer any form of structured training (Jones, 1988, p. 55).

A Basis For Choice

In spite of the number of participants and its ambitious goals, the MSC's YTS was never regarded as much more than a palliative for unemployment (Tusting and Barton, 2007, p. 18). Certainly, Clark (2011) argues that rising youth unemployment during the late 1980s and 1990s explains the sharp increase in numbers enrolling in further education (p. 523). In response to this rise, the Further Education Curriculum and Review Unit (FECRU) set up a study group to develop a suitable full-time, post-16 pre-employment course.⁹ Their report, *A Basis For Choice* (1979; 1982), presented a curriculum comprising 12 Aims designed to help learners develop a range of social and practical skills in preparation for work. Aim 6 was to develop 'a level of achievement in literacy and numeracy appropriate to ability and adequate to meet the basic demands of contemporary society' (FECRU, 1979, p. 42). The objectives of Aim 6 covered a wide range of verbal, written and numeracy skills. In addition to being able to describe and explain events, communicate with different audiences and write legibly and effectively, learners should be able

to distinguish fact from opinion, identify emotive and ambiguous statements, and identify instances where expert advice is relevant to a matter of opinion.

(FECRU, 1979, p. 59)

The objectives of the numeracy skills cover the acquisition of basic addition and subtraction skills to the more demanding, such as being able to interpret ratio and proportion and make 'elementary algebraic substitutions' (FECRU, 1979, p. 58). Accompanying the literacy and numeracy objectives are examples of their everyday application. Examples given are applying the necessary VAT to an item and being able to evaluate the veracity of a political speech or newspaper article. In spirit if not in detail, the FECRU's wide-ranging literacy and numeracy Aims appear to anticipate both the General English and Maths Competencies for T levels and the type of information needed for questions which appear in current English and Maths Functional Skills Level 1 and 2 papers.¹⁰ Although the work of the FECRU Working Group appears to have been largely forgotten, *A Basis For Choice* contains many far-sighted proposals and creative ideas for incorporating practically-applied literacy and numeracy and 'soft' skills which remain relevant to the teaching of technical and vocational subjects today.

⁹ The FECRU study group included college principals, a Head of Department of General Studies, South Thames College and representative of ILEA, a university Professor of Education, representatives from the Education Department of the Trades Union Congress, Department of Education and Science, Confederation of British Industry, and the Manpower Services Commission and an HM Staff Inspector, Department of Education and Science.

¹⁰ Specimen and past papers for Functional Skills English and Maths <https://passfunctionalskills.co.uk/functional-skills-past-papers/>

The 1980s and 'The Skills Revolution'

Although it seems possible that some of the wide-ranging proposals for Further Education Curriculum and Review Unit's (FECRU) post-16 pre-employment course would inform future core and functional skills qualifications, they appear to have had little impact at the time.

As with the far-reaching recommendations contained in the Bullock Report and the Cockcroft Report, *A Basis For Choice* became side-lined by the comparatively narrow focus of the Manpower Services Commission's 'soft' or transferable skills for employment. As Keep et al. (2006) have argued, for many young people the vocational route in England remains 'extremely narrow and dominated by task-specific vocational qualifications [with] no meaningful element of high-quality general education' (p. 553). This paper cannot do justice to all the reasons why some employers were unenthusiastic about NVQs (see Roe, Wiseman and Costello, 2006), a set of work-related competence-based qualifications introduced in 1986. However, as qualifications designed for particular jobs, they generally ignored basic skills

such as literacy, numeracy and communication (Tusting and Barton, 2007, pp. 219-20). It would not be until the early 1990s that literacy and numeracy would once again play an important role in vocational education after Kenneth Baker, the then Education Secretary, criticised the narrow approach to skills development embedded in NVQs and their failure to improve levels of numeracy and literacy in the workforce (Hayward and Fernandez, 2004, pp. 130-131). Nonetheless, Baker's proposal that core skills form common components for post-16 vocational and academic programmes in order to 'bring them closer together' (Baker, 1989, p. 18) was felt to be unworkable. As a result, qualifications focused on core skills have tended to be taught only as part of apprenticeship programmes or more general vocational pathways (Hayward and Fernandez, 2004, p. 131). Ultimately, the introduction of both core and key skills qualifications in an attempt to bridge the divide between academic and vocational courses proved an 'ineffective surrogate for general education and culture in vocational programmes' (Green, 1998, p. 23).



New Labour's National Numeracy and Literacy Skills Strategy

A key moment in policy focused specifically on English and Maths in their sibling forms of literacy and numeracy, came with the launch of New Labour's National Numeracy and Literacy Skills Strategy (NSS) (2001-9) of which 'Skills for Life' would play a key part. Informed by the 1999 Moser Report, *Improving literacy and numeracy: a fresh start*, and a belief that improving basic skills enabled people 'to earn more, to spend more, to help the economy to grow faster' (Moser, 1999, p. 3), 'Skills for Life' was an initiative to improve adult literacy, language and numeracy skills. Wolf et al. (2010) argue that Britain has been especially 'enthusiastic' about 'the idea of reshaping education for economic ends (p. 386) based on an 'assumed relationship between the basic skills of the employed population and productivity' (Wolf et al., 2010, p. 385; see also Keep et al., 2006). The NSS meant that interest in the teaching of English and Maths, both as multi-faceted academic subjects and dynamic, naturally occurring subjects within technical and vocational subjects, became side-lined in favour of policy focused on developing literacy and numeracy programmes in the workplace and FE colleges. Some educationalists and academics argued that a focus on literacy distorted the teaching of English, subverting it to the cause of literacy goals (Cambridge Assessment, 2013, p. 6). Maths educators tended to welcome the focus on numeracy, arguing that while Maths is abstract and asks students 'to rise above context', the value of numeracy is 'concrete and contextual, offering contingent solutions to problems about real situations' (Steen, 2001, p. 11). In other words, numeracy is a form of Maths which can be seen to be immediately useful and relevant.

TVET practitioners and learners' experiences

In their comprehensive study of approaches to embedding literacy, language and numeracy into post-16 vocational programmes, Casey et al. (2006) found that although learners understood the need to develop stronger literacy and numeracy skills, they were 'highly sceptical' about English and Maths being related to their vocational goals if taught in a 'school-like manner' (p. 25). Negative associations with school meant that learners resisted English and Maths when taught as discrete subjects (Casey et al., 2005, p. 7) but not when these subjects were embedded in the form of literacy and numeracy. Casey et al. also found that pedagogy using embedded English and Maths not only produced better results but retention and pass rates for vocational courses were higher (Casey et al., 2006, p. 17). Such findings suggest the far-sightedness of recommendations for the teaching of English found in Newbolt (1921), Spens (1938) and Bullock (1975) and for Maths in Spens and Cockcroft (1982). Although the language of embedding is not used, all stress the importance of integrating English and Maths into learning in ways which are meaningful for students and have relevance to their lives. Casey et al.'s (2006) study, however, is the only instance where lecturers and students describe their experiences of how English and Maths are taught as part of vocational programmes. For this reason, Casey et al.'s work represents a particularly important contribution to the history of the role of English and Maths within TVET.

Where we are now – the prioritising of GCSE English and Maths

The 2011 Wolf report *Vocational Education*, commissioned by the Conservative-led Coalition Education Secretary Michael Gove (2010 – 2014), was arguably instrumental in the policy shift from New Labour's skills-focused national literacy and numeracy strategies to one that prioritised academic (GCSE) English and Maths.

In her report, Wolf argues that GCSE English and Maths are a better route to raising literacy and numeracy levels and therefore to employability:

Individuals with very low literacy and numeracy are severely disadvantaged in the labour market. English and Maths GCSE (A* -C) are of critical importance for employment. Employers use them as a signal and sifting device and they are also of critical importance for entry into selective programmes post-16, and HE.

(Wolf, 2011, p. 32)

The Association of School and College Leaders, however, argue that GCSEs are better reserved for 'demonstrating mastery in the discipline' than acting 'as a proxy for literacy and numeracy' (ascl.org.uk). Their view is supported by a 2015 ETF report which confirms that although employers trust GCSEs, many 'do not have a reliable grasp of the skills and knowledge that GCSE tests' (p. 3) and value 'strong practical and applied skills in maths and English' over qualifications (ETF, 2015, p. 9). It seems possible that the role of GCSEs as a 'signal and sifting device' for employers may have more to do with brand recognition than the inherent usefulness of these qualifications to learners on technical and vocational programmes.

Nonetheless, Wolf (2011) and Sainsbury (2016) both advocated making GCSE English and Maths an essential part of technical and vocational programmes. Wolf's (2011) Recommendation 9 states that every student under 19 without an A* - C (9-4) in GCSE English and/or Maths should be required to pursue a course leading directly to these qualifications, or significant progress towards them (p. 84). Wolf is critical of non-

GCSE English and Maths qualifications available at the time, arguing that Key Skills in 'application of number' and 'communication' failed to provide the 'substantial content and coverage' in Maths and English necessary as a stepping stone to GCSE (p. 84). Outlining the 'limitations' of Key Skills, Wolf describes them as 'on-line, on-demand, multiple-choice tests' which may be delivered without 'specialist instruction' (Wolf, 2011, p. 84). She is especially scathing about the English test which requires 'no writing at all' and the multiple choice Maths test which covers 'only numeracy i.e. arithmetic' (Wolf, 2011, p. 84). At the time of the Wolf Report, Functional Skills had been recently introduced to replace Key Skills. Wolf concedes that they might 'settle into' useful qualifications for some but argued that they were not in themselves 'an adequate maths and English diet for the 16-19 cohort' (Wolf, 2011, p. 84). By the time of the Sainsbury Report (2016), Functional Skills were under review with the intention of improving both their 'relevance and content' and their 'recognition and credibility in the labour market' (Sainsbury, 2016, p. 49). Coupled with improved assessment and standard-setting materials, Sainsbury argues that Functional Skills will be 'a more reliable indication of secure literacy and numeracy' (Sainsbury, 2016, p. 49).

English and Maths Functional Skills, in their redeveloped form, were launched in 2019. Described as being 'relevant for employment and easier to compare with other qualifications' (DfE, 2018b), many have argued that they offer a more appropriate English and Maths qualification for learners on vocational and technical programmes (ETF, 2015; Rodeiro, 2018; Ireland, 2019). For example, Ireland's (2019) study of the 'issues and challenges' faced by post-16 learners studying English and Mathematics finds that those who struggle to grasp concepts and retain information are helped when content is delivered through real-life contexts. Ireland argues that this approach, central to Functional Skills pedagogy, is 'more difficult to do when teaching GCSE' (Ireland, 2019, p. 32). At the time of writing, however, and in spite of calls for a review (Sezen, 2019), all students under 19 who have not achieved a GCSE pass (grade 4) in English and/or Maths are required to resit. This is



also a condition of funding, although those with GCSE grade 2 may study for Functional Skills level 2 (GOV. UK). Catherine Sezen, Senior Policy Manager at the Association of Colleges (AoC), points out that 'all the research indicates employers are looking for effective written and spoken communication skills and basic numeracy', not the kind of 'analysis of language, creative writing and trigonometry' taught for GCSE English and Maths (Sezen, 2019).

In the meantime, the problems of yoking academic English and Maths to post-16 technical and vocational programmes remains but with growing unease over the GCSE resit policy. Most recent figures show a further fall in pass rates with 28% of students who resat English and 20% who resat Maths, achieving a grade 4 (Noble,

2022). Some concessions have been made. For example, although T level students who have not attained a GCSE pass are expected to study for them, it is no longer an exit requirement. Nonetheless, the viability of the GCSE resit policy raises some interesting questions about the type of English and Maths of most value to learners on TVET programmes.

Concluding thoughts

This overview of the role of English and Maths in technical and vocational education over the past 150 years has attempted to reflect the fluctuations in value attributed to these key subjects.

A notable absence of policy interest in the teaching of English and Maths as part of TVET has entailed searching through a range of school focused reports, including those firmly established in educational history as well as those produced by less well-known educational movements, for evidence of thinking about how the teaching and learning of English and Maths might apply to TVET. Latterly, when English and Maths are mentioned in relation to technical and vocational education there is a focus on literacy and numeracy or, more recently, the perennial failure of the GCSE resit policy (the AoC; ASCL; Rodeiro, 2018; Ofsted, 2018). It seems possible that a policy vacuum in how we might teach English and Maths as part of TVET has allowed GCSE English and Maths to accrue an unrealistic set of responsibilities within post-16 technical and vocational programmes, and therefore inflated the importance of GCSE English and Maths. Not only are GCSEs expected to deliver English and Maths suitable for both further academic and technical/vocational study, but GCSEs also serve as a proxy for functional literacy and numeracy (Wolf, 2011; ASCL.org.uk). The number of people who question the relevance and suitability of academic English and Maths for post-16 technical and vocational learners is increasing and include a former Chair of the Education Select Committee and the AoC. For some, the solution lies in greater recognition for Functional Skills as a 'stepping stone' to GCSE. Others argue that the design and purpose of Functional Skills suggest they should be viewed as an alternative route entirely, judged by reference to employability (ETF, 2015, p. 14). Yet others argue that the type of English and Maths skills required to pass GCSE simply do not come naturally to many post-16 learners who tend to be more motivated when taught using contextual Maths and English, as they are for Functional Skills (Ireland, 2019).

There are, however, signs that lessons from the past may be informing approaches to the teaching of naturally occurring English and Maths within TVET. Lesson observations of T level teaching (see Burgess and Winch, 2022) confirm the value of Spens's (1938) problem or 'project method' where teaching is based on real life scenarios which 'invite the application and synthesis' of

different types of knowledge and skills (Spens, 1938, p. 159). Another lesson from the past being currently applied is Newbolt's recommendation that 'applied English' should be taught 'not as a separate subject' but through 'the application of English to industrial and commercial work' (p. 136). Newbolt and Spens's recommendations are ones we now recognise as approaches which use embedded English and Maths advocated by Eldred (2005) and Casey et al (2006) and are reflected in the growing interest in project-based learning. As this overview has tried to show, recommendations for teaching English and Maths which date from as early as the 1920s and 1930s, but also as relatively recently as Bullock (1975) and Cockcroft (1982), remain highly relevant for technical/vocational education today. Unlike the past, however, it would seem that today it is college educationalists, rather than policy makers, whose knowledge and experience means they lead the way in how English and Maths may be taught using examples which engage and have relevance for TVET learners.

Some of the lessons from the past are best left to history. Others continue to inform exciting and innovative approaches to classroom teaching. A final lesson which the past offers comes in the many policy recommendations encouraging a more generous and inclusive approach to how we teach English and Maths both as academic subjects and as literacy and numeracy. All the reports up to and including Cockcroft (1982) are underpinned by the desire to make English and Maths accessible for every type of learner, at all stages of learning and in all contexts. Even Samuelson's (1894) recommendation that all students of technical subjects have access to a good general education reflects this inclusive and humanistic approach to education. In light of some of the more progressive thinkers from the past, the current importance attributed to GCSE English and Maths and the achievements of academic learners feel curiously archaic. If conceptions of English and Maths could be less rigidly applied, then both the academically-inclined and learners with an aptitude for technical study could have access to a type of English and Maths which has relevance and meaning for their learning and future lives.

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The Edge Foundation
44 Whitfield Street
London, W1T 2RH

T +44 (0)20 7960 1540
E enquiry@edge.co.uk

www.edge.co.uk