

Career-related learning and science education: the changing landscape

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ABSTRACT Pupils ask STEM subject teachers about jobs and careers in science, but where else do they learn about work? This article outlines career-related learning within schools in England alongside other factors that influence pupils' career decisions. The effect of the Education Act 2011 will be to change career learning in schools. The impact on science educators as advisers, facilitators, commissioners or managers of career-related learning is discussed, with a conclusion that, while science educators are not career educators, they nevertheless can support career-related learning in their delivery of the curriculum alongside enhancement and enrichment activities.

Science is enjoyed by a significant proportion of pupils: the majority think it is important for getting a good job, two-thirds think they are good at it, and there is a high level of interest in science-related careers. This is according to survey evidence from our longitudinal study of pupils at key stage 3 (age 11–14) in English schools (Hutchinson, Stagg and Bentley, 2009). Attitudes towards mathematics and technology are similarly positive, albeit to a lesser degree. Yet, despite this, there is still a reluctance to take science, technology, engineering or mathematics (STEM) study further. The King's College London ASPIRES research project (Archer *et al.*, 2010) is questioning the extent to which this is due to the way that young people build their personal identities; in other words, while young people enjoy science, many simply don't see themselves as becoming scientists. Career-related learning is one way to help young people to overcome that gap, in that it supports young people to build awareness of their skills and values and their own identity, it enhances their knowledge of employment and it informs their attitudes to planning their futures, to make and implement career decisions.

Science educators have a part to play in career-related learning, not least because the longitudinal survey also revealed that young people are more likely to ask their subject teachers about related careers than they are their career teachers.

This article explains what is meant by the phrase career-related learning, and more

specifically the components of such learning that will be familiar to pupils. It then goes on to outline both environmental factors and legislative change that are altering the landscape of career-related learning in English schools. Finally, it outlines the implications of such changes for science educators and senior leaders in schools.

Policy focus on STEM careers

The shortage of STEM skills in the labour market was highlighted in the Roberts review, *SET for Success*, in 2002, and also more recently by the UK Commission for Employment and Skills (2010) Strategic Skills Audit, which highlighted the potential mismatch created by a forecast of overall employment growth (in STEM, strong sectors such as advanced manufacturing, life sciences and pharmaceuticals, and the low-carbon and digital economies) alongside current STEM skills shortages experienced by employers, particularly among technicians.

It is seen as imperative to bring more people into the workforce with better scientific and technical knowledge, skills and expertise, which employers and business organisations report to be essential for future economic growth and stability. Within schools there have been numerous initiatives, including the development of stimulating learning resources, professional development opportunities for teachers, competitive challenges, STEM Ambassador schemes (where people working in industry interact with pupils in school), and a wealth of

other enhancement and enrichment activities (such as STEM clubs, visits to employers or science fairs, competitions and scholarships).

Following a cross-government review in 2006, a £160 million STEM Cohesion Programme was developed to bring together the many stakeholders who support the teaching and promotion of STEM subjects. One of the actions that was undertaken as part of this Programme was a workstream designed ‘to improve the quality of advice and guidance for students (and their teachers and parents), and to inform subject choice’. The national evaluation of the Programme (NFER, 2011) found that teachers’ engagement in enhancement and professional development activities related to STEM was increasing. The extent of teacher engagement in STEM career-related activities was less encouraging, with just 28% of teachers ‘often’ engaged with STEM careers-related enrichment activities, and only 15% ‘often’ engaged with STEM careers-related professional development. This may indicate that there is limited STEM careers focus within enrichment activities for students and training for teachers.

How do young people learn about jobs and careers?

Young people’s experiences at school only partly explain the educational choices that they make, as their vocational aspirations are developed in a complex way as they grow, learn and mature. Green and White (2007) established a link between the place where young people grow up and their aspirations, and argued that where someone lives influences the opportunities that are available to them and hence the choices that they make. Others have focused on the influence of parents and their very notable impact on young people’s choices (Gorard and See, 2009). Research has shown that the children of parents who have been to university are most likely to want to attend university, whereas parents who have lower qualifications will have children who

are more likely to leave school earlier, and with lower levels of attainment (Lankard, 1995).

Equality and diversity factors are also important in the development of the choices that young people make. For example, young people from black and minority ethnic backgrounds make distinctively different choices to those of white British background (Hutchinson *et al.*, 2011). Gottfredson (2005), meanwhile, argues that, of all personal characteristics, their gender is the fundamental factor that explains occupational choice, in that as young people mature they define themselves initially in terms of their gender and this identity then leads them to exclude certain occupational choices, thus placing self-imposed limits on personal aspiration.

Young people’s backgrounds do influence their choices but they do not always explain them. Millward and colleagues (2006) argue that, while there remain differences between what different groups of young people aspire to, what they want is more similar than it is different. Furthermore, their aspirations can be influenced by exposure to employment through work shadowing/observation or actual work experiences, or indirectly through talking to family or friends actually in the job. Moreover, learning can happen in schools through a deliberately planned programme of careers education and guidance. Research by Blenkinsop and colleagues (2006) concluded that schools can make a difference to how young people make decisions. Effective schools – in relation to curriculum management, student support, staff expectations and school leadership – were more likely to be populated by young people who were making the most rational decisions, and who remained happy with their choices 6 months later. Thus, while the influence of career-related learning in schools has to be set within the context of other powerful influences that exist outside the classroom, it can nevertheless have a positive impact on young people’s decisions and their successful transitions.

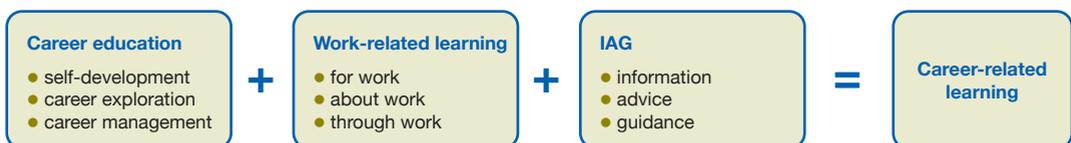


Figure 1 The components of career-related learning in school

Career-related learning in schools

Young people experience a range of different elements of career-related learning in schools. These include career education, work-related learning and careers information, advice and guidance (Figure 1).

Career education is a term used to describe a series of activities and engagements that help young people to understand themselves and the influences on them (self-development), to investigate opportunities in learning and work (career exploration), and to make and adjust plans to manage change and transition (career management). These three categories of activity are taken from a pack of resources developed to support the development of impartial careers education in schools (DCSF, 2010). Careers education therefore includes a range of learning that allows young people to articulate their own strengths, values and ambitions as well as their skills and competencies. It also encourages them to challenge their views of the world through career exploration and then supports them to develop the skills that they need to make effective transitions and to develop strategies that encourage resilience when things do not go according to plan.

Work-related learning complements careers education but has distinctive differences. The formal definition of work-related learning is:

Planned activity that uses the context of work to develop knowledge, skills and understanding useful in work, including learning through the experience of work, learning about work and working practices, and learning the skills for work. (DCSF, 2009)

In the context of this definition:

- ‘for work’ is about developing skills for enterprise and employability (for example, through problem-solving activities, work simulations and mock interviews)
- ‘about work’ is about providing opportunities for students to develop knowledge and understanding of employers, employment and enterprise (for example, through vocational courses and careers education)
- ‘through work’ is about providing opportunities for students to learn from direct experiences of work, including developing the employability skills and ‘can-do’ attitude that employers value (for example, through work experience or

enterprise activities in schools and learning through vocational contexts in subjects) (DCSF, 2009).

Finally there is careers information, advice and guidance – which has often been used to describe a service sourced externally through the Connexions service (recent changes to Connexions are discussed later). *Career information* is data on opportunities and personal support information conveyed through various media, both mediated and unmediated, including face-to-face contact (individual, group, class, etc.), written/printed matter, telephone helplines, ICT software and information housed on websites. *Advice* involves helping a young person to understand and interpret information, providing information and answers to questions and clarifying misunderstandings, understanding their circumstances, their abilities and targets, and advising them on their options or how to go about a given course of action. *Guidance*, meanwhile, involves supporting young people on a personalised basis to better understand themselves and their needs, to confront barriers to understanding, learning and progression, to resolve issues and conflicts, and to support them to develop new perspectives and solutions to problems and be able to manage their lives better and achieve their potential. Guidance may also involve advocacy on behalf of some young people and referral for specialist guidance and support. Guidance services have been provided by Connexions Personal Advisers (PAs) who deliver guidance in group sessions or, more usually, in a face-to-face interview with an individual.

From the descriptions offered above, it is clear that the three elements of careers education, work-related learning and careers information, advice and guidance are not mutually exclusive. Rather, they can bring different perspectives so careers education starts from the perspective of the individual, work-related learning brings the employer perspective and career guidance is an independent process of supporting all young people to navigate their way through transitions and make choices that are best for them.

Careers provision within the Education Act 2011

The policy and advisory framework within which career-related learning activities existed before the Education Act 2011 was complicated. There

were sets of statutory regulations, statutory guidance and non-statutory frameworks that informed career-related learning in school (see Hutchinson *et al.* (2011) for further detail). The Act has transformed the policy landscape for career-related learning in schools. The themes within it are by now familiar: increased autonomy for schools, focus on attainment and discipline, excellence in teaching and rolling back the state. The Act comes along with the review of the Personal, Social and Health Education (PSHE) curriculum, where careers education is often placed, and the removal of the statutory duty for work-related learning at key stage 4 (age 14–16). The Government stated that *'genuine work experience is an important part of a student's programme of study while remaining in education'* (DfE, 2011) and they want to see the duty on local authorities to encourage work experience for 16- to 19-year-olds retained. However, for those under 16, they want to leave the provision of work experience in key stage 4 to the discretion of each school, while also removing any duty to provide work-related learning.

The policy landscape is therefore changing, and so are the partnerships that have supported this activity in schools. Connexions services have been cut back as local authorities have sought to make savings. Hooley and Watts (2011) suggest that there have been significant redundancies across England, with many more likely after the end of the 2011/12 financial year. Likewise, Education Business Partnerships in many areas have either closed or scaled down, as they were often part of the Connexions infrastructure or separately vulnerable to public service spending cuts. Aim Higher initiatives have also finished, with some universities choosing to sustain a few elements of their activities but again without a nationally supported infrastructure.

The Education Act 2011 therefore sits in a rapidly changing landscape where all of the elements of career-related learning are under review. The Act removes the statutory duty on schools to provide careers education and guidance from September 2012. This is replaced with a duty to provide independent impartial career guidance for pupils in key stage 4 that includes information on options available in respect of 16–18 education or training, including apprenticeships. Guidance is defined as that which the person giving it

considers will promote the best interests of the pupils to whom it is given.

Consequently, schools have to consider their career-related learning provision and how to meet the new statutory requirement. Whereas previously many schools were able to enter into partnership agreements with their local Connexions provider and agree what they wanted from a menu of careers education, work-related learning support and careers guidance, this is no longer the case. There are thus a number of issues that emerge from this new landscape for schools in general and science educators in particular, and these are discussed below.

Can a school continue to employ or recruit staff to deliver career-related learning?

Schools have to secure access to 'independent' advice, which is defined as being external to the school. Early advice from the Department confirmed that schools could continue to employ staff whose remit was to deliver or coordinate career provision; this would include STEM coordinators whose roles often encompass aspects of career-related learning. However, as the most recent guidance (Department for Education, 2012) makes clear, there is also a need for schools to provide access to additional independent and impartial careers guidance. Schools are encouraged to consider the provision of face-to-face guidance where it is the most suitable support for young people to make successful transitions, particularly children from disadvantaged backgrounds or those who have special educational needs, learning difficulties or disabilities.

Can science teachers (as they are employed by the school) offer advice on which qualifications students should consider or aspire to?

Survey evidence (Hutchinson and Bentley, 2011) suggests that young people are more likely to ask their subject teacher for careers advice than they would their form teacher, a careers teacher or a Connexions adviser. Subject teachers can be well placed to offer advice on what study of a subject at a higher level is like, and to offer their experiences of related employment. They should continue to offer advice in the spirit of the definition offered earlier; that is, to clarify issues, ensure any misunderstandings are addressed and ensure that all relevant information is made available to their pupils. Science educators should not feel that in so doing they are moving

beyond their remit. In fact, they will be supporting the career-related learning of their pupils.

But, of course, they would be helped in this by having good up-to-date knowledge of who has responsibility for managing career-related learning in the school, so that they can refer pupils to knowledgeable advisers and to the impartial independent guidance secured by the school on behalf of their pupils.

Does 'impartial' mean that schools can no longer highlight careers in particular sectors or with particular employers?

Some schools have strong links with particular employers, and some employers have strong public-engagement programmes that encourage their work across a number of schools. The STEM Ambassadors programme is a good example of well-established activity in this area and is particularly effective at increasing pupil awareness of careers that involve STEM (Straw, Hart and Harland, 2011). These links have value for all pupils as they not only encourage career exploration but they help pupils to think about their own self-development in terms of what work appeals to them. Furthermore, awareness of employers' requirements helps to promote employability and other career-management skills. Such employer links are therefore part of a wider programme of career-related learning and should be positively encouraged within schools. It is the role of the independent career guidance practitioner to encourage pupils to reflect on such experiences and to apply their learning to their individual aspirations in an impartial manner.

Impartial is a term that has specific connotations for careers guidance practitioners. As a concept, when impartiality is applied to career guidance it is associated with the professional ethic that all pupils should be supported to achieve the best that they can. This goes beyond neutrality, as it means that pupils' thinking may be challenged (to redress stereotypical thinking, for example). So the fact that pupils can access a range of career- and job-related information from individual employers, the sector skills councils or professional bodies or through sites such as *Future Morph* or *Maths Careers* (see *Websites*) is to be welcomed as it provides the foundations for impartial careers support that can then encourage all pupils to consider as wide a range of career options as possible as part of their career exploration.

Should schools that have well-established practices in supporting careers work and engaging with STEM initiatives continue to do so?

There has been some controversy associated with the Education Act 2011 and its implications for careers work in schools among careers practitioners and their professional bodies. With the repealing of the statutory duty for careers education and the review of work-related learning and the requirement for work experience, there has been a deeply felt concern that schools that did not provide their pupils with effective careers support might no longer have to. Alongside this is the concern that, in an environment of budgetary constraint, schools that formerly did offer a sound programme will no longer be able to afford to do so. However, the legislation does not suggest that career-related learning is not important but rather that decisions about its design and implementation should be made, and resourced, by each school. So there is continued policy support for STEM subject teachers that have embraced the range of enhancement and enrichment activities and linked them to career-related learning. The availability of information and the engagement in enhancement activities are welcomed. These are a necessary but not sufficient condition for the legislation to be realised – because career guidance can only be effective when it is given after a programme of career- and work-related learning has been taken.

There remains a question about why some schools have engaged in career-related learning, particularly associated with supporting pupils to consider taking their STEM learning further, and why some have not. The STEM Careers Awareness Timeline project, which was part of the STEM Cohesion Programme mentioned earlier, was a 3 year programme of research and engagement with 28 pilot schools which found that the extent of a school's engagement in STEM- and career-related learning varies enormously (Finegold, Stagg and Hutchinson, 2011). This research suggested that there are two main factors which contribute to a school environment that fosters engagement with both STEM and related career learning. The first is active support from the school leadership team, including the governing body, and the second is engagement by science and other subject educators to develop a cross-curricular infrastructure that enables the school to integrate career learning opportunities

with the curriculum. These factors are currently being investigated further by researchers at the International Centre for Guidance Studies (iCeGS) at the University of Derby in collaboration with the National STEM Centre as part of its STEM Careers project.

Summary

Pupils ask STEM subject teachers about jobs and careers in science. At a time when career-related learning within schools is being reconfigured, how can teachers and their senior leadership teams help pupils to maintain their interest in STEM studies and continue into STEM careers? This article suggests a number of priorities:

- 1 Commission independent guidance provision and ensure that all teachers are aware of that provision.
- 2 Encourage STEM teachers to update their knowledge about careers and progression routes

that study of their subject might lead to (the *Future Morph* website is a good starting point).

- 3 Continue to build links with employers, through local partnerships and the STEM Ambassador scheme. Research has shown that maximum impact is achieved when pupils engage with at least three Ambassadors (Straw *et al.*, 2011).
- 4 Ensure that enhancement and enrichment activity builds career awareness and develops employability skills (through STEM clubs or more formally through learning programmes such as the STEM Leadership Skills qualification).

To summarise, this article has suggested that, while science educators are not career educators, they can recognise, support and integrate aspects of career-related learning in their delivery of the curriculum and of enhancement and enrichment activities.

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