House of Lords Social Mobility Committee
Transitions from school to work for 14-24 year olds
Submission by the Science Council – September 2015

1 The Science Council

1.1 The Science Council is a membership organisation of learned societies and professional bodies drawn from across science and its applications. Collectively our members represent almost 500,000 individuals including scientists, teachers and senior executives in industry, academia and the public sector. There are currently 41 member organisations: a list is attached. In addition to providing a mechanism for the sector to work collectively, the Science Council develops and leads collaborative projects working with member organisations and the wider scientific community: examples include LMI analysis of the UK Science Workforce and Diversity, Equality and Inclusion.[1]

1.2 The Science Council's principal area of work is to advance the professional practice of science across the breadth of the science workforce, including non-graduate and technical roles in science. A key aspect of this is professional registration and having introduced Chartered Scientist (CSci)[2] in 2004, the Science Council has added Chartered Science Teacher (CSciTeach), Registered Scientist (RSci) and Registered Science Technician (RSciTech).[3] RSci and RSciTech aim to raise the profile, aspirations and retention of scientists at graduate and technician level.

1.3 The Science Council is committed to supporting a more diverse science workforce and therefore welcomes the Committee's inquiry. Fostering greater social mobility into the science professions is key to achieving a more diverse science workforce and to meet anticipated skills demands across the UK's knowledge and science-based sectors.[4]

2 Factors affecting young people's social mobility and employment outcomes

2.1 No single organisation or intervention can tackle the issues that constrain young people's social mobility. The complex nature of the issues requires a long-term and joined-up effort involving multiple partners.

2.2 We recognise that there are a range of factors that influence young people's transition, successful or otherwise, from school to work. The transition can be highly demanding when young people are required to make often career-defining choices, particularly at an early age when they are rarely well-informed or ready to decide on their future education, training or career options. We address some of these below. We appreciate that these will not all be unique to science.

The role of good careers guidance

2.3 Science is now ubiquitous in modern life and young people need to understand the relevance of science and mathematics to their lives and their future careers, whether or not they go on to further study in these subjects.

2.4 Research has shown that young people's career aspirations are already well developed at an early age, and that many young people and parents have a narrow view of the range of post-16 routes and where science can lead.[5]

[1] http://www.sciencecouncil.org/content/diversity-equality-and-inclusion
[2] http://www.charteredscientist.org/
[3] http://www.sciencecouncil.org/professional
[4] http://www.smf.co.uk/wp-content/uploads/2013/03/Publication-In-The-Balance-The-STEM-human-capital-crunch.pdf
[5] Archer et al, "Doing science versus being a scientist: examining 10/11 year old schoolchildren's constructions of science through the lensed of identity", Science Education, 94 (2010), 617-639.

2.5 Often accessing and assessing information or advice relies on an individual's awareness of their information needs, for example, knowing that there are many different education, training and career opportunities, and that they may not necessarily need a degree to work in science. Increasing careers awareness is not only relevant to students, it plays a role in supporting the influencing environment around individuals (teachers, parents, peer groups) and broadens the base from which they can explore a wider range of career options.[6] When added to the traditional elements this gives rise to Careers Awareness, Education, Information, Advice and Guidance (CAEIAG). It is important to understand the distinct role of each element, how they fit together and to consider which bodies and individuals are appropriate to deliver each.

2.6 The Gatsby Charitable Foundation has identified 8 career guidance 'benchmarks'[7] that provide school leaders with a framework on which to base their careers strategy. Science Council members provide a wealth of information that supports both teachers and careers professionals to provide young people and parents with information about a wide range of science careers.[8]

2.7 Subject choices are particularly key for science, but the qualifications landscape can be hard to navigate. This has been acknowledged recently by the Business Secretary.[9] If a poorly informed choice is made by a young person, they may find at a later stage that the qualifications they have chosen close down potential career pathways. It is often the case that young people that do not flourish in academic subjects are very often driven towards vocational qualifications and pathways within which there is little or no opportunity to change direction.[10]

2.8 At a time when young people are expected to make an increasing financial contribution towards their education and training, it is crucial that they are able to access accurate information, advice and guidance to inform their choices.

Science capital and young people's perceptions of science

2.9 There has been much work undertaken to explore what influences the likelihood of a young person aspiring to a science-related career. The Aspires Project,[11] a longitudinal study looking at young people's aspirations and education outcomes, identified the concept of 'science capital' as a key factor affecting the likelihood of a student aspiring to study science beyond 14 and pursue a science-related career.

2.10 Science capital refers to a young person's science-related qualifications, understanding, knowledge about science and 'how it works', interest and social contacts. The research found that science capital is unevenly spread across social groups, with those from middle-class backgrounds tending to have higher levels of science capital, and are therefore more likely to aspire to science and STEM-related careers.

2.11 Other key factors in young people's take-up and continuation of science subjects are home support, good teaching and a long-term relationship with an adult (often a teacher or family member) who believes that the subject is of value and that the student can succeed in the subject.[12]

2.12 Other research has shown that the perceived image of science and scientists is a barrier to many young people's aspiration to pursue a science-related career. Whilst many young people enjoy science they cannot visualise themselves working in science in part because they do not consider themselves as being among the 'brainiest' in the class, and are therefore unlikely to see science careers as achievable,

[6] http://webarchive.nationalarchives.gov.uk/20121205091100/http://scienceandsociety.bis.gov.uk/careers/files/2010/03/bis-r9199-urn10-767-faw.pdf
[7] http://www.gatsby.org.uk/uploads/education/reports/pdf/gatsby-sir-john-holman-good-career-guidance-2014.pdf
[8] http://www.futuremorph.org/
[9] https://www.gov.uk/government/speeches/fixing-the-foundations-boosting-britains-productivity
[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf
[11] http://www.kcl.ac.uk/sspp/departments/education/research/aspires/ASPIRES-final-report-December-2013.pdf
[12] http://www.esrc.ac.uk/my-esrc/grants/RES-179-25-0013/read/keyfindings

even if they find science interesting and attain well in the subject. [13] This will be particularly the case for young people that do not have the connections to exploit opportunities.

2.13 Work-experience placements can provide a valuable insight to the world of work as well as raising awareness of the range of roles undertaken within any sector. Yet it can be hard for schools to source science placements and too often are reliant on a personal contact which disadvantages those lacking in social capital. Expanding the breadth of role models in science beyond traditional academic, research and HE can help to illustrate the wide range of exciting careers in science.[14]

2.14 The inclusion of practical work is a key component of attracting young people into science and is particularly important for those learners who may consider a future working in science.[15] We have previously expressed concerns that the removal of practical assessment in science in schools may have the consequence of turning many young people off science. Without the opportunities to experience hands-on science, young people will not be able to visualise themselves in a science career.

2.15 **The Science Council calls for Ofqual to undertake regular reviews of the impact of the changes to practical assessment in science to identify what effect reforms are having on student uptake of science at school; the impact on recruitment of science teachers and their enthusiasm for science; and the long-term impact on the availability of practical and technical skills in the workforce.**

Geographical barriers

2.16 There is a strong geographical bias for some qualifications with many vocational qualifications remaining sector and employer specific. Most young people now appreciate that they are unlikely to have a single employer and that their employment and career is likely to involve several changes during their lifetime. The aforementioned bias is potentially a barrier to transferability and mobility as it presents difficulties for the quality control, consistency and equivalence of qualifications.

2.17 Further Education Colleges play a large part in successfully delivering vocational education courses for students who prefer college settings over school settings. Delivery often relies on local rather than national provision, and often on relationships between local industries, universities and other education providers. It can also be costly to deliver as it often requires specialist facilities and a critical mass of learners to make courses viable. Yet in some coastal and rural areas, for example, there is a shortage of provision of science qualifications in FE, in part because of lack of local university or large research or innovation-driven employers.

Financial barriers

2.18 The increasing cost of living away from home impedes many young people's ability to take on opportunities in other parts of the country. We have heard from employers of instances where apprentices have only been able to relocate to take up a position with financial support of parents, but this is likely to be the exception rather than the norm.

2.19 Young people with caring responsibilities are unlikely to have the resources or desire to move cities or regions to take up opportunities. They should not be penalised for this, and should be given greater support to enable them to continue or re-start their education.

Free schools and academy schools

2.20 We note that free schools and academies are not required to follow the national curriculum, nor, for example are they required to appoint qualified teachers. While it is

[13] Important but not for me, Jenkins and Nelson 2005 http://dx.doi.org/10.1080/02635140500068435
[14] http://www.sciencecouncil.org/content/role-models-and-case-studies-report
[15] http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtvm052732.pdf

probably too early to judge the performance of many new free schools and academies, and their impact on the science workforce, we are keen to ensure that all young people have access to high-quality and inspiring science education. **The Science Council would welcome a review of the provision and quality of science and mathematics education in free schools.**

3 Support and challenges facing young people's successful transition into the workplace

3.1 Science A-levels and higher education courses play a valuable role in educating and training a highly-skilled UK science workforce, but we recognise that it is not possible for a single qualification route to adequately satisfy the needs of all stakeholders. However, much of the policy focus and investment in the science workforce has hitherto been in the graduate workforce, with little recognition that not every science-based job is a graduate job.

3.2 The Science Council has welcomed the government's recent focus on apprenticeships and vocational education in an attempt to raise their profile and status, but there remains an urgent need to address wider issues of the perception, take up and quality assurance of non-graduate pathways, particularly apprenticeships.[16]

Improving the apprenticeship 'brand'

3.3 For many the term 'apprenticeship' has become a generic term for non-university based continued learning and training, but the tendency to perceive the choice as simply 'graduate' or 'apprentice' routes is unhelpful and does not promote the distinctive value of vocational qualifications.

3.4 The lack of availability of appropriate vocational and practical qualifications has given rise to employers' lack of confidence in these qualifications.[17] It remains much easier for science-based employers to recruit into technician-level roles graduates with qualifications that they recognise and understand but where the learner has taken on the costs of their education. This in turn fuels concerns about the validity and value of some science qualifications particularly for those who achieve lower grades in STEM and does not help to develop a greater understanding of non-graduate routes to science careers.

3.5 **The Science Council calls on the government to review, with professional bodies, industry and employment sectors the provision and range of vocational science qualifications to develop better non-graduate vocation pathways into science.**

Increasing the number of high-quality science apprenticeships

3.6 There is a widely held perception that in order to become a scientist, gaining a degree is the only possible option. In the past, other routes have also been valid and many senior practising scientists have progressed from apprenticeships and experience-based routes. However, this route is relatively rare in today's science industries where the practice of science is increasingly more complex and multi-disciplinary and the apprentice route hardly exists for entry to science careers.[18]

3.7 It has been shown that while parents see an apprenticeship as a good route to employment, few would consider it the right route for their child.[19] To be attractive to employers and aspirational for young people, apprenticeships must lead to a clear and

[16] Science Council response to BIS consultation on protecting the term apprenticeship in law
http://www.sciencecouncil.org/sites/default/files/apprenticeship%20protection%20in%20law_final_0.pdf
[17] http://www.cbi.org.uk/media/2807987/gateway-to-growth.pdf
[18] https://www.gov.uk/government/statistical-data-sets/fe-data-library-apprenticeships
[19] http://www.edge.co.uk/news/2014/november/practical-qualifications-better-for-employability

identifiable achievement at completion; they should go beyond a job with a particular employer, to entry into a recognisable occupation or a profession that would also give status and mobility to the completing apprentice.[7] This is a key aspect of the German system and one that would be well worth emulating in the UK.

3.8 It is essential that apprenticeship standards directly link to professional registration requirements in sectors where they exist to support young people's career progression. The Science Council has built progression and transferability into its professional registers to provide a clear route from technician level through to Chartered status.[20]

3.9 Evidence from the engineering sector indicates that professional registration leads to increased average earnings and lower levels of unemployment.[21] The Science Council's research also shows that average science wages are generally higher than the average wage across the whole economy.[22]

Increasing the number of high-quality science traineeships

3.10 Many young people will not be ready to take up an apprenticeship because they will lack the necessary English, Maths or lab-skills demanded of employers. Increasing the number of science traineeships[23] can provide young people with the opportunity to gain essential core practical skills and experience of working in science before they decide to progress further with their education.

3.11 No clear pathway exists for those wanting to progress from a non-science-based career to a science-based career. Widening access to traineeships in science would give many young people the opportunity to gain the necessary experience and preparation in a technically-focused occupation before taking up an apprenticeship or further education options. **The Science Council calls on the government to consider tax breaks for companies that employ science traineeships in order to stimulate employment. The government has adopted a similar approach with regard to apprenticeships, whereby employers do not pay National Insurance contributions for apprentices under 25 years of age.[24]**

4 Improving young people's transition from school to work

4.1 As science and the practice of science becomes increasingly multi-disciplinary and important across all sectors of the UK economy and society, it is crucial that we understand more about where and how science skills are currently used in the economy as well as how this is likely to change in the future. Hitherto, it has been the case that most labour market information and surveys classify by core science discipline, education level or employment sectors.

4.2 We agree that there is a need to develop more accessible, consistent and comprehensive labour market information (LMI) on the demand for science-skilled workforce for careers AEIAG stakeholders and users. The Science Council has devoted significant energies to showcase the many different ways professional scientists contribute to UK society and the economy to illustrate the wide range of possible careers in science, and challenge the widely held perception that in order to become a scientist, gaining a degree is the only possible option. [25]

4.3 Used appropriately, more accessible, consistent and comprehensive LMI will help careers AEIAG stakeholders and users to gain a deeper understanding of the wide range of science-related careers available to them and the qualifications and training required to access these careers.

[20] http://www.sciencecouncil.org/professional
[21] https://www.istructe.org/news-articles/2014/industry-news/engineering-council-survey-2013-(1)?feed=Latest-News-Features
[22] http://www.sciencecouncil.org/content/science-workforce
[23] http://www.scienceindustrypartnership.com/traineeships/
[24] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/385150/TIIN_2143.pdf
[25] http://www.sciencecouncil.org/UK-science-workforce

4.4 It is essential that resources are provided to support early careers intervention work that helps to increase the diversity of the pool of young people choosing to pursue science, particularly in relation to gender, ethnicity and socio-economic background. The government's desire to grant schools and colleges greater freedom to set policies appropriate to their local needs must also be balanced with adequate guidance and support, particularly funding support.

4.5 We recognise that employers are key stakeholders in facilitating young people's social mobility. The government's employer-led Trailblazer programme, with which the Science Council and several members have been engaged, has provided employers with the opportunity to take ownership of developing high-quality apprenticeship routes. However, there has been low engagement among smaller businesses due to the resource and time-intensive nature of the programme; this has led to larger companies dominating the direction and design of the programme.[26]

4.6 We acknowledge that the Trailblazer scheme is due to end in 2017. However, the Science Council calls on government to find appropriate mechanisms to enable smaller businesses to engage with the programme now so that they remain at the heart of developing high-quality apprenticeships in the long-term.

4.7 When the Trailblazer scheme concludes in 2017, professional bodies in science are in a position to ensure apprenticeship standards in science remain relevant. They are independent and have a well-established track record for providing a link to professional standards. Professional body approval of training provision will also help employers identify quality.

4.8 At the time of writing the government is consulting on its proposed apprenticeship levy. While details are yet to be confirmed we hope that employers will better engage with apprenticeships as they will have a financial investment in the scheme.

5 Who should be responsible for improving the system to support the transition into work for school leavers?

5.1 Improving young people's social mobility cannot be solved by a single or small group of organisations. A range of stakeholders should assume joint responsibility for improving young people's social mobility. This includes but is not exclusive to government, schools and further education colleges, higher education institutions, local authorities, public and private sector employers, civil society bodies and professional bodies. The government can act as a broker to facilitate collaborative partnerships between different organisations.

5.2 Science Council members continue to support the Social Mobility Foundation's Aspiring Professionals programme[27].

5.3 The Science Council has been working in collaboration with a wide range of organisations on its Diversity, Equality and Inclusion project, including government, education, professional and learned bodies and civil society to raise the profile of the importance of diversity and develop effective action that will deliver positive change and a more diverse science workforce.

5.4 We echo the sentiments of the Gatsby Charitable Foundation that professional bodies must play a major role in supporting young people's social mobility. Professional bodies have a well-established track record for supporting young people into the professions and providing a link to professional standards; many professional bodies also have experience of providing support and recognition for non-traditional routes into science.

5.5 Other examples of our members' activities to enhance social mobility include:

- An Institute of Physics three-year pilot project to investigate the barriers that prevent

[26] http://www.publications.parliament.uk/pa/cm201415/cmselect/cmeduc/597/597.pdf
[27] http://www.iop.org/careers/i-am-an-employer/iop-social-mobility-foundation/page_62309.html

young people from lower socio-economic backgrounds choosing to take physics post-16[28]

- The Institute of Materials, Minerals and Mining offer travel grants to help younger members, those under 35, to attend international conferences.[29]
- The British Academy of Audiology provide a higher training scheme open to all registered members, regardless of academic background. This includes training modules that are fulfilled either during work or in the participants own time[30]

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[28] http://www.iop.org/publications/iop/2014/file_64460.pdf
[29] http://www.iom3.org/scholarships-grants-and-bursaries
[30] http://www.baaudiology.org/hts/#.VfLNoRH2Dcs

Member Organisations of the Science Council

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Association for Clinical Biochemistry and Laboratory Medicine
Association of Neurophysiological Scientists
Association for Science Education
British Academy of Audiology
British Association of Sport and Exercise Science
British Computer Society
British Psychological Society
British Society of Soil Scientists
Chartered Institution of Water and Environmental Management
College of Podiatry
Energy Institute
Geological Society of London
Institute of Biomedical Science
Institute of Brewing and Distilling
Institute of Corrosion
Institute of Food Science and Technology
Institute of Marine Engineering, Science and Technology
Institute of Materials, Minerals and Mining
Institute of Mathematics and its Applications
Institute of Measurement and Control
Institute of Physics and Engineering in Medicine
Institute of Physics
Institute of Science and Technology
Institute of Water
Institution of Chemical Engineers
Institution of Environmental Sciences
London Mathematical Society
Mineralogical Society
Nuclear Institute
Oil and Colour Chemists' Association
Operational Research Society
Physiological Society
Royal Astronomical Society
Royal Meteorological Society
Royal Society of Chemistry
Royal Statistical Society
Society for Cardiological Science and Technology
Society for General Microbiology
Society of Biology
Society of Dyers & Colourists
The Organisation for Professionals in Regulatory Affairs