The Foundation for Science and Technology
Debate Record Note

How can skill levels be raised to meet the needs of society and the economy?

Date and Location:	1st March, 2017 at The Royal Society
Chair:	The Lord Broers FRS FREng HonFMedSci Council Member, The Foundation for Science and Technology
Speakers:	Sir Mark Walport FRS FMedSci Government Chief Scientific Adviser, Government Office for Science
	Professor Sir Adrian Smith FRS Vice-Chancellor, University of London
	Dame Judith Hackitt DBE FREng Chair, EEF
Sponsors:	Cogent Skills, The Comino Foundation, Innovate UK, The Peter Jost Charitable Foundation, The Royal Commission for the Exhibition of 1851 and Winton Philanthropies
Presentations and audio:	www.foundation.org.uk
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SIR MARK WALPORT began by emphasising that "skills" and "education" were not synonymous (the former included not only education but also included training and practice) and that both literacy and numeracy were vital. Improved skill levels in the UK were a high national priority as had clearly been shown by the content of the Government's recent Industrial Strategy Green Paper. He went on to outline the existing picture of skills in the UK and to highlight the challenges which that presented and the urgent need for those challenges to be addressed, acknowledging that diagnosis was easier than therapy. Too many sectors of the UK economy and areas of the UK could be characterised as having a "low skills equilibrium" (low demand and supply of skills, low wage/low productivity jobs, low educational attainment and skills, cyclical employment rate and skilled out-migration) whereas the ideal was a "high skills equilibrium" with the converse of those features. That ideal existed in few parts of the UK – mainly the south of England and the north west of Scotland. Half of the graduate employees in the UK considered that their jobs underutilised their skills. On the other hand employers in England considered that almost half of their 16 year old school leaver employees were poorly prepared for the world of work; that level of preparedness was found to be better the higher the level of qualification and the higher the age of entering the world of work from education.

The UK scored badly as compared with other countries in a study of the work-readiness of newly-recruited graduates in the opinion of education providers and of employers. Only around a third of employers in England offered work experience to those in education, and those were concentrated in the South East. The UK also scored very badly as compared with other countries in the proportion of higher education students with good levels of literacy and numeracy.

Research had shown that the level of

parental education could have a significant impact on the numeracy skills of young people – particularly in the UK. Research had also shown a decline in the proportion of UK adults engaged in any form of learning after leaving school and that the decline was much greater among those who had been least successful during their school years.

What steps would help to improve the learning trajectory of individuals throughout their lives? Who should take those steps? Better (i.e. contextual) teaching of maths and English, greater engagement between employers and schools, targeted family and community learning schemes, encouraging firms in low-skill sectors to move up the skills value chain, better job design and rewarding employee progression – action in all of these areas would help. The responsibility for doing so rested not just with Government; it required joint action by Government, education providers, employers and families. But he cautioned against the pursuit of cultural change at the expense of the higher priority of providing the young with the right education.

PROFESSOR SIR ADRIAN SMITH outlined the work of the review of mathematics education which he had undertaken in 2016 on behalf of HM Treasury and the Department for Education. The two main reasons for the review were the importance of equipping the future workforce with mathematical and quantitative skills and the fact that England compared badly with its competitors in the percentage of students continuing mathematics after the age of 16 – almost three quarters of those with an A*-C in GCSE maths chose to drop the subject at that point. But other relevant considerations were, first, gender and regional variations and, secondly, the UK's long-standing failure to give adequate priority to technical and vocational education.

As regards the first of these considerations, in 2013/14 only 50 per cent of girls with GCSE A grades in maths continued with the subject as compared with 71 per cent of boys. 33 per cent of London students with GCSE A*-C grades were likely to go on to the next level but the figure for the North East was only 20 per cent. As regards the second, the Government's response in the Post-16 Skills Plan to Lord Sainsbury's Panel's 2016 proposals for technical education promised significant reforms.

The new Institute for Apprenticeships[1] would determine the maths content of the 15 technical education routes recommended by the Sainsbury Panel. But the maths teaching resources of Further Education (FE) colleges which would have to deliver that education were already heavily stretched, in part because of the Government's current GCSE re-sit policy which many in their evidence to Sir Adrian's review criticised as ineffective.

He believed that getting the young to decide to do Level 3 maths on the basis of timely and well-informed careers advice was critical. But the requirements set by Higher Education Institutions (HEI) for entry to undergraduate courses with a significant quantitative element could play a major part.

It was important not to overlook the relevance of quantitative skills for courses in social sciences and humanities. And the Government needed to ensure that funding models for schools and colleges did not lead to unintended financial disincentives for mathematics provision. Government also needed to address the fact that the teacher shortage challenges facing schools were shared by FE colleges. He saw a need for research into the effectiveness of technology in the teaching of 16-18 maths.

Research was also needed into the cultural and other root causes of negative attitudes to maths and into the long-term maths and skills educational implications of the rise of data science. Looking into the future he hoped for near universal participation in maths post-16 and for a culture which values mathematical and quantitative skills.

DAME JUDITH HACKITT said that manufacturing industry in the UK continued to be short of candidates in the required numbers and equipped with the required skills and educational experience. Industry needed a greater proportion of candidates with an apprenticeship background than with an academic background.

Apprentices learned not only relevant skills but also about the company context within which to exercise them. They were more likely to stay with the company and the best increasingly went on to reinforce their foundation skills with higher levels of attainment. The need for the UK to achieve levels of productivity growth in industry comparable to those achieved by its overseas competitors was well recognised. This need required investment in both

1 www.gov.uk/government/consultations/institute-for-apprenticeships-draft-operational-plan

physical and human capital – technicians as well as managers and leaders.

The proportion of vacancies for engineering professionals which employers found difficult to fill (35 per cent) had worsened since 2011, largely because of a lack of technical skills among applicants. Industry was taking determined action to find a solution through increases in apprenticeships and did not regard the problem as "for someone else to fix".

The EEF had its own well-equipped centre at Aston in Birmingham with about 1,000 apprentices in training but was finding it difficult to fill the 350 places available because the applicants lacked adequate maths and English; out of 8,500 applicants no more than 330 were placed.

The efforts to increase apprenticeships and incentives provided by the new apprentice levy[2] would have implications for those providing a graduate route into industry which many regard as inefficient because the high rate of subsequent leakage into non-engineering employment. Moreover employers were already finding it hard to recruit graduates of the right calibre and more than a quarter had to recruit from outside the UK (a source of supply which might diminish if borders were tightened post-Brexit).

Many employers considered that HEI engineering courses lacked sufficient industry-relevant content. The recruiting problems would get worse as the number of young people in the UK population was expected to fall from 3.7 million in 2014 to 3.5 million by 2019. It would be all the more important to encourage a greater proportion of 16 year olds to study STEM subjects post-GCSE.

She agreed with what had already been said about the need for better and earlier action to enthuse and interest the young of both sexes about the opportunities available in industry.

In conclusion she said that society and the economy needed the elimination of the existing mismatch between skills demand and skills supply; that need would be even greater in a post-Brexit environment. She welcomed the prominence given to this need in the Industrial Strategy Green Paper but doubted whether the full extent of the funding required had been accepted. She also welcomed the Government's response to the Sainsbury recommendations. But there was much else which needed to be done – and urgently – by education providers, by industry and Government working coherently and collaboratively.

In the two discussion periods following the three presentations summarised above there was almost universal support for the points which had been made about the nature of the problems and challenges and about the direction and content of the various actions proposed for dealing with them.

Additional actions favoured or points made by contributors were:

- The use of accreditation and re-registration of skills to increase motivation for continued learning;
- Greater use of digital technology as the vehicle for helping students, teachers and families to improve their learning and skills;
- Encouraging those retiring from a career in industry to become teachers;
- The need for those studying STEM subjects to be equipped with literacy (especially communication) skills;
- Three quarters of the population did not reach Level 2 maths yet maths skills were fundamental to the UK's ability to prosper in a post-Brexit world. If sufficient encouragement was to be given at the primary school stage for the subsequent pursuit of maths learning by the young, teacher training needed to take appropriate action to respond to the fact that most primary school teachers had a humanities background rather than a STEM background;
- Should there be a skills passport to facilitate movement between professions and careers;
- One contribution to improved productivity could be a taxation system which incentivised investment in human assets as well as investment in physical assets;
- Why were engineers predominantly male and social scientists predominantly female?

Sir John Caines KCB

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2 www.gov.uk/government/publications/apprenticeship-levy-how-it-will-work

USEFUL REPORTS AND URLS - Click on a link to go the site

Building Our Industrial Strategy, Green Paper
beisgovuk.citizenspace.com/strategy/industrial-strategy/?utm_campaign=gov&utm_source=gov.uk&utm_medium=referral&utm_content=homepage

Independent Panel Report on Technical Education (the Sainsbury report)
www.gov.uk/government/uploads/system/uploads/attachment_data/file/536046/Report_of_the_Independent_Panel_on_Technical_Education.pdf

The Government response to the Sainsbury report
www.gov.uk/government/publications/post-16-skills-plan-and-independent-report-on-technical-education

Government Office of Science Evidence Review for the Foresight
Future of Skills & Lifelong Learning project
www.gov.uk/government/collections/future-of-skills-and-lifelong-learning

Skills and lifelong learning: UK's current and future skills mix
The UK's Skills Mix: Current Trends and Future Needs
Professor Mike Campbell, December 2016
www.gov.uk/government/uploads/system/uploads/attachment_data/file/571675/ER5_The_UK_s_Skills_Mix_Current_Trends_and_Future_Needs.pdf

The UK skills system: how aligned are public policy and employer views of training provision?
Anne Green and Terence Hogarth, August 2016
www.gov.uk/government/uploads/system/uploads/attachment_data/file/571695/ER8_The_UK_skills_system_how_aligned_are_public_policy_and_employer_views_of_training_provision.pdf

The UK's Skill System: Training, Employability and Gaps in Provision
Anne Green, Terence Hogarth, Sally-Anne Barnes, Lynn Gambin, David Owen, and Nick Sofroniou,
August 2016
www.gov.uk/government/uploads/system/uploads/attachment_data/file/571691/ER7_The_UK_s_Skill_System_Training__Employability_and_Gaps_in_Provision.pdf

Skills Demand, Training and Skills Mismatch: A Review of Key Concepts, Theory and Evidence
Frances Green, August 2016
www.gov.uk/government/uploads/system/uploads/attachment_data/file/571667/ER4_Skills_Demand__Training_and_Skills_Mismatch_A_Review_of_Key_Concepts__Theory_and_Evidence.pdf

The UK skills system: how well does policy help meet evolving demand?
Lynn Gambin* and Terence Hogarth, August 2016
www.gov.uk/government/uploads/system/uploads/attachment_data/file/571688/ER6_The_UK_skills_system_how_well_does_policy_help_meet_evolving_demand.pdf

Review of Vocational Education: The Wolf Report
www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf

Making Mathematics Count
The 2004 report of Professor Adrian Smith's Inquiry into Post-14 Mathematics Education
www.mathsinquiry.org.uk/report/MathsInquiryFinalReport.pdf

Sir Adrian Smith's Review of Mathematics Teaching to 18
www.gov.uk/government/news/south-asian-method-of-teaching-maths-to-be-rolled-out-in-schools

Baker Dearing Educational Trust
www.utcolleges.org/about/baker-dearing-educational-trust

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Arts and Humanities Research Council
www.ahrc.ac.uk

Biotechnology and Biological Sciences Research Council
www.bbsrc.ac.uk

Engineering and Physical Sciences Research Council
www.epsrc.ac.uk

Economic and Social Research Council
www.esrc.ac.uk

Medical Research Council
www.mrc.ac.uk

Natural Environment Research Council
www.nerc.ac.uk

Science and Technology Facilities Council
www.stfc.ac.uk

Companies, Research Organisations and Academies:
Academy of Medical Sciences
www.acmedsci.ac.uk

Association of Innovation, Research and Technology Organisations (AIRTO)
www.airto.co.uk

British Academy
www.britac.ac.uk

Cogent Skills
www.cogentskills.com

Comino Foundation
www.cominofoundation.org.uk

Department for Business, Energy and Industrial Strategy
www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy

Department for Culture, Media & Sport
www.gov.uk/government/organisations/department-for-culture-media-sport

Department for Education
www.gov.uk/government/organisations/department-for-education

EEF
www.eef.org.uk

Government Office for Science
www.gov.uk/government/organisations/government-office-for-science

Higher Education Division, Department for Education, Northern Ireland Government
www.economy-ni.gov.uk/articles/higher-education-division

Higher Education Funding Council for England
www.hefce.ac.uk

Higher Education Funding Council for Wales
www.hefcw.ac.uk

Innovate UK
www.gov.uk/government/organisations/innovate-uk

Learned Society of Wales
www.learnedsociety.wales

Research Councils UK
www.rcuk.ac.uk

The Royal Society
www.royalsociety.org

Royal Academy of Engineering
www.raeng.org.uk

Royal Commission for the Exhibition of 1851
www.royalcommission1851.org

Royal Society of Edinburgh
www.rse.org.uk

Scottish Funding Council
www.sfc.ac.uk

University Alliance
www.unialliance.ac.uk

Wellcome Trust
www.wellcome.ac.uk

Winton Philanthropies
www.winton.com/en/philanthropies

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