

APPG for Education Inquiry Call for Evidence: Do schools prepare young people for their future careers?

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Do schools prepare young people for their future careers?

Thank you for giving the Institute of Directors (IoD) the opportunity to participate in this call for evidence, published by the APPG for Education on the 25th April 2016. The education, training, and skills gaps are among the most prominent concerns of our members. This paper presents the IoD's comments on some of the key issues raised by this call for evidence and presents the views of the IoD's members on the topic of preparing young people for their future careers.

About the IoD

The IoD was founded in 1903 and obtained a Royal Charter in 1906. It is an independent, non-party political organisation of approximately 35,000 individual members. Its aim is to serve, support, represent and set standards for directors to enable them to fulfil their leadership responsibilities in creating wealth for the benefit of business and society as a whole. The membership is drawn from right across the business spectrum. 71% of FTSE 100 companies and 51% of FTSE 350 companies have IoD members on their boards, but the majority of members, some 70%, comprise directors of small and medium-sized enterprises (SMEs), ranging from long-established businesses to start-up companies. IoD members' organisations are entrepreneurial and growth-orientated, and more than half (57%) export goods and services internationally.

The IoD's response to specific questions posed in this call for evidence:

The IoD's position: The views of our members

Demographic and technological changes are transforming the world of work. The way these changes increasingly place a premium on particular skills suggests that education and training are of vital importance. Consequently, schools and the education sector will need to innovate if it is to keep up with evolving employment demands. Government, educators, employers, and learners themselves need to prepare for developing the skills businesses will need to compete in the face of intensifying competition and market volatility. Managing this transition in the nature of employment will require

a renewed focus on the importance of lifelong engagement in education and training. The IoD has identified two key areas that need to be reshaped in order for schools to prepare young people for the emerging employment environment:

- 1) Curriculum
- 2) Guidance

If the UK is to build a competitive economy for the 21st century, the reforms proposed in this response to your call for evidence will be crucial to ensuring young people have the skills they need to succeed in the new world of work.

Overview

We are living in a time of major change in the labour market. A recent study by the Bank of England's (BoE) chief economist Andy Haldane assessing the impact of new practices and technologies on the UK labour market has predicted that over the next twenty years fifteen million jobs, or about half of the total, are at risk of being lost to automation¹.

The Bank's study is just the latest in a long line of similarly harrowing predictions by leading academics and institutions about the future of employment². At the same time, many businesses are facing difficulty hiring qualified staff. The 2015 UKCES Employer Skills Survey found that almost one in four of the nearly one million current job vacancies in the UK are the result of a skills shortage, while the number of job vacancies unfilled because employers cannot find candidates with the appropriate skills has risen by 130% over the last 5 years³.

Technological advances have always altered the nature of business and employment. As new forms of work are added, the skills of some workers are inevitably made obsolete. Throughout history, this process of creative destruction has generated enormous wealth, but it has also borne difficult disruptions⁴. While technological change has always occurred, two trends set recent innovations apart:

- 1) First, is the level of pervasiveness. Previous job-replacing technological change has been confined to tasks that were predominantly physical and/or repetitive, that is, the kinds of jobs that a machine with relatively simple software can easily replace. Recently, however, computers have begun substituting for complex cognitive skills. The set of human tasks

¹ Andy Haldane, Labour's Share, Bank of England, November 2015:

<http://www.bankofengland.co.uk/publications/Pages/speeches/2015/864.aspx>.

² Martin Ford, *The Rise of The Robots: Technology and The Threat of Mass Unemployment*, (One World, 2015); Erik Brynjolfsson & Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, (W. W. Norton & Company, 2014); Jerry Kaplan, *Humans Need Not Apply: A Guide to Wealth and Work in the Age of Artificial Intelligence*, (Yale, 2015); Frank Levy & Richard J. Murnane, *The New Division of Labor: How Computers Are Creating the Next Job Market*, (Princeton, 2005); *Economic Possibilities for Our Children*, Lawrence H. Summers, National Bureau of Economic Research, 2013, Number 4; Richard Susskind & Daniel Susskind, *The Future of the Professions: How Technology Will Transform the Work of Human Experts*, (Oxford, 2016); Tyler Cowen, *Average Is Over: Powering America Beyond the Age of the Great Stagnation*, (E P Dutton & Co., 2013); Klaus Schwab, *The Fourth Industrial Revolution*, (WEF, 2016); Jeremy Rifkin, *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*, (Palgrave Macmillan, 2015); Carl Benedikt Frey & Michael A. Osborne, *The Future of Employment: How susceptible are jobs to computerisation?*, (Oxford, 2013).

³ UK Commission for Employment and Skills, *Employer Skills Survey 2015*, 28 January 2016:

<https://www.gov.uk/government/publications/ukces-employer-skills-survey-2015-uk-report>.

⁴ Daron Acemoglu, *Introduction to Modern Economic Growth*, (Princeton, 2009); Maarten Goos & Alan Manning, *Lousy and Lovely Jobs: the Rising Polarization of Work in Britain*, CEP, December 2003:

http://eprints.lse.ac.uk/20002/1/Lousy_and_Lovely_Jobs_the_Rising_Polarization_of_Work_in_Britain.pdf.

machines can feasibly automate has extended beyond those routine ‘blue-collar’ clerical roles to include formerly secure, ‘white-collar’ professional roles. In essence, the next wave of labour-saving technology looks to be replacing human brains, rather than just human brawn.

- 2) Second, is the sheer speed of recent technological change. Moore’s Law, the observation made in 1965 by Intel co-founder, Gordon Moore, that the rate of growth in computer processing power will accelerate by approximately twice its speed every two years has been markedly accurate, indicating that not only is this change happening fast, but its pace is likely to increase exponentially for the foreseeable future. The advent of Quantum Computing is only likely to make this process greater.

Such predictions have been claimed by some economists as proof that the Luddites – reputed to have smashed factory machinery during the Industrial Revolution – were right all along. Yet, despite centuries of creative destruction, the concerns over technological unemployment have not materialised. In fact, rather than destroying jobs as the Luddites predicted, technological advancement has proven to be a net creator of employment.

Since around 1750, each of the four waves of new labour-saving technology has been met with public anxiety about the impact on jobs⁵. The first industrial revolution (1760-1840) used water and steam power to mechanise production; the second (1870-1914) used electric power to create mass production; the third (1950-1980) used digital circuits to automate production and the fourth industrial revolution (2000-?) is using data exchange to personalise production⁶.

In the long run, however, each bout of worry about mass technology induced unemployment has proved misplaced. In every round of technological change, some jobs have been lost but ultimately more new jobs have been created. Efficiencies gained through new practices and technologies reduce the cost and duration of production, which, when passed on to the consumer, increase spending power, therefore stimulating demand and creating new jobs. Rather than making human workers redundant, technology has simply shifted work into other areas⁷. For example, whereas in previous centuries the majority of people worked in agricultural or artisanal production, the nineteenth century saw a shift to factory based employment, while the twentieth century saw a move to service and management occupations.⁸

Nevertheless, while it is unlikely that in the long run the net result of the fourth industrial revolution, as it has become known, will be a decline in the number of jobs, robots and smart software will result in significant changes to the nature of work as industries evolve and outdated job functions disappear.⁹ A recent study in the Harvard Business Review estimates that for 60% of existing jobs,

⁵ David Ricardo, *On the Principles of Political Economy and Taxation*, (John Murray, 1821); *The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different?*, Joel Mokyr, Chris Vickers, and Nicolas L. Ziebarth, *Journal of Economic Perspectives*, Volume 29, Number 3, Summer 2015.

⁶ Thomas S. Khun, *The Structure of Scientific Revolutions*, (Chicago, 1962).

⁷ James Bessen, *How Technology Creates Jobs for Less Educated Workers*, *Harvard Business Review*, March 2014: <https://hbr.org/2014/03/how-technology-creates-jobs-for-less-educated-workers>.

⁸ Ann Wren, *The Political Economy of the Service Transition*, (Oxford, 2013); Ian Stewart, Debapratim De & Alex Cole, *Technology and people: The great job-creating machine*, *Perspectives*, August 2015: <http://www2.deloitte.com/uk/en/pages/finance/articles/technology-and-people.html>; L. Rachel Ngai & Barbara Petrongolo, *Gender Gaps and the Rise of the Service Economy*, CEP, September 2015: <http://personal.lse.ac.uk/PETRONGO/Ngai-Petrongolo2015.pdf>.

⁹ *Creativity Vs Robots*, Hasan Bakhshi, Carl Frey and Michael Osborne, Nesta, April, 2015: <http://www.nesta.org.uk/publications/creativity-vs-robots>; *Rise of the Machines: the Effects of Labor-Saving Innovations on Jobs and Wages*, Andy Feng & Georg Graetz, CEP Discussion Paper No 1330, February 2015: <http://cep.lse.ac.uk/pubs/download/dp1330.pdf>; *Robots at Work*, Georg Graetz & Guy Michaels, CEP Discussion Paper No 1335, March 2015: <http://cep.lse.ac.uk/pubs/download/dp1335.pdf>; *Estimating the*

30% or more of current work activities can be automated by available or announced technologies¹⁰. The problem facing many major economies, therefore, is not that robots will take all the jobs; it is that humans need to be trained and ready to work in parallel with those robots. In this new environment labour, more than capital, will represent the critical factor of production.

The velocity and magnitude of disruption that underpins the fourth industrial revolution is already having a major impact on businesses:

- On the supply side, many industries are experiencing significant disruption from agile new competitors who, thanks to access to innovative platforms for research, development, marketing, sales, and distribution, can oust well-established incumbents faster than ever by improving the quality, ease, speed, or price at which a product or service is delivered.
- On the demand side major shifts are also occurring, as growing transparency, consumer engagement, and new patterns of consumer behaviour built on increasing access to networks and data are forcing companies to adapt the way they design, market, and deliver products and services¹¹.

New platforms, rendered easy by emergent technologies, are also lowering the barriers to entry for new businesses and individuals, altering the personal and professional environments of workers. There are now over 5.4 million businesses in the UK, an increase of 1.9 million, or 55%, since the year 2000 and the proliferation of new firms is still accelerating¹². The annual birth rate of UK businesses is up from just 66,500 in 1979, when records began, to a record number of over 585,700 start-ups founded in 2015¹³. Encouragingly, the rate of firm survival has also increased such that the UK is now ranked in 9th place on the Global Entrepreneurship Index and as the 6th best place in the world to start a business according to the Legatum Institute and the World Bank¹⁴.

impact of robots on productivity and employment, Guy Michaels & Georg Graet, CEPR, March 2015: <http://www.voxeu.org/article/robots-productivity-and-jobs>; Klaus Schwab, The Fourth Industrial Revolution, (WEF, 2016); Leslie P Willcocks & Mary C Lacity, Service Automation: Robots and the Future of Work, (Steve Brooks, 2016); Technical Change and the Relative Demand for Skilled Labor, Lawrence F. Katz & Robert A. Margo, NBER, Working Paper 18752: <http://www.nber.org/papers/w18752>; The Cambridge Economic History of Modern Britain, Vol. 1-3, (Cambridge, 2003); Bessen & James E., How Computer Automation Affects Occupations: Technology, Jobs, and Skills (January 16, 2016). Boston Univ. School of Law, Law and Economics Research Paper No. 15-49; Michael Chui, James Manyika, and Mehdi Miremadi, Four fundamentals of workplace automation, McKinsey Quarterly, November 2015: <http://www.mckinsey.com/business-functions/business-technology/our-insights/four-fundamentals-of-workplace-automation>;

¹⁰ How Many of Your Daily Tasks Could Be Automated?, Michael Chui, James Manyika & Mehdi Miremadi, Harvard Business Review, December 2015: https://hbr.org/2015/12/how-many-of-your-daily-tasks-could-be-automated?utm_campaign=harvardbiz&utm_source=twitter&utm_medium=social.

¹¹ Government Office for Statistics, The Future of Manufacturing: A New Era of Opportunity and Challenge for the UK, Foresight Report, 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/255923/13-810-future-manufacturing-summary-report.pdf.

¹² Companies House, Incorporated companies in the United Kingdom – 2015: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/495706/Incorporated_Companies_in_the_UK_December_2015-ver0.1-6.pdf; Department for Business, Innovation & Skills, Business population estimates 2015: <https://www.gov.uk/government/collections/business-population-estimates>; Office for National Statistics, Business Demography Statistical bulletin, November 2015: <http://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/businessdemography/previousReleases>.

¹³ Companies House, Incorporated companies in the United Kingdom – 2015: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/495706/Incorporated_Companies_in_the_UK_December_2015-ver0.1-6.pdf.

¹⁴ Global Entrepreneurship Development Institute, 2016 Global Entrepreneurship Index rankings: <http://thegedi.org/global-entrepreneurship-and-development-index/>; Legatum Institute, 2015 Legatum

New inventions and innovations such as big data, cloud computing, the internet of things, artificial intelligence, quantum computing, robotics, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, and energy storage mean not only that the birth rate of new businesses is increasing more rapidly but also that their Schumpeterian disruptive capacity is greater than ever. One crucial area which has underpinned the UK's start-up strength is the speed and enthusiasm with which this country has embraced the digital revolution. An estimated 12.4% of UK GDP this year will come from the 'internet economy', making the UK the world leader, 50% ahead of our nearest competitor, South Korea, which is on just 8%¹⁵. The digital economy has grown 32% faster than the rest of the UK economy since 2010, and is creating new jobs at an unprecedented rate. The sector currently accounts for 1.56m jobs across the UK, with the digital workforce growing three times faster than the wider UK job market¹⁶. This entrepreneurial revolution is not limited to digital products, of course, but these figures demonstrate the rapid speed at which the UK economy and labour market are changing¹⁷. Consequently, the education sector will need to innovate if it is to keep up with evolving employment demands.

As the 2015 UKCES Employer Skills Survey points out, around 90% of the current UK labour force have the potential to be active in work a decade from now¹⁸. The economy cannot rely on the next generation alone to fill skills gaps. In this race between education and technology we must also prepare the existing workforce for the jobs of the future. With the continuously changing nature of employment, government, employers, and educators need to look at reforming education provision so that workers can retrain and up-skill to meet the needs of the jobs market¹⁹.

A concurrent factor altering the future of employment is demography²⁰. British people today are living longer than ever before and many are choosing to remain in work until later in life. Recent reports by Public Health England, the Registrar General for Scotland, and the Medical Research Council, as well as studies in the *BMJ* and *The Lancet* have shown that the proportion of life spent in good mental and physical health is increasing in Britain, even as life expectancy continues to rise. This, alongside the removal of the official retirement age and the advantage of more flexible working practices, has seen participation in the UK labour market by those aged over 50 reach an all-time high²¹.

Prosperity Index: <http://www.li.com/activities/publications/2015-legatum-prosperity-index>; World Bank Group, Doing Business: <http://www.doingbusiness.org/rankings>.

¹⁵ Boston Consulting Group, The Internet Economy in the G-20, March 2012: <https://www.bcg.com/documents/file100409.pdf>.

¹⁶ Tech City UK & Nesta, Tech Nation 2016: <http://www.techcityuk.com/technation/>.

¹⁷ Judith Scherer & Michael Mandel, A Low-Cost and Flexible Approach for Tracking Jobs and Economic Activity Related to Innovative Technologies, Nesta Working Paper 15/11, June 2015: <http://www.nesta.org.uk/publications/low-cost-and-flexible-approach-tracking-jobs-and-economic-activity-related-innovative-technologies>; Nesta, Living Map of Jobs Innovators: <http://jobsinnovators.org/>.

¹⁸ UK Commission for Employment and Skills, Employer Skills Survey 2015, 28 January 2016: <https://www.gov.uk/government/publications/ukces-employer-skills-survey-2015-uk-report>.

¹⁹ Jan Tinbergen, Substitution of Graduate by Other Labour, Volume 27, Issue 2, pages 217–226, January 1974: <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6435.1974.tb01903.x/abstract>.

²⁰ Charles Goodhart, Pratyancha Pardeshi, & Manoj Pradham, Workers vs pensioners: the battle of our time, November 2015: <http://www.prospectmagazine.co.uk/features/workers-vs-pensioners-the-battle-of-our-time>.

²¹ Andy Haldane, Labour's Share, Bank of England, November 2015: <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/864.aspx>; Public Health England, Life expectancy: recent trends in older ages, February 2015: <https://www.gov.uk/government/publications/life-expectancy-recent-trends-in-older-ages>; Registrar General for Scotland, Life Expectancy in Scottish Areas, 2012-2014: <http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/life-expectancy-in-scottish-areas>; Medical Research Council, MRC National Survey for Health and Development (NSHD), 2016: <http://www.mrc.ac.uk/news/browse/longest-running-cohort-study-in-the-uk-celebrates-turning-70/>; Office for National Statistics, Measuring National Well-being, Personal Well-being in

Nevertheless, just 69% of 50 to 64 year olds today are in paid work compared to 83% of their younger counterparts. Ominously, by 2025 there will be 750,000 fewer people aged between 16 and 49, but 3.7m more people aged between 50 and 64²². As the ratio of workers to dependants worsens in the coming decades due to population ageing it is important that an increasing number of older people remain in employment²³. To that end, the evidence shows that a more educated labour force is likely to be able to remain in work for longer, owing not just to the greater employment prospects associated with better education but also due to the generally greater physical and mental health of better educated people. The UK economy will have to make adjustments to provide and then to capitalise upon a greater supply of educated older labour²⁴. In the past there was a correlation between the age of workers and their productivity. Yet, with people remaining both physically and mentally healthier for longer, and as the demands of work have changed, this correlation is fading²⁵. Workers nearing what has traditionally been seen as retirement age will increasingly seek to reduce their hours while still remaining engaged in the workplace. Indeed, the number of people over the age of 65 in employment today stands at over one million, meaning the UK now has the 7th highest employment rate for persons in their late-60s in the OECD. This trend points to the need for flexible working practices. Older workers in ageing economies often have difficulty finding viable employment as industries evolve and the nature of work moves beyond their existing skills set²⁶. As more workers remain available for employment for longer, employers will have to adapt to accommodate. Individuals will have to take ownership of their careers, but there is also an onus on employers to provide on-the-job training to ensure the skills of an older workforce remain relevant and up to date. With government projections expecting one in three babies born today to live to

the UK, 3 year data 2012 to 2015:, February 2016:

<http://webcache.googleusercontent.com/search?q=cache:lzcZ-d7MlyYJ:www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/personal-well-being-in-the-uk--three-year-data-2012-2015/index.html+&cd=1&hl=en&ct=clnk&gl=uk>; Lynda Gratton & Andrew Scott, *The 100-Year Life: Living and working in an age of longevity*, (Bloomsbury, 2016).

²² Public Health England, *Life expectancy: recent trends in older ages*, February 2015:

<https://www.gov.uk/government/publications/life-expectancy-recent-trends-in-older-ages>; Registrar General for Scotland, *Life Expectancy in Scottish Areas, 2012-2014*: <http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/life-expectancy-in-scottish-areas>; Medical Research Council, *MRC National Survey for Health and Development (NSHD)*, 2016:

<http://www.mrc.ac.uk/news/browse/longest-running-cohort-study-in-the-uk-celebrates-turning-70/>; Office for National Statistics, *Measuring National Well-being, Personal Well-being in the UK, 3 year data 2012 to 2015*:, February 2016: <http://webcache.googleusercontent.com/search?q=cache:lzcZ-d7MlyYJ:www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/personal-well-being-in-the-uk--three-year-data-2012-2015/index.html+&cd=1&hl=en&ct=clnk&gl=uk>; Lynda Gratton & Andrew Scott, *The 100-Year Life: Living and working in an age of longevity*, (Bloomsbury, 2016).

²³ Department for Work and Pensions, *Fuller Working Lives: a framework for action*, June 2014:

<https://www.gov.uk/government/publications/fuller-working-lives-a-framework-for-action>; Independent Review of Retirement Income, *We Need a National Narrative: Building a Consensus around Retirement Income*, March 2016: <http://www.pensions-institute.org/IRRI/Report>.

²⁴ United Nations, *World Population Prospects, 2015*:

http://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf.

²⁵ OECD; "Maintaining Prosperity in an Ageing Society: the OECD study on the policy implications of ageing"; Working Paper AWP 4.1; pp 136.

²⁶ Keith Breene, *What is the future of work?*, (WEF, 2016); Workers' Educational Association, *Why adult education matters*, 2015; Higher, Further, Faster, More: Improving higher level professional and technical education, Jonathan Simons & Natasha Porter, Policy Exchange, October 2015: http://www.policyexchange.org.uk/publications/category/item/higher-further-faster-more-improving-higher-level-professional-and-technical-education?utm_source=zzz+Workbooks+integration+list&utm_campaign=4db0842812-Higher_Further_Faster_More10_19_2015&utm_medium=email&utm_term=0_ebb868324e-4db0842812-358642265; Financial health of the higher education sector, HEFCE, Issues paper, November 2015: http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2015/201529/HEFCE2015_29.pdf.

100, compared to just 1 in 10 born in 1950, it is important that today's young people are enabled to pursue continuous education, re-training, and up-skilling throughout their careers so that the option of working later in life remains both attractive and possible.

How economies incorporate and adapt to new and emerging inventions, innovations, lifestyle and demographic trends will therefore depend on employers', educators', and policymakers' ability to facilitate re-training and life-long learning. The fact that roughly twenty million jobs were lost in Britain between 1980 and 2000 shows that the Bank of England's prediction of fifteen million automated jobs would not be unprecedented²⁷. The lesson from the lay-offs of the 1980s and early-1990s is the importance of enabling those people who have lost their job to re-skill in order to find alternate employment and fill the new jobs being created. This is one reason why university graduates enjoy greater sustained long-term growth in earnings than apprentices — they are better able to ride waves of technological change²⁸. Indeed, of the record 2 million new jobs created in the UK since 2010, more than two-thirds have been full-time highly-skilled professions²⁹. If the pace of adoption of technology is accelerating as predicted, individuals and society will need to prepare.

Supply side policies will be crucial if workers are to navigate the era of automation. The way in which these changes increasingly reward particular skills suggests that education and training are of vital importance. Global labour markets are already experiencing difficulties as the number of workers with the requisite skills struggles to keep pace with employers' needs. This gap between supply and demand is evident among IoD members, 38% of whom say their organisation is suffering from an inability to find the right person to fill an existing vacancy³⁰. Indeed, access to skills is the number one concern of IoD members and a recent survey of our start-ups and young entrepreneurs, the IoD99, shows that a lack of access to employees with the requisite skills is their biggest barrier to growth³¹.

A key challenge for businesses will be how they engage with education providers throughout the upheaval. The emergence of new business models means that talent, culture, and organizational forms will have to be rethought. A recent survey by the Economist Intelligence Unit (EIU) found that less than a quarter (23%) of employers have devised and implemented a strategy to address the potential impact of new practices and technologies on their workforce³². Yet many of the challenges that companies face in making effective use of new practices and technologies will require strategic directives to overcome. The types of work that businesses are able to offer human employees look likely to undergo a radical reinvention in the years ahead. The EIU's findings underscore the need for directors to investigate how automation within their organisation will affect their workforce and competitive performance, evaluating which jobs provide the best use of humans' unique talents and abilities, as well as which jobs will require human oversight and decision-making capacity. Business leaders need to consider what their workforces will look like 5, 10, 20 years from now, assessing what skills they will need and informing schools and education providers so that employers will be able to recruit and retain suitable workers³³.

²⁷ Office for National Statistics, Labour market, Alison Spence, Social Trends 41, Table 2.

²⁸ Robert Putnam, *Our Kids: The American Dream in Crisis*, (Simon & Schuster, 2015).

²⁹ Andy Haldane, *Labour's Share*, Bank of England, November 2015:

<http://www.bankofengland.co.uk/publications/Pages/speeches/2015/864.aspx>.

³⁰ IoD Policy Voice members survey, May 2015.

³¹ IoD Policy Voice members survey, May 2015; IoD99 members survey, December 2015.

³² Economist Intelligence Unit, *Preparing for the digitisation of the workforce: How robotics, artificial intelligence and on-demand crowdsourced labour are reshaping organisations*, 2015:

<http://www.economistinsights.com/technology-innovation/analysis/preparing-digitisation-workforce/fullreport>.

³³ Rahel Jaeggi, *Alienation*, (Columbia, 2014).

As the fourth industrial revolution alters rather than eliminates jobs, ensuring the efficient adoption and use of new practices and technologies will take on increasing importance³⁴. Already, the so-called 'productivity puzzle' has become one of the defining features of the aftermath of the Global Financial Crisis³⁵. That productivity rises over time is at least in part a natural outcome of people getting better at their jobs. In the post-War period the UK became more efficient year-on-year at using its stock of workers and capital to produce output at an average growth rate of 2% per annum³⁶. Currently, however, it appears that process of gradual improvement has stagnated.

That stagnation of UK productivity can, in part, be explained by the changing nature of work and much of the proposed solutions to the productivity puzzle centre on measures that government or businesses could take to improve skills. What is less commented upon is the way in which new practices, technologies and skills are brought into and disseminated within companies. One of the best ways to have companies consider new approaches is to have new employees joining firms at a variety of levels, to disseminate fresh approaches and ideas throughout the firm³⁷. Long-term employees undoubtedly bring great value to any firm, but there is equally a point at which an organisation benefits from new employees who bring differing experiences and fresh approaches.

In this new rapidly changing economic environment, a company's performance will be increasingly determined by a firm's agility and their ability to respond quickly to changing employment, technology and consumer demands, not just how well they can refine production and processes in mature businesses. How quickly ideas and practices are adopted is dependent upon a number of factors but workforce agility is primary among them. While most productivity gains are the result of the accumulation of minor adjustments to the way work is processed or completed, and consequently high degrees of productivity can often be achieved through intense specialisation, this degree of specialisation often tends to mitigate against agility. In a world of rapid and increasing innovation and change, worker agility, adaptability and resilience will be the crucial differentiating factor in securing future employment and economic growth.

1. Curriculum

Formal knowledge alone is no longer enough to prepare workers for the dramatic socioeconomic demands of the digital age. If workers and the UK economy are to continue to reap the benefits of education, policymakers must focus on the changing skills set that will be required to prosper in a rapidly evolving global economy. In the past, education was about imparting knowledge. Today, it is about providing students with the intelligence and skills to navigate an increasingly uncertain and volatile employment market.

³⁴ Robert Solow, "We'd better watch out", *New York Times Book Review*, July 12, 1987, page 36.; Brynjolfsson, Erik (1993). "The productivity paradox of information technology". *Communications of the ACM* 36 (12): 66–77; Paul A. David, "Computer And Dynamo: The Modern Productivity Paradox In A Not-Too Distant Mirror", Stanford:

https://www.researchgate.net/publication/23750155_Computer_And_Dynamo_The_Modern_Productivity_Paradox_In_A_Not-Too_Distant_Mirror.

³⁵ Larry Summers, Why stagnation might prove to be the new normal, 2013: <http://larrysummers.com/2013/12/15/why-stagnation-might-prove-to-be-the-new-normal/>; Tyler Cowen, , *The Great Stagnation: How America Ate All the Low-Hanging Fruit of Modern History, Got Sick, and Will(Eventually) Feel Better*, (Dutton, 2011); HM Treasury & Department for Business, Innovation & Skills, *Fixing the Foundations: Creating a more prosperous nation*, July 2015:

<https://www.gov.uk/government/publications/fixing-the-foundations-creating-a-more-prosperous-nation>.

³⁶ Stephen Broadberry & Mary O'Mahony, *Britain's Twentieth-Century Productivity Performance in International Perspective*, July 2005:

<http://www2.warwick.ac.uk/fac/soc/economics/staff/sbroadberry/wp/labmkt5.pdf>.

³⁷ Robert J. Gordon, *The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War*, (Princeton, 2016).

The UK education system began to take its present form with the establishment of our current exam system towards the end of the first industrial revolution in 1858³⁸. In an era of skilled factory work, this mass public examinations system was designed to assess and rank school leavers on their ability to recall information and apply the standard methods required to satisfy the needs of 19th century employment. Students would go into a large room where they would pen answers to examinations which were split into subjects: English language, English literature, mathematics, geography, Latin, French, German, sciences, art, music and religious studies. This remains essentially the same system that we employ today. Yet, to prepare students for the change in the way we work, the skills that schools teach need to change.

A recent study by researchers at Oxford University found that UK schools were amongst the world's worst culprits for teaching to pass a test, focusing on short term knowledge acquisition at the expense of nurturing deep and lasting intelligence and understanding³⁹. This study raises serious concerns that UK education policy is turning our schools into exam factories, squeezing out creativity and the joy of learning at a time when these very attributes are becoming increasingly important. Worryingly, the skills that are easiest to teach and test — method and recall — are also the easiest to automate. An over emphasis on testing comes at the expense of teaching children to employ the creativity and entrepreneurial talents they will need to insulate them against the unpredictability of the future economy⁴⁰. Knowledge, of course, will still be important, but with widespread internet access, the labour market no longer rewards workers primarily for what they know but for what they can do with what they know⁴¹. A fast-paced global economy requires workers with the flexibility and agility to adapt to constant change rather than follow a traditional career path. Consequently, school and student assessments must evolve to meet the needs of current and future employers. The broad curriculum of the new English Baccalaureate (EBacc), for example, should go some way to helping achieve this aim but the decline in the number of pupils taking GCSEs in artistic subject (such as design, music, and drama) is a concern given the growing importance of developing creativity in students⁴². In the past, educators imparted knowledge by breaking problems into manageable pieces and then teaching techniques to solve them. Today, value is often created by synthesising and evaluating disparate bits of information. For that to be achievable, however, workers need more than technical knowledge; they must be imbued with curiosity, open-mindedness, and the ability to make connections between seemingly unrelated bits of information.

Today's schools and universities are dominated by approaches to learning that are fundamentally individualistic and competitive in nature. Students learn on their own and are judged individually. As technology and globalisation progress, however, working with others is becoming increasingly important. Innovation rarely results from individuals working in isolation. Instead it is usually the product of sharing and collaboration. The world of work is increasingly a collective enterprise, and this must be reflected in education curricula. A recent Harvard study found the number of jobs that require both socialising and creative thinking grew 24% between 1980 and 2012 and these jobs have also fared best in terms of pay growth. By contrast, jobs that do not require social skills have steadily

³⁸ Lou Aronica & Ken Robinson, *Creative Schools: The Grassroots Revolution That's Transforming Education*, (Viking, 2015).

³⁹ Natasha Stotesbury, *Understanding Income Inequality and its Implications: Why Better Statistics are Needed*, (Oxford, 2015).

⁴⁰ Mike Tomlinson, *14-19 Curriculum and Qualifications Reform: Final Report of the Working Group on 14-19 Reform*, October 2004: <http://webarchive.nationalarchives.gov.uk/20050301194752/http://www.dfes.gov.uk/14-19/documents/Final%20Report.pdf>.

⁴¹ OECD, *Education at a Glance 2015*, November 2015: <http://www.oecd.org/education/education-at-a-glance-19991487.htm>.

⁴² The Warwick Commission on the Future of Cultural Value, *Enriching Britain: Culture, Creativity and Growth*, 2015: <http://www2.warwick.ac.uk/research/warwickcommission/futureculture/finalreport/>.

declined in both number and pay⁴³. UK schools need to incorporate this new reality into their curricula, preparing students to work across cultures and equipping them for a world shaped by issues that transcend national boundaries.

As technology alters the demand for skills, workers will need to reallocate to tasks that are not susceptible to automation. For example, a recent study by McKinsey estimates that activities consuming more than 20% of a CEO's working time could be automated using existing technologies. These include analysing reports and data to inform operational decisions, preparing staff assignments, and reviewing status reports⁴⁴. Various examinations of the tasks computers are unlikely to be able to perform suggest general behavioural and non-cognitive 'soft' skills necessary for collaboration, innovation, and problem solving such as resourcefulness, creativity, abstract reasoning, and emotional intelligence are the likely domains where humans will retain a comparative advantage. That is not least because these are skills where computers complement our abilities rather than substitute for them. Even though today mobile devices, online social networks, and high-speed wireless broadband make communication over vast distances possible at almost zero cost, face-to-face interactions are still the key engine of innovation, collaboration and growth. Yet these soft skills are the very skills IoD members say current school-leavers and graduates lack most. Indeed in our May 2015 Policy Voice survey the shortage of soft skills was the number one barrier to growth cited by members, ahead of things like the state of the economy; taxes and regulations; and access to finance⁴⁵. Two-thirds (68%) were worried specifically about poor communication skills, 35% said team-working, 36% listed resourcefulness as an issue, while 22% cited a lack of creativity as a concern⁴⁶. Education providers, therefore, need to focus on improving how students think and work together, and on providing the social and emotional skills needed to collaborate with others.

Beyond the recent introduction of coding and computer programming to the schools' curriculum and the increased emphasis on numeracy, quantitative literacy, and STEM (Science, Technology, Engineering, and Maths) subjects, the education sector must be redesigned to focus on learning to learn and acquiring the skills and experience needed to collaborate with others⁴⁷. Too much emphasis on exam performance at the expense of other developmental activities has contributed to the number of 16-17 year olds with a Saturday job declining from almost half twenty years ago to less than 18% today. Uniquely human skills, like being able to work in teams, manage relationships, and understand cultural sensitivities, are vital for businesses across all sectors and must become a core component of future generations' repertoire. It is clear that our education system will need to adapt by providing training that places more emphasis on developing these abilities in students, moving beyond the current rote-learning exam focus to more group based projects, in-class presentations, and team-working exercises. Of course good grades will continue to be important, but we shouldn't confuse qualifications with competencies and experience, particularly for future generations who are going into a world that is far more fluid and entrepreneurial.

⁴³ David J. Deming, The Growing Importance of Social Skills in the Labor Market, NBER Working Paper No. 21473, August 2015: <http://www.nber.org/papers/w21473>; David H. Autor, Polanyi's Paradox and the Shape of Employment Growth, MIT, NBER and JPAL, September 2014: <http://economics.mit.edu/files/9835>; James J. Heckman & Jora Stixrud & Sergio Urzua, The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior, NBER Working Paper No. 12006, February 2006: <http://www.nber.org/papers/w12006>; Andrea Salvatori, Don't blame the robots: is technology responsible for a decline in mid-skilled jobs?, ISER, January 2016: <https://www.iser.sx.ac.uk/blog/2015/09/15/don-t-blame-the-robots>.

⁴⁴ Michael Chui, James Manyika, and Mehdi Miremadi, Four fundamentals of workplace automation, McKinsey Quarterly, November 2015: <http://www.mckinsey.com/business-functions/business-technology/our-insights/four-fundamentals-of-workplace-automation>.

⁴⁵ IoD Policy Voice members survey, May 2015.

⁴⁶ IoD Policy Voice members survey, August 2015.

⁴⁷ Andrew Hacker, The Math Myth: And Other STEM Delusions, (The New Press, 2016).

Part of the policy answer is promoting skills-oriented learning throughout workers' lives, rather than focusing on education that ends when work begins. After all, developing skills is easier when learning is integrated into the workplace. Doing so also allows young people to develop hard skills on modern equipment and learn soft skills through real-world experience⁴⁸.

The difficulties of reform are perfectly apparent in the gap between where industry experts think schooling should be heading, preparing for society 20 years hence when young children entering their first year of school today will be entering the world of work, and what the majority of the public thinks schools should be doing – improving standards in the existing curricula⁴⁹. This is an issue that highlights the need for an independent, non-political body of trusted, leading, representatives from policy, business, and the education system, which could monitor and review schools' subject choice and content on an ongoing basis, with the aim of informing and recommending curriculum reform to providers based on evidence of evolving employment demands. These systemic changes in education and training can be broken down into three key areas:

- 1) The education system needs to adapt to allow a focus on lifelong skills rather than short-term knowledge.
- 2) Employers and education providers need to collaborate more and share practical knowledge of employer needs to ensure students develop the skills they need to help insulate them against the unpredictability of the future economy.
- 3) Education curricula need to be monitored, informed and continuously re-examined by an expert body, free from political interference, which would advise schools on subject choice and make curricula more relevant to ever-changing labour market demands.

2. Guidance

As this pace of change grows and employees continue to work later in life, preparing people for the rapidly evolving employment landscape will thus become increasingly important. Many people today, particularly younger generations, will work in jobs that do not exist yet, in industries that haven't been created. Most will change jobs multiple times and brief periods of unemployment, for people at all levels, will become more common⁵⁰. While education and training initiatives can help fill potential skills gaps, there is also a need to establish stronger links between the education system and the labour market.

Graduates and school-leavers often struggle with the transition between education and the workplace partly because of poor career guidance. A key issue is the long-term nature of the challenge. An individual starts to make choices in education that will affect the skills needed in their career as much as a decade before they enter the workplace, by which time technology and consumer preferences will have changed significantly⁵¹. Alarming, just 43% of students currently receive any formal careers guidance before choosing their A-Level subjects, yet the subjects they

⁴⁸ Andreas Schleicher, Education in an Uncertain World, Project Syndicate, December 2015: <http://www.project-syndicate.org/commentary/education-technological-skills-more-important-by-andreas-schleicher-2015-12>.

⁴⁹ Keith Breene, What is the future of work?, WEF, January 2016: http://www.weforum.org/agenda/2016/01/what-is-the-future-of-work?utm_content=buffer7cf9e&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer.

⁵⁰ Ulrich Beck, The Brave New World of Work, (Polity, 2000).

⁵¹ City&Guilds, Great Expectations: Teenagers' career aspirations versus the reality of the UK jobs market, 2015: http://www.economicmodelling.co.uk/wp-content/uploads/CG_Great-Expectations_Online-FINAL.pdf.

those can severely restrict their employment options later in life⁵². This is partly because only 83% of secondary schools employ a qualified, full time, careers advisor, with many relying instead on other support staff to fill career guidance roles⁵³. In the UK schools system, where learner choice plays an increasingly important role, it is ever more important for students, teachers, and parents to access good quality and timely information, advice and guidance on the likely skills needed by employers in the future⁵⁴. This needs to be based on a range of data and informed by trends in workplace practices, emerging technologies and business models which have developed within the digital age. For many pupils the immediate concern about their future is not employment but their next stage of study. Providers should work to ensure students have encounters with older students from universities, colleges or apprenticeships, so that students can learn from each other⁵⁵.

STEM skills underpin many of the potential high-growth industries in the UK economy but STEM skills in particular remain in short supply. According to the 2015 UKCES Employment and Skills survey, five million people are employed in high level STEM roles, but 43% of STEM vacancies are hard to fill due to skills shortages, compared to a UK average of 24% for other difficult to fill roles⁵⁶. The recent YourLife Tough Choices Report found just a quarter of A-Level students take up two or more STEM subjects despite 74% starting secondary school with high levels of interest in these subjects. The misperceived importance placed on higher grades at A-Level instead of good subject choices leads students to choose subjects they expect to do well in rather than studying the supposedly 'harder' STEM subjects. With so many students turning away from these subjects at ages 15 and 16, they are inadvertently closing the door to more than 50% of potential jobs⁵⁷.

Businesses can help offer a solution. Encounters with employers, visits to work places, and education and training all help enlighten and inspire. Research by the government's new Careers & Enterprise Company shows that young adults who have greater levels of contact with employers whilst at school are significantly less likely to become NEET and can expect, when in full-time employment, to earn up to 18% more than peers who had no such workplace exposure⁵⁸. The 2013 UKCES Employer

⁵² The Gatsby Charitable Foundation, Good Career Guidance, 2014:

<http://www.gatsby.org.uk/uploads/education/reports/pdf/gatsby-sir-john-holman-good-career-guidance-2014.pdf>; The Gatsby Charitable Foundation, Assessing Benchmarks of Good Practice in School Career Guidance, 2014: <http://www.gatsby.org.uk/uploads/education/reports/pdf/pwc-assessing-benchmarks-of-good-practice-in-school-career-guidance.pdf>.

⁵³ The Careers Service: the Government's Elephant in the Room, Unison, January 2015:

<https://www.unison.org.uk/content/uploads/2014/08/TowebThe-Careers-Service-The-Governments-Elephant-in-the-Room-UNISON-Briefing-August-20142.pdf>.

⁵⁴ YourLife, Tough Choices: The real reasons A Level students are steering clear of science and Maths, February 2016:

<http://yourlife.org.uk/tough-choices-the-real-reasons-a-level-students-are-steering-clear-of-science-and-maths/>; Jen Lexmond & Richard Reeves, Building Character, Demos, 2009:

http://www.demos.co.uk/files/Building_Character_Web.pdf?1257752612; Rebecca Allen & Simon Burgess, Can School League Tables Help Parents Choose Schools?, Fiscal Studies, Vol. 32, No. 2, June 2011, Vol. 32, No. 2, pp. 245-261: <http://www.ifs.org.uk/publications/5658>.

⁵⁵ Gatsby, Good Career Guidance, April 2014:

<http://www.gatsby.org.uk/uploads/education/reports/pdf/gatsby-sir-john-holman-good-career-guidance-2014.pdf>.

⁵⁶ UK Commission for Employment and Skills, Employer Skills Survey 2015, 28 January 2016:

<https://www.gov.uk/government/publications/ukces-employer-skills-survey-2015-uk-report>.

⁵⁷ YourLife, Tough Choices: The real reasons A Level students are steering clear of science and Maths, February 2016:

<http://yourlife.org.uk/tough-choices-the-real-reasons-a-level-students-are-steering-clear-of-science-and-maths/>.

⁵⁸ Ralph Scott & Jonathan Birdwell, Learning by Doing, Demos, June 2015:

<http://www.demos.co.uk/project/learning-by-doing/>; Christian Percy & Anthony Mann, Education&Employers, School-Mediated Employer Engagement and Labour Market Outcomes for Young Adults: Wage Premia, NEET Outcomes and Career Confidence, May 2015: <http://www.educationandemployers.org/research/school-mediated-employer-engagement-and-labour-market-outcomes-for-young-adults-wage-premia-neet-outcomes-and-career-confidence-2/>.

Skills Survey found that 66% of employers think work experience is critical or significant when hiring, but only 38% offer it⁵⁹. This is not because schools and businesses do not think employer engagement matters. Half of IoD members engage directly in some form with schools or education providers⁶⁰. Instead the evidence points to the practical challenges of linking the worlds of work and education, given, for example, their different timetables, as well as the pressures schools face to prioritise exam results over what are often seen as extra-curricular activities.

Better forecasting of industry and labour-market trends is vital to allow governments, businesses and individuals to react quickly to change. Big data is likely to prove pivotal in developing more accurate predictions of where the jobs market is moving and where the skills shortages are expected to lie.

There is also a need to support in-work progression. Career guidance professionals must develop a focus not simply on helping people into the world of work, but also begin offering post-employment support. Today's record employment figures hide the fact that over recent decades it has taken many people longer to progress in their careers. Government estimates indicate that around 30% of graduates are still in entry-level positions five years after graduation⁶¹. Poor in-work progression stifles employees' careers and as a result they take longer to reach their productivity and earnings potential. Better information about education and employment paths and a comprehensive understanding of the labour market, both as it exists today and is likely to exist in the future, will enable young people to take the appropriate strategic steps along their career journey⁶².

As the workplace changes, education and training must adapt so that talent can keep pace with market demands. Strategic relationships between employers and schools will be vital to ensure that the right skills needed by business for a rapidly evolving environment are developed and delivered. This means enabling employers to have a greater degree of influence over the education and training system⁶³. Structural changes in the labour market are already making it difficult for young people to get into work and progress. Newly emerging business fields are only likely to make this worse by creating even bigger skills vacuums that arise at rapid speed, outpacing the ability of individual organisations to respond. Those businesses that can't access new skills or fail to adapt those they do have face being left behind, assuming they survive at all. To ensure an effective response, Government will have an important role in facilitating and supporting these processes by, for example:

- 1) Ensuring that every school has a suitably qualified, dedicated, full-time, careers coach whose job is to provide independent careers education and guidance and to co-ordinate employer engagement for students.
- 2) Multiple, high-quality work experience opportunities should become compulsory for all students from the age of 13 onwards (Key stage 3, 4, and "5") so that young people can

⁵⁹ UK Commission for Employment and Skills, Employer Skills Survey 2013, 25 April 2014: <https://www.gov.uk/government/collections/ukces-employer-skills-survey-2013>. No equivalent question was asked in the 2015 UKCES survey.

⁶⁰ IoD Policy Voice members survey, August 2015.

⁶¹ Department for Business, Innovation & Skills, Graduate labour market: quarterly statistics, June 2015: <https://www.gov.uk/government/collections/graduate-labour-market-quarterly-statistics> ; Full Fact, Are graduates settling for non-graduate jobs?: <https://fullfact.org/education/are-graduates-settling-non-graduate-jobs/>.

⁶² AQMeN, School subject choices and social inequalities in higher education entry and labour market outcomes, March, 2015: <http://aqmen.ac.uk/node/1720>.

⁶³ UK Commission for Employment and Skills, The future of work: jobs and skills in 2030, February 2014: <https://www.gov.uk/government/publications/jobs-and-skills-in-2030>.

learn from employers and be better informed and equipped to make the right choices to help achieve their future career aspirations.

- 3) Ensuring national career guidance services are not just focused on helping young people to enter the workforce but also focus on help those young people once in employment to progress their careers.

Conclusion

Demographic and technological changes are transforming the world of work. The way these changes increasingly place a premium on particular skills suggests that education and training are of vital importance. Consequently, schools and the education sector will need to innovate if it is to keep up with evolving employment demands. Government, educators, employers, and learners themselves need to prepare for developing the skills businesses will need to compete in the face of intensifying competition and market volatility. Managing this transition in the nature of employment will require a renewed focus on the importance of lifelong engagement in education and training. As these trends continue the alterations to the education curriculum and improvements to career guidance outlined above will have an important role to play in enabling the development of a new approach to education and training. If the UK is to build a competitive economy for the 21st century, the reforms proposed in this response to your call for evidence will be crucial to ensuring young people have the skills they need to succeed in the new world of work.

Thank you once again for giving the IoD the opportunity to participate in this call for evidence. We hope you find our comments useful and we look forward to further engagement on this topic. If we can provide further information on any of the issues discussed, please do not hesitate to contact me.

Yours faithfully,

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