

# Lifelong Learning

Reforming education for an age  
of technological and demographic  
change







## Author



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# Executive summary

Demographic and technological changes are transforming the world of work. These changes inevitably raise concerns about the impact of this impending revolution on the number of jobs and the future of society. However, the ageing workforce and the so-called ‘rise of the robots’ do not need to presage the apocalypse that so many are predicting.

Since the first industrial revolution, each wave of economic change has been met with public anxiety. Yet, in the long run, each bout of worry has proved misplaced. The lesson from these events is the importance of enabling people to re-skill and upskill in order to succeed in the new economy.

As the fourth industrial revolution continues to radically alter the world of work, reforming education and training will be of vital importance. There are four key areas where significant progress needs to be made to ensure the UK is prepared to succeed in this new economic landscape.

## Curriculum

- The UK education system began to take shape in 1858, and featured mass public examinations based on pupils’ ability to recall information and apply standardised methods. This remains essentially the same way we educate today.
- The expansion of the internet means the labour market no longer rewards workers primarily for what they know, but for what they can do with what they know.
- UK education policy is at risk of turning our schools into ‘exam factories’ still teaching method and recall, the easiest skills to automate.
- Schools must refocus on the application of knowledge rather than simply the acquisition of it, to boost the level of soft skills in future generations.
- A welcome emphasis on coding and increased emphasis on Stem subjects will provide stronger foundations for the digital revolution, but teaching new technologies using old approaches is no longer suitable.

- Education curricula should be independent of political interference and instead informed, and continuously re-examined, by an expert body of providers, businesses, academics and other stakeholders with a focus on delivering education today for tomorrow’s workplace.

## Guidance

- The level of careers guidance given to young people is inadequate, with what little there is focused on an outdated and static idea of a jobs market
- In the UK education system, learner choice is playing an increasingly important role, so it is vital that students have the information they need to succeed in a rapidly changing labour market.
- Stem skills will underpin many of the potential high-growth industries in the UK economy, but the misperceived importance of higher A-Level grades is turning students towards subjects they will do well in, rather than those that will be most valuable in the workplace.
- In the 21st century, education doesn’t end at school and businesses must play their part. The focus must be on in-work training and providing a career lattice, rather than a career ladder, where employees can develop by doing a range of different roles, gaining experience, developing new skills, and tapping into alternative networks.
- Government must play its part too, bringing together industry-wide collaboration between businesses and employers, ensuring 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.
- Multiple, high-quality work experiences should become compulsory for all students from the age of 13 onwards so that young people can learn from employers and be better informed and equipped to make the right choices to help achieve their future career aspirations

## Provision

- Automation and digital technology offer new routes for the provision of education via computer-based outlets.
- Distance education is nothing new but recent innovations in 'Massive Open Online Courses' (Moocs) enable independent vocational learning more conveniently and cheaply than ever before.
- The cost savings, convenience, and flexibility that online learning offers has the potential to revolutionise education provision, but only if businesses and the education sector work together to capitalise on the potential of computer-based teaching applications to support employees in their pursuit of lifelong learning.
- In this self-guided environment, students and workers will become central in regulating their learning and determining the development of their own skills, meaning that one of the core functions of 21st-century schools will be teaching students how to learn for themselves.
- In a world of online media, which can become an echo chamber of one's existing opinions and interests, digital skills will need to be complemented by the development of critical analysis, evaluation skills and self-regulation.
- This will be vital as global credit transfer systems develop that will allow student consumers to use courses offered by one institution (both online and in-house) to count towards their qualification from another, and to build up gradually to a degree at different times rather than completing it all in one go.
- Rather than thinking of progress as a linear measure through the curriculum, the breadth of development will also be important.
- The government should use the new higher education Teaching Excellence Framework (TEF) to incentivise education providers to expand their provision of computer-based and blended learning opportunities to enhance access to education, reduce the costs of provision, and capitalise on a growing demand for alternative learning opportunities.

## Finance

- On-the-job training and e-learning offer part of the solution but finance is also key.
- Affordability and limited credit options are the biggest barriers to workers enrolling on part-time or further education.
- Lifelong learning has a key role to play in boosting productivity, contributing to economic growth and aiding social mobility. For these reasons, financial incentives to facilitate continuous engagement in education throughout a person's life should be explored by government.
- The relevant government departments should work together to facilitate lifelong learning. The value of tax incentives can provide a worthwhile 'nudge' towards the enhanced uptake of lifelong learning opportunities.
- An enhanced tax deduction for employers would encourage them to invest in training their staff.
- The income tax system should therefore be flexed to encourage and enable individual learners to upskill throughout their working lives.

The fourth industrial revolution will bring significant challenges, but also huge opportunities. If the UK is to build a competitive economy for the 21st century, a shift to lifelong learning will be crucial to ensuring that UK workers have the skills they need to succeed in the new world of work.

# Foreword



**Jimmy  
McLoughlin**  
*Head of external  
affairs, IoD*

Malcolm Turnbull, the Australian Prime Minister, recently said that “there has never been a more exciting time to be alive”. We’re used to Australian optimism putting a sunny spin on things, but on this, he’s right.

The world is going through twin revolutions; digital and entrepreneurial. Nowhere are these twin revolutions more keenly felt than in Britain. This year, 12.4 per cent of our GDP will come from the digital economy, streets ahead of our nearest competitor<sup>1</sup>. In 2015, almost 600,000 businesses were started<sup>2</sup>. It is useful sometimes amid the swirling winds of change to stop and take stock; it is an extraordinary time to be alive, and to be living in Britain.

But while these are both good for Britain, and millions of people benefit from them, according to the Edelman Trust barometer more than half the UK population believe that innovation is going too fast – a startling fact.

One of the anxieties is obvious; with these revolutions, the job market is changing. Experts predict that 15 million jobs could be lost by 2036 thanks to the digital revolution and automation. This is not unprecedented: 20 million jobs have been lost since 1980, but they were replaced with a whole new army of jobs, whether it be app designers, social media managers, even night desk operators on 24-hour news channels.

Many of the jobs that were lost were boring, repetitive, or downright dangerous – coal mining being the most obvious. It is a sign of human advancement and progress that we replace inefficient industries.

However, for people to feel the benefits of innovation and new businesses they need to feel secure that their employment prospects remain strong, and this is one significant reason for the government to redouble its focus on upskilling the nation; not just children in our schools and students in our universities, but adults who currently sit in relatively secure jobs that may not be so secure in 10 or 15 years’ time.

From a wider economic perspective, upskilling

is crucial. Our members, the majority of whom lead SMEs, consistently cite a skills shortage as a significant factor. Among our younger members, the start-up-focused IoD 99, skills came out as the number-one issue that entrepreneurs are grappling with. Indeed, while in 2014 we climbed to be the fourth-most entrepreneurial nation on the planet according to the Global Entrepreneurship Monitor, it was noticeable that in that survey we were ranked behind Russia and Greece when it came to skills and human capital<sup>4</sup>.

In this paper, we aim to turn the idea of ‘education’ on its head. Too often, policymakers trot out the phrase “the education our children receive”. That model is dead; as my old headmaster would remind us each year, education is something you achieve, *not* receive.

People now recognise that they are unlikely to leave school at 18 (or finish a degree at 21) and then be secure in a job for life, but our education system hasn’t caught up with those changes. The scale of change and the speed at which we must reshape our skills environment may seem daunting, but with many of our schools turning into exam factories it is time for radical action to ensure that curiosity and a desire to learn are ingrained into the next generation.

Business, too, has a part to play. In-work training, both for specific jobs and on wider soft skills, will be a crucial part of thriving businesses in the 21st century.

We at the IoD feel business changes more acutely and earlier than most. Founded in 1903, we have seen change after change during our more than a century in existence, and the services we provide have changed. Indeed, the IoD was possibly the first co-working space in London, allowing members to mingle in our Directors’ Room.

Our Royal Charter says that we must fight for

a climate favourable to entrepreneurialism and wealth creation, and it is in that spirit that this report is written. The twin revolutions we have spoken of are cause for optimism, not for trepidation. To our core, we believe that ensuring every individual has the chance to enjoy the benefits of these extraordinary changes should be the top priority for government, education providers and businesses.

Britain has had an extraordinarily strong start to the 21st century, despite financial crises and global headwinds. If we are to continue this swashbuckling start, it is crucial that we get the right skills environment in place – allowing us to face the future with strong foundations, and confidence.

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# Lifelong learning

## Reforming education for an age of technological and demographic change

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, 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. This paper proposes four key areas that need to be reshaped in order to prepare UK workers for the emerging employment environment:

- ① **Curriculum**
- ② **Guidance**
- ③ **Provision**
- ④ **Finance**

If the UK is to build a competitive economy for the 21st century, a shift to lifelong learning will be crucial to ensuring UK workers 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 20 years, 15 million jobs, or about half of the total, are at risk of being lost to automation<sup>5</sup>.

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 employment<sup>6</sup>. 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 five years<sup>7</sup>.

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 disruptions<sup>8</sup>. While technological change has always occurred, two trends set recent innovations apart:

Despite automation and demographic change, in the UK today, the employment rate as a proportion of the total population is around 50%, roughly the same level as in the early 19th century.

The largest effect of technology on jobs is in the number of hours worked. In the UK, the average working week has fallen from 50 hours a century ago to around 30 hours today.



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 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.

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 jobs<sup>9</sup>. 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 production<sup>10</sup>.

In the long run, however, each bout of worry about technology-induced mass 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 areas<sup>11</sup>. For example, whereas in previous centuries the majority of people worked in agricultural or artisanal production, the 19th century saw a shift to factory based employment, while the 20th century saw a move to service and management occupations.<sup>12</sup>

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.<sup>13</sup> A recent study in the *Harvard Business Review* estimates that for 60 per cent of existing jobs, 30 per cent or more of current work activities can be automated by available or announced technologies<sup>14</sup>. 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.

As technology has boosted productivity so too has it boosted incomes. Since the first industrial revolution, productivity and real wages have both increased by an average of 1% per annum. However, as the rate of innovation increased, the rate of productivity and wage growth has doubled to 2% per annum in the post-war period.

# The fourth industrial revolution

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 services<sup>15</sup>.

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 more than 5.4 million businesses in the UK, an increase of 1.9 million, or 55 per cent, since the year 2000 and the proliferation of new firms is still accelerating<sup>16</sup>. 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 2015<sup>17</sup>. Encouragingly, the rate of firm survival has also increased such that the UK is now ranked ninth on the Global Entrepreneurship Index and as the sixth-best place in the world to start a business according to both the Legatum Institute and the World Bank<sup>18</sup>.

New inventions and innovations such as big data, cloud computing, the Internet of Things, artificial intelligence, quantum computing, robotics, autonomous vehicles, 3D 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 per cent of UK GDP this year will come from the 'internet economy', making the UK the world leader, 50 per cent ahead of our nearest competitor, South Korea, which is on just 8 per cent<sup>19</sup>. The digital economy has grown 32 per cent faster than the rest of the UK economy since 2010, and is creating new jobs at an unprecedented rate. The sector currently accounts for 1.56 million jobs across the UK, with the digital workforce growing three times faster than the wider UK job market<sup>20</sup>. 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 changing<sup>21</sup>. 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 per cent of the current UK labour force have the potential to be active in work a decade from now<sup>22</sup>. 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 upskill to meet the needs of the jobs market<sup>23</sup>.

In 1871, the year records began, 6.6% of the UK workforce were agricultural workers. That number has fallen by 95% to 0.2% today even though the UK population has more than doubled in size. Manufacturing jobs have dropped from 38% in 1948 to just 8% today. Meanwhile, the number of accountants counted in the U.K. in 2011 was over 2,000% higher than it was 150 years ago.

# Demographic challenges and opportunities

A concurrent factor altering the future of employment is demography<sup>24</sup>. 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 high<sup>25</sup>.

Nevertheless, just 69 per cent of 50 to 64-year-olds today are in paid work compared to 83 per cent of their younger counterparts. Ominously, by 2025 there will be 750,000 fewer people aged between 16 and 49, but 3.7 million more people aged between 50 and 64<sup>26</sup>. As the ratio of workers to dependants worsens in the coming years due to population ageing it is important that an increasing number of older people remain in employment<sup>27</sup>. 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 better physical and mental health of more educated people. The UK economy will have to make adjustments to provide and then to capitalise upon a greater supply of educated older labour<sup>28</sup>. 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 fading<sup>29</sup>. 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 seventh-highest employment rate for persons in their late sixties 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 set<sup>30</sup>. As more workers remain available for employment for longer, employers will have to adapt to accommodate. Individuals will have to take greater 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 100, compared to just one in 10 born in 1950, it is important that these people are able to pursue continuous education, re-training and upskilling throughout their careers so that the option of working later in life remains both attractive and possible. Worryingly, however, less than six per cent of the government's education budget is spent on adult further education and the adult skills budget has been reduced by 24 per cent since 2009-10 as part of the fiscal deficit reduction strategy. Indeed, governments in all the UK nations have made reductions to public provision for what were already small and marginal services, while many universities have also closed their adult education programmes<sup>31</sup>. Consequently, as the Universities UK Patterns and Trends Study 2015 shows, the number of part-time and mature university students — undergraduates and postgraduates — both fell by over a third in the last 10 years, at a time when the participation of older learners has increased across most of the rest of Europe<sup>32</sup>. This is not owing to any lack of desire from potential older learners. In fact, in recent years there has been an increase in the number of people seeking to engage in adult and further education<sup>33</sup>. Evidence from the ongoing 1958 National Child Development Study shows that around one in five of this group gained new qualifications in their forties, and double that number studied courses that did not lead to a formal qualification<sup>34</sup>. This demographic trend, combined with technological innovations that enable greater participation, represents a significant new market for the education sector<sup>35</sup>.

## Labour markets and the skills shortage

However, the participation of mature and part-time students in education is limited by personal circumstances and often their needs cannot be met by the inflexibilities inherent in conventional full-time higher education. At the same time, numerous surveys show that investment by businesses in in-work training for their staff has declined by between a quarter and a half since the 1990s, although this may be changing as the latest UKCES Employer Skills Survey shows employers spent £45.4bn on staff training in 2015, a six per cent increase on the amount spent at the time of the previous survey in 2013<sup>36</sup>. Education is expensive and at a time when the desire to tackle deficits is so prominent, government and businesses are understandably keen to reduce spending. Nevertheless, we need to find new ways of providing training at much lower cost.

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 lifelong learning. The fact that roughly 20 million jobs were lost in Britain between 1980 and 2000 shows that the Bank of England's prediction of 15 million automated jobs would not be unprecedented<sup>37</sup>. 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 change<sup>38</sup>. Indeed, of the record two million new jobs created in the UK since 2010, more than two-thirds have been full-time highly skilled professions<sup>39</sup>. 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 per cent of whom say their organisation is suffering from an inability to find the right person to fill an existing vacancy<sup>40</sup>. Indeed, access to skills is the number-one concern of IoD members and a recent survey of our start-ups and young entrepreneurs, the IoD 99, shows that a lack of access to employees with the requisite skills is their biggest barrier to growth<sup>41</sup>.



A key challenge for businesses will be how they engage with employees throughout the upheaval. The emergence of new business models means that talent, culture and organisational forms will have to be rethought. Speed in the adoption of new practices and technologies, as much as enhancing existing mature processes, will determine future productivity levels so the digitisation of labour will present strategic issues that it will take strong leadership to overcome. A recent survey by the Economist Intelligence Unit (EIU) found that less than a quarter (23 per cent) of employers have devised and implemented a strategy to address the potential impact of new practices and technologies on their workforce<sup>42</sup>. 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 five, 10, 20 years from now, assessing what skills they will need and how they might set about recruiting, developing and retaining suitable workers<sup>43</sup>.

As the fourth industrial revolution alters rather than eliminates jobs, ensuring efficient adoption and use of new practices and technologies will take on increasing importance<sup>44</sup>. Already, the so-called 'productivity puzzle' has become one of the defining features of the aftermath of the global financial crisis<sup>45</sup>. 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 annual growth rate of two per cent<sup>46</sup>. Currently, though, 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 many 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 firm<sup>47</sup>. 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 its ability to respond quickly to changing employment, technology and consumer demands, not just how well it can refine existing production and processes in mature businesses. How quickly ideas and practices are adopted is dependent upon a number of factors: institutional agility, competitive pressures, and the adoption rate of technology. 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 increasingly rapid innovation, agility will be the crucial differentiating factor in securing future employment and economic growth.

# Facing the future: policy recommendations

## 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.

The UK education system began to take its present form with the establishment of our current exam system in 1858<sup>48</sup>, towards the end of the first industrial revolution. In an era of skilled factory work, this mass public exam 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 exams for 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 among 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 understanding<sup>49</sup>. 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

economy<sup>50</sup>. 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 know<sup>51</sup>. 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 subjects (such as design, music, and drama) is a concern given the growing importance of developing creativity in students<sup>52</sup>. 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. Rather, it is usually the product of 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 per cent 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 declined in both number and pay<sup>53</sup>. 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 per cent 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 reports<sup>54</sup>. 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, 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 such as the state of the economy, tax and regulation, and access to finance<sup>55</sup>. Two-thirds (68 per cent) were worried specifically about poor communication skills, 35 per cent said teamwork, 36 per cent listed resourcefulness as an issue, while 22 per cent cited lack of creativity as a concern<sup>56</sup>. 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 welcome recent introduction of coding and computer programming to the schools' curriculum and the increased emphasis on numeracy, quantitative literacy and Stem subjects, the education sector must adapt to focus on learning to learn and instilling the skills and experience needed to collaborate<sup>57</sup>. 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 20 years ago to less than 18 per cent 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 teamwork 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.

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 experience<sup>58</sup>.

## ② Guidance

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 general public think schools should be doing – improving standards in the existing curricula<sup>59</sup>. 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 learning.
- 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.

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 common<sup>60</sup>. 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 significantly<sup>61</sup>. Alarming, just 43 per cent of students currently receive any formal careers guidance before choosing their A-level subjects, yet the subjects they chose can severely restrict their employment options later in life<sup>62</sup>. This is partly because only 83 per cent of secondary schools employ a qualified, full-time careers adviser, with many relying instead on other support staff to fill career guidance roles<sup>63</sup>.

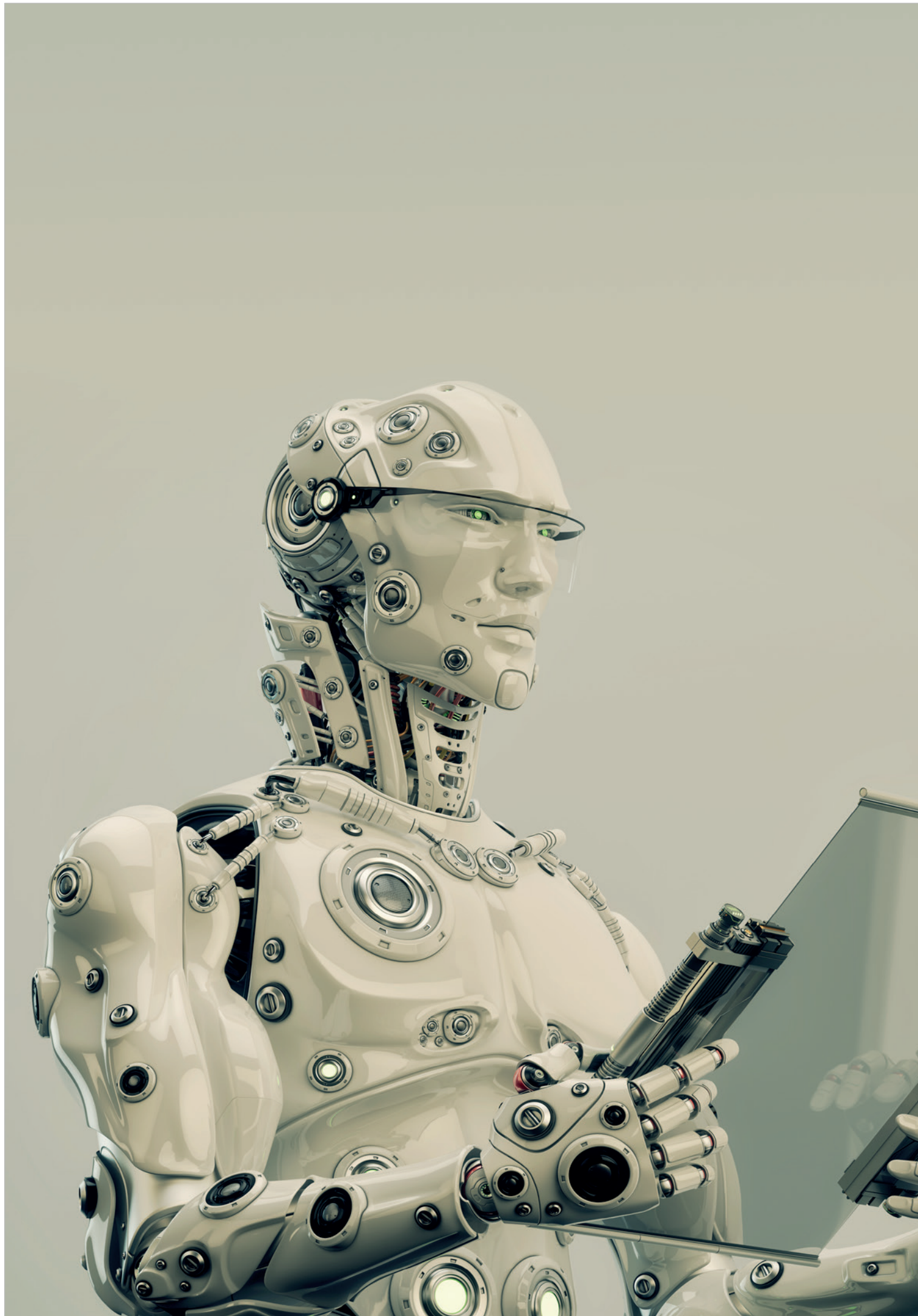


In the UK schools system, where learner choice plays an increasingly vital role, it is ever more important for students, teachers and parents to access good-quality and timely information, advice and guidance on the likely skills needed by employers in the future<sup>64</sup>. This needs to be based 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 other<sup>65</sup>.

Stem skills underpin many of the potential high-growth industries in the UK but they remain in particularly short supply. According to the 2015 UKCES Employment and Skills survey, five million people are employed in high level Stem roles, but 43 per cent of Stem vacancies are hard to fill due to skills shortages, compared to a UK average of 24 per cent for other difficult-to-fill roles<sup>66</sup>. The recent YourLife Tough Choices Report found just a quarter of A-Level students take two or more Stem subjects despite 74 per cent starting secondary school with high levels of interest in them. The misconceived 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 them at ages 15 and 16, they are inadvertently closing the door to more than 50 per cent of potential jobs<sup>67</sup>.

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 while at school are significantly less likely to become Neet (not in employment, education or training) and can expect, when in full-time employment, to earn up to 18 per cent more than peers who had no such workplace exposure<sup>68</sup>. The 2013 UKCES Employer Skills Survey found that 66 per cent of employers think work experience is critical or significant when hiring, but only 38 per cent offer it<sup>69</sup>. 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 providers<sup>70</sup>. 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 have often been 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. 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 per cent of graduates are still in entry-level positions five years after graduation<sup>71</sup>. Poor in-work progression stifles careers and as a result employees take longer to reach their productivity and earnings potential. Companies need to foster not a career ladder but a career lattice where employees can grow by doing a range of different roles, gaining experience, developing new skills and tapping into alternative networks. This will help them acquire a portfolio of transferable skills, benefiting both themselves and their employers.

Independent recruiters and career guidance counsellors must develop a focus not simply on helping people into the world of work, but also to begin offering post-employment support. Assistance should be offered to employees throughout their working lives via high quality, tailored, in-work careers advice and job-matching services. 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 people to take the appropriate strategic steps along their career journey<sup>72</sup>.

As the workplace changes, education and training must adapt so that talent can keep pace with market demands. Strategic relationships between employers and training providers 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 system<sup>73</sup>. Structural changes in the labour market are already making it difficult for young people to get into work and then to 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, businesses will need to collaborate, perhaps on an industry-wide scale. Government will therefore have an important role in facilitating and supporting these processes, for example, by:

- 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 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 cater to people already in employment, helping them to progress their careers, not just young people entering the workforce.

### 3 Provision

The way these demographic and technological changes increasingly place a premium on skills and training means we need to develop better pathways for students to continue in and to re-enter education. Thankfully, this is one area where automation offers not a problem but a solution. Recent innovations in online technology, such as the creation of massive open online courses (Moocs) enable independent vocational learning more conveniently and cheaply than ever before. Similarly, Personalised Learning Algorithms can help students to learn at their own pace<sup>74</sup>. The adaptive intelligence of these analytic algorithms can also enable a student to tailor their learning in a way which focuses on their individual weaknesses and needs. Crowdsourcing too, is proving a useful tool for solving specific problems of workplace-based learning challenges. By offering flexible ‘anywhere, anytime’ education, online communications and similar web-enabled collaborative and virtual reality tools offer invaluable new spaces for developing skills beyond the bricks-and-mortar classroom and in a way that can be adjusted to meet the student’s individual needs, interests and abilities. These tailored e-learning opportunities can also be easily integrated into corporate processes.

Distance education is nothing new, but the combination of quality courses offered by world-leading providers, innovative online learning technology and the wide availability of broadband internet links has allowed distance learning to come of age. The UK is already a world leader in distance, blended and e-learning provision with many universities, most notably the Open University, as well as other providers, pioneers in innovative and alternative forms of education provision. Computer-based forms of education provision have their limitations and they are not, on their own, a perfect or complete substitute for a traditional university education<sup>75</sup>. Nevertheless, the cost savings, convenience and flexibility they afford mean online learning has the potential to revolutionise education provision, but only if businesses and the education sector work together to capitalise

on the potential of computer-based teaching applications to support employees in their pursuit of lifelong learning. As autonomous computer enabled education progresses, conventional formal learning environments will likely become less significant, complemented by the flexibility and availability of information through technology<sup>76</sup>. The lessons of digital disruption from other industries suggest that those education providers that embrace technology, and in particular the potential of the internet, are the ones that will survive and thrive.

In this self-guided environment, the student becomes central in regulating their own learning and in determining the development of their own skills. One of the core functions of 21st-century schools will therefore be teaching students how to learn for themselves. Information on its own is not the same as intelligence. The latter pre-supposes an element of interpretation. In a world of autonomous online learning – where the internet can become an echo chamber of one’s existing opinions, consequently closing our minds off to new ideas and perspectives – digital literacy will need to be complemented by the development of critical analysis, evaluation skills and self-regulation. In essence this means teaching people to think critically by ingraining practices that enable them to be inquisitorial, breaking down the barriers between subjects so that children learn skills, rather than simply facts. This will be vital as global credit transfer systems develop that will allow student consumers to use courses offered by one institution (both online and in-house) to count towards their qualification from another, and to build up gradually to a degree at different times rather than completing it all in one go<sup>77</sup>.

Motivation is crucial for effective self-guided learning. From an employer perspective, self-guided learning helps inculcate the soft skills of resourcefulness, resilience, reflectiveness and responsibility that employers value highly. As the OECD recently highlighted, adding 21st-century technologies to 20th-century teaching practices will just dilute the effectiveness of teaching. We therefore need to get much better



at using pedagogies that make the most of new technologies<sup>78</sup>. A future based on learning to learn implies a qualitative shift of emphasis in the type of education provided. Rather than thinking of progress as a linear measure through the curriculum, the breadth of development will also be important. This would represent a step change in what is considered to be achievement in education, from progress as speed, to the idea of progress as mastering a topic albeit at one's own pace<sup>79</sup>. It is essential that autonomous computer-enabled education and learning to learn become key features in future education provision to encourage the participation of all citizens in a volatile labour market and enable workers to fulfil their full potential<sup>80</sup>. Government should:

- 1 Use the new higher education Teaching Excellence Framework (TEF) to incentivise education providers to expand their provision of computer-based, blended and flexible learning opportunities to enhance access to education, reduce the costs of provision, and capitalise on a growing demand for alternative learning opportunities.

## 4 Finance

Affordability and limited credit options are the biggest barriers to workers enrolling in part-time or further education<sup>81</sup>. A recent study by the Higher Education Policy Institute (HEPI) cited cost and inflexible course structures as the biggest obstacles to people signing up to part-time education while a similar ComRes poll showed almost one in four people listed affordability as the biggest barrier to enrolling in part-time or further education<sup>82</sup>. On-the-job training and e-learning offer part of the solution but on their own they will not be enough. The government is exploring loans to enable adults to return to education. However given cost, and by implication debt, is already the biggest inhibitor dissuading workers from returning to education, a more significant step change will be needed.

The ill-fated Individual Learning Accounts (ILA) experiment of the early 2000s should not discourage policymakers from developing a financial support system to enable adults to continue education and training throughout their lives. Indeed, the ongoing success of the revamped ILA model subsequently developed in Scotland shows the benefits of an appropriately designed and delivered scheme. Lifelong learning has a key role to play in boosting productivity, contributing to economic growth and aiding social mobility. For these reasons, financial incentives to facilitate continuous engagement in education throughout a person's life should be explored by government.

Proscriptive attempts to predict or determine the specific education courses that will be required to prepare people for the jobs of the future have historically proven difficult. An open approach, enabled by tax incentives, is therefore advisable. Such an approach would allow workers the flexibility to pursue training to meet their employment needs as and when those needs emerge. It would also enable employees to tailor their studies so as to undertake only as much or as little training as is required. The value of tax incentives can provide a worthwhile 'nudge' towards the enhanced uptake of lifelong learning opportunities. Both businesses and individuals take note of, and often respond to, focused tax incentives provided that the compliance processes to claim the tax incentives are sufficiently simple and the tax reduction is sufficiently large to make it worthwhile filing a claim.

The IoD proposes introducing two versions of a tax nudge — one for employers to train staff, and one for individual workers themselves — to incentivise lifelong learning in a way that would be simple to introduce, align with the existing self-assessment and digital tax compliance systems, and would limit potential bureaucracy. More importantly, however, these tax incentives would represent an initial step towards aligning the UK's fiscal policies with its most significant employment challenges, both for today and for the foreseeable future.

1

The Treasury, HMRC, Department for Business, Innovation & Skills, the Department for Education, and the devolved governments should work together to develop workable but simple criteria to enable large and medium-sized employers to obtain an enhanced tax deduction for qualifying lifelong learning courses from accredited providers for their employees which goes beyond training for the business itself. This would not be a new idea from a purely technical tax perspective as expenditure by business to, for example, rectify contaminated land, already receives a tax deduction at 150 per cent of the expenditure incurred rather than 100 per cent. At a corporation tax rate of 20 per cent, this deduction would save 30p rather than 20p for each £1 spent. The IoD proposes that relevant lifelong learning expenditure should qualify for a deduction at a rate of 200 per cent against corporation tax, therefore saving 40p in tax for every £1 spent at the corporation tax rate of 20 per cent. A higher rate would be appropriate because the benefits of lifelong learning inevitably accrue more to the employees concerned than the business itself. For smaller employers, microbusinesses and non-employing (ie one-person owner-employee) businesses which typically have more constraints and less flexibility with regard to releasing employees for education or training which is not directly focused upon the short-term needs of the business itself, a higher rate of tax incentive would be appropriate, for example at a rate of 300 per cent against business profits, therefore saving 60p in corporation tax for each £1 spent.

2

That being said, regardless of whether enhanced tax incentives are made available to their employer or not, some learners will nevertheless have to rely upon their own finances to fund their personal lifelong learning requirements. The income tax system should therefore be flexed to encourage and incentivise this, recognising that lifelong learning benefits not just the individuals themselves but the broader economy as a whole. A relatively simple way to achieve this would be to provide all learners — over the age of 25 so as not to disadvantage school leavers who now pay increased tuition fees to go to university — with a ‘shadow personal allowance’ set at, for example, 10 per cent of the current personal allowance, which could be offset against their income tax liability provided that the learner has personally paid for, undertaken and/or remains in, a qualifying lifelong learning programme in that tax year. Any surplus allowance would be carried forward to the following years until so used. This would emphasise that the ongoing need for lifelong learning has no predetermined time limit while still focusing individuals on the need to update their skills to meet the needs of a rapidly changing employment market.

## 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, 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 reforms to:

- ① **curriculum**
- ② **guidance**
- ③ **provision**
- ④ **finance**

outlined in this paper will all 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, a shift to lifelong learning will be crucial to ensuring UK workers have the skills they need to succeed in the new world of work.



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