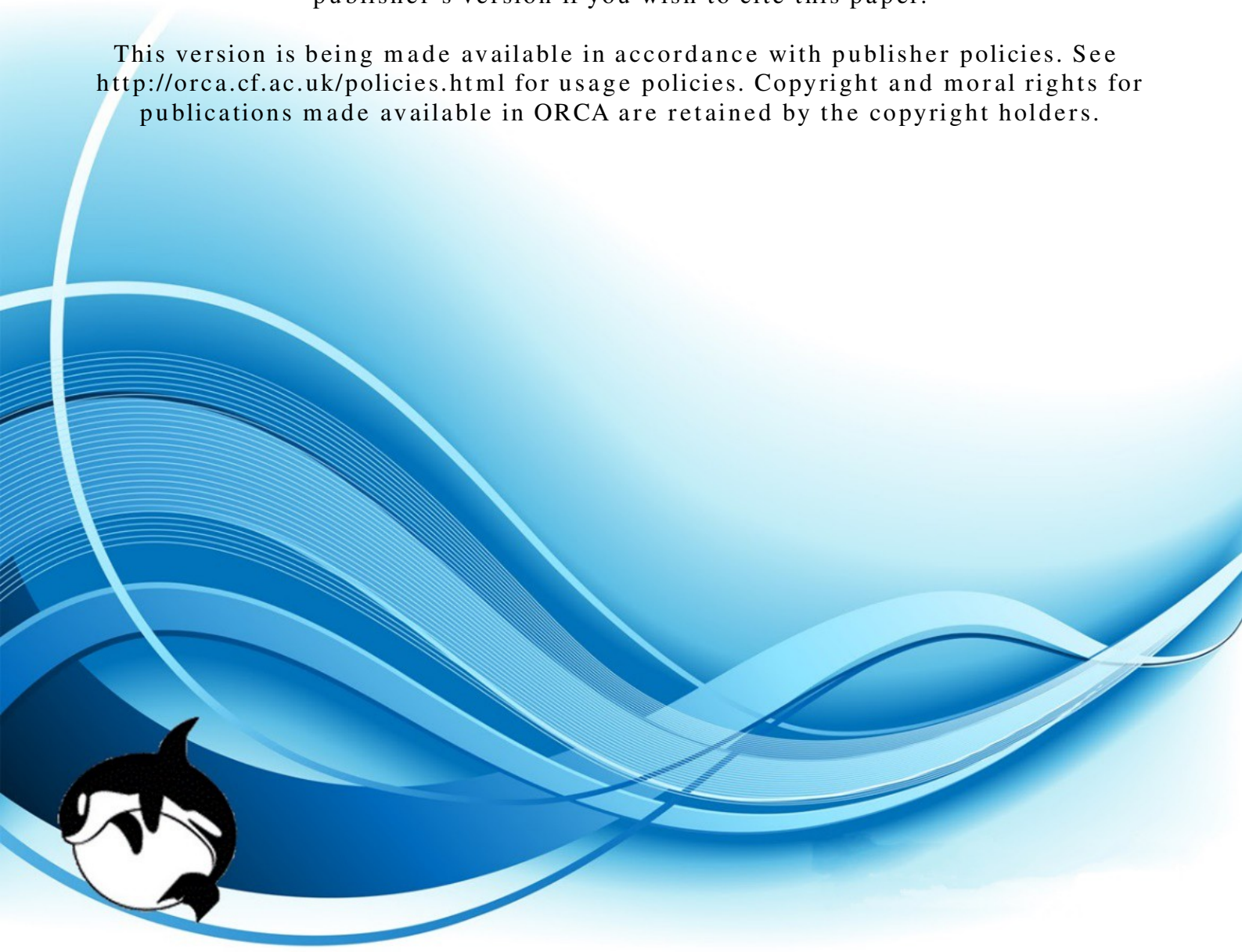

Some Observations on The Race to Higher Education, Digital Technologies and the Future of Work

Phillip Brown, School of Social Sciences, Cardiff University

Email: BrownP1@cardiff.ac.uk

Abstract

A fundamental shift is taking place in the way we think about the future of work and its relationship to education, training and the labour market. Until recently, expanding higher education was widely believed to result in higher earnings, reflecting an insatiable demand for knowledge workers (Brown, Lauder and Cheung, 2020). In the United Kingdom this race to higher education included a major transfer of resources from further and adult provision to higher education. This paper raises a number of issues that will need to be addressed in a context of digital disruption.

Introduction[1]

A fundamental shift is taking place in the way we think about the future of work and its relationship to education, training and the labour market. Until recently, expanding higher education was widely believed to result in higher earnings, reflecting an insatiable demand for knowledge workers (Brown, Lauder and Cheung, 2020). In the United Kingdom this race to higher education included a major transfer of resources from further and adult provision. The proportion of 20-65 year old graduates with a bachelor's degree or higher, more than doubled from 16 per cent in 1998 to 37 per

cent in 2018 (Mason, this volume).

We can identify three challenges to the idea of a burgeoning knowledge economy (Drucker 1993) fuelling the expansion of higher education. First, the initial challenge followed the Western financial crisis of 2007-8. It resulted in a stark realization that soaring equity markets at the time were driven more by leveraged debt than by knowledge-intensive business innovation (Stiglitz 2010). Second, the assumption that the global knowledge economy would expand the demand for Western graduates doing the thinking for the rest of the world (Reich 1991), failed to understand the economic transformation that was taking place in key emerging economies such as China and India. There was a growing realization that the global knowledge economy would not give Western businesses and workers decades of first-mover advantage widely assumed in America and Britain. China and other emerging economies were rapidly learning how to use global value chains to accelerate entry into the competition for high value goods and services using high skilled but low cost labour (Brown, Lauder and Ashton, 2011).

Third, and perhaps of even greater significance, is a growing realization technological innovation may not require mass ranks of graduate knowledge workers, even if there is little evidence to support large-scale 'technological unemployment' (Keynes 1930). However, some leading academics continue to present the current phase of technological disruption in terms of 'revolutionary' cycles of historical technological disruption in an inexorable shift to a knowledge-intensive, high skilled workforce. Brynjolfsson and McAfee (2012), along with others (Schwab 2016; Autor 2015), assume that with appropriate education and training reforms, there are good quality jobs for people providing there is a complementary relationship between humans and machines. This involves refocusing education on the cognitive and non-cognitive skills that are difficult to automate:

‘In medicine, law, finance, retailing, manufacturing, and even scientific discovery, the key to winning the race is not to compete against machines but to compete with machines. While computers win at routine processing, repetitive arithmetic, and error-free consistency and are quickly getting better at complex communication and pattern matching, they lack intuition and creativity and are lost when asked to work even a little outside a predefined domain. Fortunately, humans are strongest exactly where computers are weak, creating a potentially beautiful partnership.’ (Brynjolfsson and McAfee 2012,p.6)

Others challenge this view of economic change in the early twenty-first century, along with the merits of accelerating the race to higher education based on the changing technological ‘needs’ of industry (Brown, Lauder and Cheung 2020). Indeed, the development of ‘general purpose’ technologies - including AI, machine learning, robotics, data analytics, Internet of Things (IoT), Blockchain, Additive Manufacturing (3D printing), etc. - have contributed to an unravelling of the relationship between education, jobs and rewards.

Here there is a need to avoid technological determinism. The technologies fueling digital transformation (or the fourth industrial revolution), do not pre-determine social or economic purpose; how new technological tools will be used in shaping the design of the future workforce; or the implications for individuals, firms and nations. How we understand digital transformation and the future of education and work will depend on the underlying assumptions that are made about technological change, along with the challenges and opportunities it presents (Brown Review, 2019).

Mindful of Schumpeter’s (1943) advice to avoid delving in futurology - as it may take decades before we can properly understand the significance of technological,

economic and social changes we are currently living through - the following observations offer a guide, albeit incomplete, to rethinking higher education and its relationship to learning, working and earning a living:

…all industrial revolutions are social as well as technological. The idea of a 'knowledge-driven economy', 'digital economy', 'second machine age', or 'fourth industrial revolution', can be a useful shorthand when talking about complex economic change, but we should avoid reducing society to the level of technological advancement (Williams 1961). What is truly revolutionary is not the level to technological development, but the fact that it is part of wider cultural, political and institutional change. And there is nothing inherent in digital technologies that will result in a shared prosperity, more graduate jobs, or better opportunities for education and training.

There is little consensus about the scale of job losses (or the scale of job creation), and little evidence to support claims that we are approaching the end of waged work, which is likely to remain a basic organising principle of society. But occupations and employment contracts have lost many of their 'former assurances and protective functions' (Beck, 1992, p.140). There is growing evidence, underlined by the response to the global pandemic, that digital innovation is having a major impact, reshaping how people work, where they work, and what people do for a living, etc. These changes have already touched the lives of many people and it is not only a matter for government, employers, or trade unions, but for everyone.

On its own the distribution of waged work through the labour market can't deliver a fair and inclusive society. Evidence from many countries show that the job market isn't meeting the needs and aspirations of a lot of people and we can't rely on a technical fix or supply side solutions (Sandbu 2020). There is no inbuilt tendency for digital

innovation to utilise and reward the skills of all rather than a few, associated with skilled-biased technological change (Goldin and Katz 2008). There is evidence of a polarisation rather than averaging of skills, discretion and career opportunities, but this is not to subscribe to the 'hollowing out' thesis, which sees the labour market creating more 'lousy' jobs towards the bottom end and more 'lovely' jobs towards to top end (Goos and Manning, 2007). Such ideas contributed to the race to higher education given the assumption that many in middle-skilled jobs will ultimately join the ranks of knowledge workers through increasing access to higher education.[2]

…it's the powers of 'creative destruction' unleashed by market capitalism that holds the key to understanding any industrial revolution. In other words, it's not only a question of how complex or smart (ro)bots are becoming, but how the latest advances in technologies are used by companies, governments and the wider population. This reminds us that whether corporate executives wear a tie, trouser-suit or tee-shirt they are playing the rules of the market, and there is little evidence that corporate leaders that wear tee-shirts are any less profit oriented that previous generations that wore pin-striped suits. This is why it is never simply a question of substituting robots for people because it depends on what 'commands a decisive cost or quality advantage' (Schumpeter, 1943:84).'

This explains why some tasks or occupations may not be automated even when the technology exists to do so, for the simple reason that it may make little commercial sense for companies when they have access to a supply of relatively cheap labour. If the cost of that labour increases due to minimum wage legislation or demographic shifts in workforce composition, they may opt for a 'technological' solution. There are also areas of work such as financial auditing which could be fully automated, but national and international regulations, not technological barriers, have limited the automation of such functions.

It also explains why we need to focus on job quality rather than simply the extent of technological unemployment (Keynes 1930). New technologies enable new forms of command and control by using digital software to capture knowledge, redesign jobs and automate business processes (Brown, Lauder and Ashton 2011). This has resulted in the translation of knowledge work into working knowledge, further separating conception (thinking) from execution (doing). Here digital Taylorism is characterised by the extraction, codification and digitalisation of knowledge into software prescripts and templates that can be transmitted and manipulated by others regardless of location (ibid. 2011). When applied to the work of managers, professionals and technicians, it raises fundamental questions about the future of 'graduate' and professional work, as control of the coordinating power of big data can be restricted to a relative small proportion of the workforce who continue to enjoy 'permission to think' for a living.

…*today's digital transformation is characterised by unravelling, unbundling and recombining rather than a unique age of invention*.[3] Digital innovation offers new ways of doing existing things, as well as creating new things to do.[4] But most innovation is not of the step-change or radical variety but incremental (refining; rearranging, repurposing), that flourish when there is a culture of innovation (Toner 2011). While investment in R&D and world-class higher education play a vital role, in an age of recombination we need to focus our attention on digital innovation across the whole economy and wider workforce. As noted above, the rhetoric of the knowledge economy exaggerated the demand for knowledge workers. This led to a major expansion of higher education but under-played the role of so-called 'middle skilled' (or sub-degree) level jobs, along with less skilled occupations that are not going to disappear anytime soon. As a result Geoff Mason (this volume) concludes:

> ‘the current education and training system contributes to unfavourable labour market prospects for a sizeable proportion of recent graduates…while failing to meet demand from young people interested in acquiring substantive skills through apprenticeship training... It also provides very little support for adults who wish to study part-time in higher or further education and others who wish to improve their skills and knowledge in other ways at intervals throughout their lives. Increasingly, this lack of support for adult learning is a problem for relatively young adults (aged 25-39), many of whom receive less employer-provided training than their counterparts in earlier generations.’

A key implication is that the impact of digital innovation is not limited to those in ‘low-skilled’ or routine occupations. Graduate underemployment was on the rise before Covid-19, and highlights questions about how employers are restructuring managerial and professional work, leading them to differentiate categories of employees which may exclude well-qualified employees from the career progression opportunities offered to those identified as ‘high potential’ talent.

…the fundamental problem in most developed and emerging economies is a scarcity of good jobs not a scarcity of employability skills (even if there is an urgent need to reform education and training). Despite much talk about the ‘disruptive’ potential of digital technologies, influential commentators remain convinced that, as in the past, new positions and professions will emerge to replace any jobs lost in the current period of disruption. There is evidence of new occupations relating to cyber security, software engineering, data analytics, etc. but job numbers are relatively small when considered in a wider labour market context.

There is also little evidence to support claims that most of the jobs school children will enter don't yet exist. A PWC report on Will Robots Steal Our Jobs? found only 6 per cent of all UK jobs in 2013 were of a kind that didn't exist in 1990.[5] Gerald Huff calculates in the top 35 occupations that make up half of all U.S. workers, there is only one - software engineer - that is new. All the others have existed for at least 75 years.[6] This does not mean these jobs remain unchanged. But it does remind us that most job opening for those entering the job market will be 'replacement' jobs, as people retire or move into other positions. In the UK, 88 per cent of job openings between 2014-2024 are predicted to be 'replacement' not new jobs.[7]

Therefore, the future impact of AI and machine learning on employment underlines what we already know from existing evidence, there is a major capacity problem at the heart of most, if not all, national economies, to provide the kinds of jobs that people want and have often been trained for (Brown, Lauder and Cheung, 2020).[8] This does not overlook current or future skills gaps in rapidly changing market contexts, including a shortage of appropriate digital skills, but the fundamental problem is job quality.

…if technology is not fate, the future of learning and work will be shaped by the individual, business and policy choices being made today. As already suggested, digital innovation is an enabler but does not define what is to be enabled. The decisions about what technologies to use and the way they are implemented will have an important bearing on education, learning and the future of work. Public and private sector employers can use technologies in different ways to eliminate, standardize or enhance human labour, rather than digital innovation simply reflecting the limits of technological possibilities.

The growth in 'on-demand' gig jobs - often touted as a liberation from standard models of employment - may in reality do little to extend individual economic freedom given

the dull compulsion to earn a living. Those with business networks providing regular consultancy income may gain more control and discretion by becoming a sole trader on digital platforms, but the vast majority are not in this position (Tomlinson and Corlett 2017). Indeed, much of the 'know how' and surplus value is captured by platform empresarios. A large proportion of gig workers have two or more sources of waged work to make ends meet and many sole traders live on low wages (Booth 2018). Moreover, gig jobs offer, at best, *shallow* learning or training possibilities, but education and training systems continue to be organized on the assumption that employment offers *deep* learning and training with employers willing to train employees.

Recent evidence from the UK, for example, shows that digital innovation does not necessarily lead to new learning or investment in training. There has been a significant reduction in public funding in adult learning and training in the UK and no evidence of companies increasing 'training' budgets despite constant claims that new hires and current employees lack the digital skills required for the future (Mason this volume). A survey conducted by the Institute for Learning and Work found participation in any kind of learning activity in the past three years declined from 46 per cent in 2001 to 33 per cent in 2019. It also found evidence of class, educational and regional inequalities,[9] consistent with the Matthew Effect where those in stable and higher-skilled jobs are the most likely to received further training. This is a far cry from the idea of lifelong learning for all.

A further consideration is if it's difficult to predict how existing jobs will be restructured or displaces by new technologies, there is a need for significant educational and training reform to prepare people for both career journeys and life journeys that can't be front-loaded as we do today, with a concentration of effort and resources on education to the age of twenty-five. The challenge of an ageing society, with far more people likely to remain in work or return to the labour market in later life, will put added

pressure on supporting the learning needs of people in different stages of their work-life. Therefore, how should lifelong learning be reimagined to enable people to thrive in a context where they may need to retrain or update skill sets at regular intervals, not limited to digital skills?

The complexities of today's workplaces and competitive labour markets, makes it more difficult for people to know what course of action to take and what skills they are expected to demonstrate to stay employable in their current job roles or in the wider job market. Real time data on the changing world of work could help to provide people with a sense of where and how the nature of work is changing and what skills they need to adapt to changing market context, but the issue here is not simply an information gap but a much more fundamental challenge to the existing model of work as we know it.

…arguments about the future of digital innovation are in danger of contributing to education and labour market inequalities. Digital innovation is having an uneven impact on the present and future workforce, contributing to increasing education, training and workplace inequalities. There are growing concerns about the scale of educational inequalities laid bare by the Covid-19 lockdown (Andrew et al. 2020). This also includes issues of how to reduce systemic inequalities fuelling a digital divide based on class, gender, race and age. This divide is often presented in terms of access to digital 'tools' (wifi connectivity, laptop computers, etc.), along with the employability skills need for people to participate in a rapidly changing digital world. Therefore, a key question is whether arguments about the direction of technological change and the future of work, are used to champion greater equality or to reproduce existing patterns of educational, economic and social inequalities

It also re-opens questions about who and how people should be educated, which are

never far removed from distributional questions. One line of argument is that because (ro)bots are better at processing information and knowledge than emotions and complex physical activities, it's time to rebalance the relationship between graduate level 'head' jobs (cognitive skills), as opposed to non-graduate roles involving 'hand' (craft) and 'heart' (caring) jobs (Haldane, 2018; Goodhart, 2020). This, it is argued, not only reflects changes in labour demand evident in significant graduate underemployment, but it also addresses inequalities in status, experience, and opportunities enjoyed by university students and graduates. Caplan (2018), also claims that there is a major mismatch between labour demand and the rapid expansion of higher education in America, resulting from a proliferation of courses offering little market worth and poor value for money to student, parents and government, based on an assumption that students on such courses would be better served by sub-degree technical or apprenticeship training.

In England, the 50 per cent participation target for higher education has been abandoned and various reviews and reports emphasize the need to reform tertiary education. This includes a more integrated institutional approach to tertiary education (and lifelong learning), with both sub-degree institutions (Further Education), and higher education institutions, introducing reforms including integrating apprenticeship and vocational training (including higher apprenticeships), along with a contribution to business innovation and regional economic development. This includes the idea of universities becoming 'multiversities' (Haldane, 2018):

> 'the future university may need to be a very different creature than in the past. It may need to cater for multiple entry points along the age distribution, rather than focussing on the young. And it may need to cater for multiple entry points along the skills spectrum, rather than focussing on the cognitive. It would, in

> short, need to be plural rather than singular – a 'multiversity', rather than a university' (p.17).

The idea of multiversities, based on harnessing diversity, extending learning opportunity and greater research innovation is worthy of consideration (Brown Review 2019). Equally, an end to the policy focus on artificial university participation rates - especially when it is at the expense of other elements of tertiary education and apprenticeship training - is consistent with the aim of creating a fairer distribution of resources and opportunities across tertiary education. But there are real dangers that current reforms within English higher education will do little to address longstanding issues of inequalities in education, jobs and rewards. Indeed, there is a real danger that digitizing labour market recruitment will reproduce hierarchical distinctions that reinforce class, gender and racial divisions which reserve the real vocational prizes to university elites.

…Dumbing Down versus Individual Empowerment? Rifkin (2014: 129) argues that 'much of the productive economic activity of society is going to be increasingly placed in the "hands" of intelligent technology, supervised by small groups of highly skilled professional and technical workers.' Therefore, it is claimed that advances in machine intelligence, robotics and advanced analytics, holds the prospect of 'liberating' hundreds of millions of people from work in the market economy in the next 20 to 30 years. But what if this is not the end of work? The crucial question concerns who writes the algorithms and whose vesting interests or cultural assumptions are baked into the system? Simon Heads warns that 'the majority of employees are in danger of becoming little more than an appendage to the machine', and this 'is what "dumbing down" means in the early twenty-first century' (Head, 2014:185). What then will be the human contribution to decision-making processes in all areas of economic, political and social life?

This highlights a fundamental tension between organising education around the purported needs of industry as opposed to the needs of individuals to live meaningful and fulfilling lives. Changes in the human-machine relationship require an extended definition of educational inclusion to address rapid advances in artificial intelligence and machine learning. If more areas of economic and social life are being 'intermediated' through digital platforms and predictive analytics, rather than other human beings, it raises a question of how the 'social' in social inclusion can be preserved:

'In an age of machine learning, training humans to be 'smart machines', is an education in technological servitude. If machines come to do more of the work done by humans it is how we develop ourselves in a process of lifelong learning that offers the best chance of achieving productive wellbeing….Therefore, permission to think needs to be extended to all rather than the few (Brown, Lauder and Cheung, 2020: 221).

This closely relates to Dewey's (1916) concept of vocational education which acknowledges the full intellectual and social meaning of a vocation. It includes a broad-ranging curriculum far beyond the skill and knowledge requirements of any specific vocational field, which along with the competence to fulfil a vocational role, 'bring the future worker into touch with the problems of the day and the various methods proposed for its improvement.' 'Above all', Dewey suggests, 'it would train power of readaptation to changing conditions so that future workers would not become blindly subject to a fate imposed upon them. This ideal has to contend not only with the inertia of existing educational traditions, but also with the opposition of those who are entrenched in command of the industrial machinery, and who realize that such an educational system if made general would threaten their ability to use others for their own ends (1916:372).'

This includes consideration of the role of educators and trainers as agents of change, as Sellwyn (2019) makes clear in *Should Robots Replace Teacher?* The main question is not whether robot teachers, lectures or trainers are technologically possible, which they are, but what role they have in our classrooms, lecture halls or training facilities? This points to the need for an ethical, philosophical and technical understanding, as those in positions of power make choices about how and when new technology are applied, along with opportunities to develop new pedagogies of learning, etc. Questions about what robots can do better than humans, or whether they can replace teachers, accountants, lawyers, soldiers, etc. need to be extended to questions of what kind of society, workplaces, schools, or human beings we want to create (and become).

I suspect that such a view of vocational education and learning is somewhat different from what is currently understood by the UK government when it talks of the need for higher education to be more vocationally relevant.

Conclusion

The race to higher education has remained a key part of economic and public policy since the 1990s in the UK and beyond. Today, it is being fundamentally challenged. But putting the brakes on this race does not make it any easier to answer the question of how to prepare people for working-life within a highly stratified division of labour. If there is an increasing divergence between the kinds of skilled workers that employers want to hire, and the kinds of life people want to lead, the fourth industrial revolution will require a new reconciliation. Therefore, if anything, it has become more difficult to answer such questions because there is little political appetite for a further widening of access to higher education (which could be justified for social rather than economic reasons). There is also little prospect of using intergenerational social mobility as a

mode of social advancement, because future productivity gains do not depend on employing an ever-increasing number of university graduates, therefore creating room at the top will depend on downward social mobility which traditionally has not enjoy political support.

Whatever policy initiatives are proposed, they will have little success without addressing (re)distributional issues. These are not limited to educational opportunities, but how we are going to share waged work of the kind people hope to enter after college or university; rethink existing reward structures and occupational status hierarchies (highlighted by the role of key workers during the Covid-19 pandemic); address vast inequalities in income distribution, and egregious inequalities in wealth (which often have little connection to productive contribution) (Piketty 2014).

As a final observation, if technology is not fate it is a key factor in the current period of disruption which requires the kind of careful and skilled analysis that characterise the life's work of Geoff Mason.

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Notes

[1] This article draws on ideas recently published including collaborations with other authors, see Brown, Lauder and Cheung, 2020; Brown 2019, 2020; and Brown, Souto-Otero and Lloyd, (2018).

[2] This was also part of the explanation for increasing wage inequalities between winners and losers (Goldin and Katz 2008), despite important differences in the magnitude of inequality (Piketty 2014).

[3] The distinction between unravelling and unbundling is that the former may result from the unintended consequence of purpose actions and institutional contradictions, while the latter is a deliberate strategy to, for example, dis-aggregate jobs or skill sets, to take advantage of the granularity of big data.

[4] See Now and Then – The Process of Invention, Economist, April 25, 2015, and Hyejin Youn, Deborah Strumsky, Luis M. A. Bettencourt and Jose Lobo, 2015 Invention as a Combinatorial Process: Evidence from US Patents', Interface, 12, pp.1-8. [available online]

[5] PwC (2017) UK Economic Outlook, March 2017, p. 44 www.pwc.co.uk/economic-services/ukeo/pwc-uk- economic-outlook-full-report-march-2017-v2.pdf

[6] Gerald Huff, The Rising Risk of Technological Unemployment, https://medium.com/@geraldhuff/the-rising-risk-of-technological-unemployment-8fe97a985ddf

[7] See UK labour market projections: 2014 to 2024 (Working Futures) https://www.gov.uk/government/publications/uk-labour-market-projections-2014-to-2024

[8] A distinction between 'labour scarcity' and 'job scarcity', is developed in Brown, Lauder and Cheung 2020).

[9] See Figure 2 Participation in Learning 1996-2019, page 9. https://www.learningandwork.org.uk/wp-content/uploads/2019/12/2019-Participation-Survey-Report.pdf