HOW CAN WE BEST PREPARE STUDENTS FOR THE FUTURE OF WORK?

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In 2012, as Chair of the National Centre for Vocational Education Research (NCVER), I was asked by the Australian Workforce and Productivity Agency to reflect, from a personal perspective, on the future of work.[1] Five years later on the basis of my experience as a bureaucratic mandarin, and in the wake of increasing evidence that robotic process automation would soon be able to undertake many administrative tasks, I was asked by the Singapore Civil Service College to assess what was likely to happen to public service employment in the years ahead.[2] And, in 2018, as a university Chancellor I was asked to consider more broadly the prospects for graduates, as Western Sydney University (like many of its counterparts) embarked on a redesign of its curricula and teaching methodologies.

Much of the present excitement or despair about the future of work finds its roots in the prediction of Klaus Schwab, Founder of the World Economic Forum, that we "stand on the brink of a technological revolution that will fundamentally alter the way we live, work and relate to one another."[3] In his enthusiastic view, the 'Fourth Industrial Revolution' will see the lines between the physical, digital and biological spheres become blurred. The fusion of technologies will be characterised by billions of people staying connected remotely through pervasive mobile devices, able to access vast amounts of newly created data, while assisted by capable machines. The adoption of artificial intelligence (AI), Schwab argues, is at an inflection point. The internet of things, fuelled by neural-based machine learning, will move from simple digitisation to a convergence of technologies. The major challenge is not technical but how best to integrate robotic automation into workplace processes, decision-making and culture.

A new wave of disruptive automation is already transforming work. In the last century automation saw repetitive lower-skilled factory labour progressively taken over by mechanical robots. Now it is knowledge-work that is most under challenge. Much of the know-how of professionals will be demystified and their role as gatekeepers to learned expertise undermined. Many occupations which previously

required extensive training and the exercise of judgement can already be undertaken faster, better and at lower cost by increasingly capable machine-based systems.

As the technologies of visual recognition and speech translation combine with exponential growth in data processing capability, the workplace is likely to be changed in fundamental ways. It will not just be the relatively routine but often complex tasks of white-collar administration that will become automated. Professional skills - legal, medical, engineering and financial - will increasingly be undertaken with greater reliability by robots able to access, analyse and interpret big data at an unprecedented speed and scale.

A high proportion of these jobs are the ones that our graduates take up. What will happen to them? How should we best prepare our students?

The challenge is daunting. Indeed, predictions of what '4IR' means for humanity often take a dystopian character. In my research for the Singapore Civil Service I found estimates that robots will take over 830,000 public sector jobs in Britain by 2030.[4] There are similarly extravagant forecasts for other sectors of the economy. A study in 2017 by McKinsey Global Institute estimated that between 400 million and 800 million of today's jobs will be automated by 2030. Between 75 million to 375 million people will need to switch occupational categories.[5] A frequent statistic is that 40% of jobs are at risk of automation in the next 10-20 years. Most are middle class, white-collar, professional occupations. Most are undertaken by university graduates.

Martin Ford fears that the 'rise of the robots' threatens mass unemployment.[6] His book, which won both the *Financial Times* and McKinsey Business Book of the Year Awards, predicts that many 'good jobs' – university-educated jobs – will become obsolete. If correct, such an outcome has terrifying implications. Today's disciplined structures of paid work underpin social order : as jobs disappear, become casualised or deskilled, governance of citizens may become harder. Similarly, Richard and David Susskind predict the decline of professions. In their view, increasingly capable systems will erode the practical expertise of specialists.[7] Doctors, teachers, accountants, architects, consultants, lawyers and many others will no longer have the same status needed in the internet society of the future.

Tim Dunlop is rather more optimistic.[8] In his view, the question is not whether robots will take our jobs but what we will do when that occurs. He believes that a future 'world without work' could turn out to be positive, but only if the state intervenes to ensure that mass unemployment does not result in vastly increased inequality of wealth and power.

It is such concerns that have led to rising interest in the radical concept of a universal basic income. To address the anticipated job losses associated with a 'weightless' or 'gig' economy, it is argued that society will be required to provide all adult individuals with a payment to meet their basic needs, made without any work or activity tests. What was a fringe concept, born of academic research, is starting to become mainstream. It can seem, in the world of public discourse, a disarmingly simple idea. It is not. Nor is an it encouraging prospect for universities to imagine their role to be preparing students for welfare life protected by a financial safety net.

Thankfully, some commentators are unpersuaded by such catastrophic forecasts or the need for such radical solutions. They argue that there is a natural human tendency to believe that we live in special times. Similar predictions have failed to eventuate in the past. In the United Kingdom in the 1930's it was the great economist John Maynard Keynes who foresaw a future world of leisure. In Australia in the 1970's it was the historian Ian Turner, and in the 1980's the Minister for Science Barry Jones, who argued that mass redundancy awaited in the near future. *Sleeper Awake* was Jones' clarion cry.[9] But the anticipated societal revolution future has not yet happened.

Nor, perhaps, will it. The Australian economist Jeff Borland thinks that future unlikely.[10] Machines will not necessarily take away our graduates' employment prospects. Whilst new technologies will destroy many jobs, an approximately equal number of new ones are likely to emerge. He suggests, on the basis of empirical evidence, that there is a balance of job creation and destruction. In Australia, employment remains strong. Involuntary job loss is only about half what it was two decades ago. The present pace at which workers are moving between jobs in the labour market does not appear to be accelerating.

Certainly the impact of computer-based technologies, automation and artificial intelligence is complex. Not all tasks within society can be automated : as some

administrative and professional skills are undermined, so the demand for human-to-human interpersonal skills that require high levels of emotional intelligence continues to increase. Many diagnostic skills will be lost (or complemented) by robots but the need for care-giving skills is likely to rise. It is evident that the 'tasks' within many graduate jobs are subject to tremendous change. Indeed, Andrew Charlton estimates that about half of Australian's jobs are being transformed from the inside by new technologies and processes.[11]

Our universities produce most of the professionals and executive managers who work in the Australian jobs where task changes are presently greatest – architects, software programmers, speech pathologists, technicians, accountants, retail managers, health professionals and life scientists. Some of the transformation is positive. Registered nurses now spend less time recording patient medical histories and more time looking after patients. Potentially, robotic process automation will mean that public servants will be able to devote less time to paperwork and record-keeping and more time adding value to citizen service. Of course, even if this more positive scenario eventuates, our students will still find themselves destined for a world in which their professional skills are transformed. It remains an unsettling prospect.

In short, the direction of technological transformation is clear. What is fiercely contested is the scale, speed and consequence of labour market change. At a time of such uncertainty how can universities best respond?

In Australia, there is no shortage of suggestions from outside the academy. Professional consultancy companies proffer a variety of avowed solutions. Nous Group argues that answeres will involve "rethinking the shape of post school education".[12] It recommends separating the cost of research from the funding of teaching places, and recognising a new category of university that exhibits its educational merit by focusing on teaching. Such 'teaching' universities, collaborating with vocational education and industry providers, might create academic excellence by bringing curricula and pedagogy to the design of industry-driven learning packages. Nous suggests that it is time for the Humboldtian concept of the nexus between teaching and research to be broken. Academia does need not to be research-based in order to deliver higher education.

EY (Ernst and Young) have tried to imagine how a university of the future could best respond to 'the Transformative Age'.[13] They present four scenarios but believe that two are most likely : the emergence of 'commercial' universities offering work-integrated learning and close collaboration with industry; and 'disruptor' universities that meet the preference of continuing learners for on-demand micro-certification skills as technology disrupts their chosen profession. EY also envisages the possible emergence of the 'virtual' university which will integrate higher and vocational education, prioritising training and employability outcomes as humans begin to be replaced by machines. Such an institution would cater to lifelong learning needs by unbundling course structures and delivering education much more flexibly and increasingly online.

KPMG have also sought to reimagine tertiary education.[14] It posits that Australia needs to discard an unstable and outdated distinction between higher education and VET and move from a binary system to an ecosystem. Greater emphasis needs to be placed on teaching, with innovation directed to courses focused on practice and the workplace.

Other key institutions have taken up a similar reprise. The Productivity Commission, in its provocative report on *Shifting the Dial*, has examined how universities can become more resilient to the shock of new technologies.[15] The Commission argues that goals will only be achieved by maximising the public benefits of research and improving the incentive for research collaboration and commercialisation with industry. Given that it will not be too long before the university sector becomes the key vehicle for skills formation in the economy, there needs to be a much stronger focus on helping students prepare for the acceleration of automation. Universities, which have become central to greater human capital development, need to improve the value and relevance of the skills and knowledge taught to students, not just during their undergraduate degrees but throughout their working lives.

The Business Council of Australia (BCA) strikes a similar tone. Its recent report, *Future-Proof*, starts from the proposition that whilst nobody know exactly how the world of work is changing, "we can be sure that almost every single job will be different; some sectors will be severely disrupted".[16] To produce resilient students, they call for a tertiary system that puts the learner in charge by providing a capped

Lifelong Skills Account, with workers able to dip in and out of short, accredited modules to upskill and retrain throughout their lives.

In short, beyond academia there seems to be a broad consensus emerging that Australia needs more teaching-based universities which are better integrated into a holistic tertiary education system. Vocational and higher education need to be firmly integrated if providers are to become more agile and adaptive in meeting the changes requirements of 'Industry 4.0.'

I remain uncertain about fundamental aspects of this emerging consensus. It is not that I am a vehement critic of the so-called "neoliberal university.' Whilst I strongly subscribe to "the role of universities as guardians and producers of knowledge for the common wealth and public benefit,"[17] I see no irreconcilable conflict with also preparing students for the labour market. Universities do have key role "in securing the future labour supply by fostering knowledge, analytic thinking, broad capabilities and technical skills in our young people."[18]

Indeed, I am strongly attracted to the creation of a single tertiary sector in which people, over a lifetime, have the opportunity to create the educational portfolio that they believe best prepares them for the changing tasks of a changing career in a changing economy. Universities should be a key part of this, from post-doctoral research to micro-learning, delivered face-to-face and/or digitally. Students, wherever they are in their lives' journey, should be at the centre of what we do. Helping them to acquire and adapt the skills they need for their careers is a crucial component of that commitment.

 I also believe in the merit of academic institutions building closer collaborations with business and civil society organisations. There is a benefit to jointly-funded research, particularly when it contributes directly to the creation of purposeful public impact. To the extent that partnerships with the private sector contribute to innovation, universities and academics should benefit commercially from the intellectual property created by staff.

Yet I remain unpersuaded by much of the literature on how universities should best adapt their education to change. In part, no doubt, this is because I believe that universities have more than an instrumentalist purpose. Much blue-sky research in physics or astronomy is not undertaken with any obvious practical purpose in mind,

but the application of scientific, mathematical and technological skills are just as valuable as the more practical expertise taught in medicine, dentistry or engineering. And in the liberal arts and humanities, research on 'Post-orientalist arts of the Straits of Gibraltar' (to take a recent controversial example) may not seem to have immediate benefit to the 'national interest' but the scholarship, research and interpretation involved – particularly if those disciplines can be conveyed to students – almost certainly does contribute to intellectual curiosity and analytical acumen.

There are other problems to tailoring higher education too exclusively to professional requirements. Even if one accepts that much university teaching should have a utilitarian objective, it is uncertain that framing it to the perceived needs of employers is the most sensible approach to addressing the uncertainties of technological revolution.

Indeed, I have concerns about the increased influence of professional associations on university curricula, often wielded by virtue of the registration requirements that they set. It is useful, if sometimes burdensome, to allow professional bodies to ensure themselves that the academic program content is current, technically accurate and taught by qualified staff. But, given their explicit role is to protect and preserve existing professional competencies, they may not be best-placed to imagine (let alone embrace) a future in which these traditional skills are undermined by technological disruption. Their goals are likely to be premised on an understanding of the competencies required today rather than a considered assessment of what expertise might be necessary in ten years' time.

So, what to do? I am increasingly persuaded that the best way to respond to the impact of cognitive technology on professional skills is to place greater emphasis on critical thinking : on conceptual and analytical capabilities; the capacity to synthesise and interpret differing arguments; the ability to solve complex problems; the facility to assess the provenance and reliability of evidence (a task which has become significantly more challenging in the digital age) ; and the aptitude to reason ethically. Many of these skills are born of academic scholarship. They need to be taught alongside technical competences if our mission is to prepare students for a fast-changing future. They are central to cognitive flexibility and the exercise of creativity.

Pedagogy is also important. Emotional intelligence needs to underpin teaching method. For a future world it is already apparent that successful application of intellectual attributes will depend on students learning how to work as part of a team, to negotiate, to coordinate and to co-design. They need the training to facilitate collective decisions. Our students are now much less likely to live their working lives in large, hierarchical corporations. They need to be trained for mobility across less structured workplace environments and for the responsible exercise of autonomy.

Perhaps universities need to go back to the future. Enterprise skills are important. But if all that our students gain from us are specific vocational and professional competencies, we will fail to instil in them the intellectual resilience that they require for change. Many of our graduates will shift their careers. Many more will discover that their careers transform from within. Their success will depend not on a credential but on the intellectual skills they can display in a future world that we still see only through a glass, darkly.

ENDNOTES

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