



FUTURE FRONTIERS ANALYTICAL REPORT



Preparing for the best and worst of times

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A report prepared for the NSW Department of Education on the key implications for school education of artificial intelligence and other emerging transformations.

ABOUT THE RESEARCH TEAM

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ABOUT THE SYDNEY POLICY LAB

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EDUCATION: FUTURE FRONTIERS is an initiative of the NSW Department of Education exploring the implications of developments in AI and automation for education. As part of this initiative, the Department has commissioned background reports on future skills needs. The views expressed are solely those of the authors.

Executive Summary

The NSW Department of Education challenged a consortium of University of Sydney academics to consider the important question of what today's kindergarteners will need to thrive and not just survive in the 21st century. The Department is particularly interested in the predicted changes that Artificial Intelligence (AI) and other developing technologies could bring to Australia's economy, workplace and community. This report, which integrates insights from scholars in faculties as diverse as engineering and medicine, business and education, is not a definitive analysis of all potentially relevant issues; rather, it explores some of the challenges and opportunities around these emerging technologies and what this might mean for education, particularly school education.

Section 1 outlines the methodology for this interdisciplinary approach and how this report was prepared.

Section 2 considers the three dimensions of impact associated with artificial intelligence. Its most *overt* impact is on job numbers and content. Its *covert* impact is on means of decision-making and social connection. Its impact as an amplifier of other changes is significant, especially given its capacity to intensify dynamics associated with labour market fragmentation, globalisation, inequality and climate change. The central challenge is not to predict the future but to prepare for uncertainty. This is best achieved by developing in individuals the capacity to adapt successfully to changing situations.

Section 3 considers how education might best nurture this capacity. The relationship between education and the labour market is not as obvious as commonly thought. Moreover, recent literature on improving people's employability reveals formal education is only one (and not necessarily the most important) factor determining labour market success. That said, appropriate education is a vital ingredient. Arguably the most prevalent current narrative concerns the need for educators to focus on 'soft',

'generic employability' or so-called '21st century skills'. Typically, these are defined as 'literacy and numeracy' and capabilities concerning 'problem solving', 'creativity', 'communication' and 'collaboration'. This narrative, while superficially attractive, is ultimately not sufficient for guiding education policy and practice in an AI era. Any effective approach must grapple with four issues.

1. *What types of pupils are we developing: highly flexible labour or flourishing, productive citizens?* Many prescriptions in the current 'future of work' literature are predominantly concerned with developing what is best described as the ultra-flexible worker – i.e. people able to meet ever-changing market requirements. Drawing on the health, humanities and social science disciplines we highlight the importance of nurturing productive, flourishing citizens.
2. *How can education contribute to the development of human flourishing over the life course?* Human development is a complex, multi-dimensional process. The early school years are critical for developing individuals' 'learner identity'. Primary schools in particular have a crucial role to play in shaping people's learning dispositions. These concern such things as curiosity, the ability to concentrate, resilience and learning relationships. If nurtured well, they result in people empowered to learn, wanting to learn and excited by learning. If not developed early, their absence can have lasting effects on people's willingness, interest in and capacity to learn and adapt.
3. *What is the relationship between developing general learning dispositions and developing specialist expertise?* Using literature from disciplines as diverse as cognitive psychology, education, philosophy, engineering and applied labour economics we show specific knowledge is important. We highlight how gaining 'generic'

skills (or, more accurately, learning dispositions concerning such things as collaboration and problem solving) are often best acquired in the context of mastering specific disciplinary, trade or professional expertise (i.e. having something substantive to contribute to a team or solving a problem).

4. *Are current approaches to gaining specialised knowledge providing students with well-developed learning dispositions?* The mainstream academic curriculum focuses on fairly abstract analytical skills, perceived by many students as ‘too academic.’ Much vocational education and training in schools, on the other hand, focuses on developing narrow skills relevant to an immediate job. Academic disciplines need to better highlight their potential broader relevance to life (and not just the labour market). Keynes once observed that there is nothing more practical than a good theory. Why this is the case and how abstraction can be appropriately applied ‘in real life’ deserve closer attention. For vocational education, greater attention needs to be devoted to giving students underpinning knowledge for a broadly defined domain of expertise to increase their capacity to adapt to changing opportunities.

Section 4 considers the implications for schools. There is a need to engage more effectively with AI and its broader impacts. Increasing ICT literacy is important but involves much more than teaching all students how to code. Rather, it involves equipping young people with digital fluency, i.e.; the ability to handle the ‘covert’ and ‘amplifying’ impact of AI as well as its more overt consequences for job destruction and transformation of job content.

Widespread debate is needed on how to define domains of specialised knowledge necessary for underpinning the development of ‘generic’ skills. Recognised academic disciplines are important, but they are not the only categories for defining expertise. Special attention is especially needed for the vocational offering in schools. Take the example

of care work. Instead of doing courses in ‘aged care’, ‘disability support’, ‘youth work’ or ‘drugs and alcohol support’, for example, consideration should be given to preparing people for ‘care work’ more broadly defined. This would provide the context for practicing in the more specialised sectors. Closer engagement with the world of work challenges us to consider how we define domains of occupational capability. Notions of job clusters or vocational streams of connected occupations deserve closer attention from a wide range of stakeholders, within schools and beyond.

The challenges associated with AI require more than marginal adjustments to established arrangements, best conceived of as an education ‘settlement’ or ‘compact’. Education, like most social domains, is structured by an array of stakeholders contributing in different ways. Currently employers and the community are not as actively engaged in local schools and education as they could be. Many are quick to criticise the status quo, but few are helping build new arrangements. The country’s education effort would benefit immensely from closer engagement with employers in the private and public sectors, and community organisations. While schools have been endeavouring to do this, quality engagement from the business sector has been limited. The importance of specialised knowledge – both academic and vocational – highlights the continuing importance of professional teachers. We conclude by asking whether it is time for a new education settlement. Such a settlement would give greater recognition to teacher professionalism on the one hand and support closer connections with quality employers and arts and community organisations on the other to develop the flourishing citizens of tomorrow.