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Artificial intelligence and graduate employability: What should we teach Generation AI?

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Abstract

In the era of Generative Artificial Intelligence (AI), universities are grappling with how best to prepare students for a workforce increasingly influenced by the technology. This commentary explores the implications of AI for graduate employability, emphasising the need for educational institutions to reassess their curricula. It suggests integrating AI literacy and ethical decision-making skills to ensure graduates remain valued by employers. As AI encroaches on graduate-entry and even high-skill jobs, I call for a curriculum that balances technical skills with critical thinking and interpersonal abilities and that prepares students for the complexities of a technology-driven job market.

Keywords: AI; artificial intelligence; ChatGPT; future of work; generative artificial intelligence; graduate employability; LAMs; Large Action Models; Large Language Models; LLMs.

The defeat of Chess Grandmaster Gary Kasparov to IBM's Deep Blue computer in a game of chess in 1997 now seems like a pivotal moment in the history of machine intelligence. It was the first public display of artificial intelligence's (AI) capacity to overtake the very best human performance, albeit in the narrow arena of chess. This perhaps should have been a prescient moment that foreshadowed the emergence of Generative AI, but in truth, much of the higher education sector was caught off-guard by the explosive adoption of AI tools such as ChatGPT in 2022 (Rudolph et al., 2023b).

OpenAI's ChatGPT sudden entrance on the world stage sparked immediate concerns throughout the global higher education sector. Chief among these was the academic integrity implications of Large Language Models (LLMs). How could universities ensure the authenticity of assessment, if essays, reports, coding tasks and term papers could be so easily manufactured by Generative AI tools in mere moments? A rigorous discussion ensued across the sector with various solutions suggested from returning to high-value invigilated exams through to assessment re-design and increased use of oral examination (viva voce). Higher Education regulators such as Australia's TEQSA responded by developing whole repositories of informed responses to AI and suggested guidelines for learning and teaching (see TEQSA, 2024).

The conundrum faced by educators as a result of AI extends beyond authenticity and trust in assessment. It also poses serious and challenging questions as to what universities should teach, how they should teach and how they should best prepare students for the rapidly changing world of work. While universities tend to have multiple and diverse missions, it is generally accepted that ensuring graduates are employable and considered valuable to prospective employers is a common aspiration. The evolution of AI is occurring at unprecedented speed, spurred on by both rapid technological developments in AI chip design and remarkable investor support for AI applications from everything from electric vehicles to smartphones, airports, and green technologies. In this opinion piece, I explore the challenge to graduate employability posed by AI models and tools and the question it raises for universities as to how best to prepare the next generation (Generation AI) for employment likely to be heavily laden with the influence of AI.

Generative AI, to some extent, has upended previous predictions of the future of work and autonomous systems. Prior to ChatGPT, there was a strong view in the 'Future of Work' literature that, like a rising tide, machine intelligence and autonomous systems would replace tasks requiring lower skills and cognitive ability (see Waring et al., 2020). Higher-level functions requiring advanced cognitive ability – for instance, creativity, reasoning, problem-solving, literacy, numeracy, judgment, translation and interpretation, and emotional and interpersonal skills – were predicted to be less vulnerable to the 'great replacement machine' of AI. With perhaps a touch of hindsight, the 'Future of Work' literature has sometimes appeared analogous to debates regarding Science and Creationism and the origin of the Universe. In that age-old discussion, it is Creationism that with each new scientific discovery (for example, that the Earth is not the centre of the Universe) makes certain accommodations. Similarly, much of the 'Future of Work' literature has previously claimed that jobs of the future will need to emphasise those qualities that are innately

human – interpersonal skills and emotional intelligence are often cited as among these human qualities that cannot be replaced with silicon-based forms of intelligence. That may be so presently, but time and the march of technology are proving this to be wishful thinking. Since the rapid arrival of Generative AI, the world has witnessed the credible emulation of a range of human abilities at super-human speed.

The steady encroachment of AI towards emulating what was previously thought of as innately and unreproducible human qualities has been a feature of its evolution thus far. Multi-modal AI models such as Google DeepMind's Gemini are already able to reason across a range of inputs, including audio, video, text, code and images. Google also claims that Gemini outperforms human experts on 'massive multitask language understanding' (Pykes, 2024).

There are also Large Action Models (LAM) emerging, which not only perform the same range of tasks as LLMs but also understand and perform actions that would otherwise be undertaken by humans. A recent demonstration of this technology by firm Rabbit Tech demonstrated how their AI tool could not only propose a complex travel itinerary that incorporated specific spoken wishes but also proceed with making all the necessary travel bookings (Pan, 2024). It is highly probable that these LAM versions of AI will further evolve and become more adept at undertaking a range of actions at the instruction of human beings or with some level of autonomy.

Many of the jobs that require higher-level cognitive capabilities are professional, white-collar jobs – and many of these careers begin at graduate entry. As Cazzaniga et al. (2024) note, these AI tools and models challenge the belief that technology affects mainly middle and, in some cases, low-skill jobs; its advanced algorithms can now augment or replace high-skill roles previously thought immune to automation. For the creators of these AI tools, there is an economic incentive tied to expanding the range of functions and utility of AI. Thus, it might be expected that AI will continue to climb the value chain and replace the higher-level tasks characteristic of well-paid jobs. This rather surprising trajectory of AI technology illustrates the difficulty in making reliable predictions when it comes to new technologies, thus rendering the traditional educative role of universities increasingly uncertain. In strategic terms, the concept of 'skating to where the puck is going to be' (often attributed to ice hockey legend Wayne Gretzky), which denotes getting ahead of the strategic curve, has become extremely challenging for university leaders.

It is also reasonably foreseeable that in the future, professions that require high-level empathy, compassion, and complex interpersonal skills (Psychology, Counselling, Nursing, etc.) could be substantially replaced by AI bots with advanced 'empathy algorithms' – able to listen compassionately and offer curated advice based on many terabytes of clinical psychology data. Already customer contact or call centres are looking to replace human beings with AI bots that can listen to and manage customer enquiries with all the natural language processing and interpersonal skills of a call centre worker (Valentino, 2024).

Adding to this uncertainty are the variable effects of AI across jurisdictions and industries. Cazzaniga et al. (2024) note that the impact of AI is likely to be uneven across different sectors and across different countries. In particular, their study demonstrates that 60 per cent of jobs in high-income/advanced countries are exposed to AI due to "the prevalence of cognitive-task orientated jobs" (p. 2). By contrast, the proportion of AI-exposed jobs in less developed countries is estimated to be 26 per cent. Yet they argue that this does not mean that workers in high-income countries will be necessarily worse off. Instead, Cazzaniga et al. (2024) claim that AI is more likely to complement rather than displace the employment of high-income workers. This is because they speculate that AI tools are most likely to make university-educated workers more productive. Furthermore, it is argued that the productivity gains from AI penetration are expected to boost total income in high-income countries. It is important, however, to caution that Cazzaniga et al (2024) suggest that the adoption of AI is likely to amplify income and wealth inequality if the productivity gains are captured by a minority of those who own the technology, have equity stakes in AI companies or who are skilled in using the technology.

Consistent with Cazzaniga et al. (2024), the World Economic Forum's (2023) research (covering 803 companies employing 11.3 million workers) on the 'Future of Jobs' also acknowledges the prospect of 'job destruction' from AI and automation. However, the 'Future of Jobs' report also expects that the overall impact of technological change will be 'net positive' for job growth based on their employer survey. Interestingly, the WEF survey finds (perhaps counter-intuitively) that businesses expect to introduce automation at a slower pace than previously believed. Overall, they find that while the human-machine frontier is shifting in favour of tasks performed by machines, they estimate that two-thirds of all tasks are still performed by humans (World Economic Forum, 2023). This may suggest that many businesses are just beginning to examine the application of AI tools.

Universities, though, should be concerned for the future of graduate-entry positions. Many of these roles across the functional areas of businesses tend to be structured around tasks requiring less advanced cognitive abilities that are also computer-based. Tasks such as researching a topic, writing emails or short reports, organising meetings, constructing presentation decks, performing spreadsheet calculations, analysing financial statements, drafting contracts, and writing simple computer code are typical of a range of graduate-entry positions (see Rudolph et al., 2023a). These are exactly the kinds of tasks that are clearly within the capability set of Large Language Models, performed at digital speeds at near zero cost. As Brown (2023) notes, the adoption of Generative AI by organisations threatens to remove 'the bottom rung of the ladder' for those graduates starting their careers. This is persuasive and points to the need for graduates to be 'AI literate' so that they not only adroitly use the AI tools they need to complete tasks and solve problems but also have the ability to critically assess the output of AI models.

There is potentially another, more subtle and negative impact on graduate jobs, which is rarely acknowledged in the growing AI literature. That is the experience that performing

these less complex tasks brings, and the subtle qualities of discipline, focus and persistence that are ingrained in graduates through performing routine tasks. These are presumably lost (or need to be developed in other ways) when AI is routinely used to perform these tasks.

Where does all this leave university graduates and what can universities do to ensure that graduates remain valued by employers?

Brown (2023) calls for universities to urgently review their employability strategies to account for the growth in AI while also integrating AI into teaching and learning. Importantly, he builds a case for universities to emphasise the development of "[c]ritical analysis, critical enquiry, problem formulation, socio-ethical considerations, interpersonal skills, resilience" as key graduate attributes in a world with near-universal adoption of AI (p. 20). Brown (2023, p. 19) stresses that the use of AI is "likely to place a premium on critical thinking skills, including the ability to challenge and interrogate knowledge". Further, he contends that its widespread adoption will increase the value attached to interpersonal skills.

Similarly, 'The Future of Jobs' research published by the World Economic Forum indicated that employers regarded 'Analytical Skills' as being the most important core skill. 'Creative Thinking' ranks second, but interestingly, self-efficacy skills such as resilience, flexibility, agility, motivation, self-awareness, curiosity, and lifelong learning are also highly ranked, which suggests that employers suspect that these qualities will prove important for technology-disrupted workplaces (World Economic Forum, 2023). In the same study, 'AI and Big Data' skills saw the biggest increase in ranking by employers, signalling that they expect to invest significantly in upskilling their workforces to be able to use AI tools effectively. This was especially true of large employers (those with more than 50,000 employees) who responded to the WEF survey.

The importance of 'self-awareness' as a core skill to be developed in the age of AI is also advanced by historian and public intellectual Yuval Noah Harari who argues that in the face of relentless change, people will need to constantly reinvent themselves. Achieving this requires mental flexibility, resilience, and emotional intelligence (Irais, 2023). Harari argues, "Investing in people's flexibility and mental or psychological resilience is no longer a luxury. It's essential to survive in the 21st Century job market" (Irais, 2023). Perhaps at a more philosophical level, Harari makes the point that technology provides the human race with unprecedented power. Therefore, there is a need to teach people how to exercise that power ethically and responsibly. Part of this will also require teaching people to make good decisions, to be able to critically evaluate a set of circumstances or fact patterns to determine what is fact/evidence and what is not – to judge what is reliable information and what is unreliable.

I now propose an input/output and action model to inform how universities can come to grips with designing a curriculum to meet the challenges of the AI generation. The challenge for higher education institutions in designing a curriculum for the AI era is considerable. The shifting task frontier between humans and machines injects considerable uncertainty into curriculum design. If history is quintessentially the study of change, as Harari has argued, then we are witnessing history unfold at a rapid rate as a consequence of unrelenting technological innovation.

As I have already contended, there is an urgent need for universities and other institutes of higher learning to develop curricula that equip graduates with a set of AI competencies to make effective use of the new technology. Part of this will require educators to explain how AI models work – to explain how they are designed, built and trained. But another, perhaps more significant, need is for educators to teach students how to ethically make the greatest use of these tools.

To this end I would like to suggest that educators think of this challenge in terms of an 'Input/Output/Action' model. The model that I advance here, deconstructs the processes by which AI tools are used and identifies a set of questions at each stage that should inform the development of curricula and graduate competencies.

The 'Input' stage recognises that AI tools require some level of input that typically comes from the human user of the tool. This might be a question or prompt, an image, a video file or perhaps computer code. At this initial stage, it is relevant to ask about the type and quality of information that is submitted to the AI tool. How do users ensure that the input is relevant, reliable and, if a question, framed in a way that it is likely to produce the best results? This also requires an appreciation of the data sets on which AI models are developed and the possibility that these large data sets may contain errors and bias. Educators, therefore, need to develop the critical faculties of students who are using these tools to be able to ask these questions and understand the limitations of AI data sets and the methods of 'learning'.

At the 'Output' stage, there is an equally important need to be able to interrogate what is produced by the AI tool. Users need to be able to determine if the outputs are valid, reliable, relevant, and grounded in reality. The AI literature (see Naddaf, 2023; Zhou et al., 2023) has demonstrated quite consistently that AI tools are capable of fabricating output which is entirely fictional, including, for example (and worryingly), in areas of medical science and the law. To be able to discern if the AI output is valid and not the product of an AI 'hallucination', users need to have some subject knowledge or know how to check the veracity of the AI output (see Rudolph et al., 2023b). Additionally, users need to be able to assess if the AI output is potentially biased or offering unethical or ethically dubious advice. Thus, it will be important for educators to teach students how to think ethically and apply ethical principles to AI output.

The final stage in the model draws attention to the set of skills required to action the output of an AI tool. It is one thing to generate AI output but quite another to use that output effectively and responsibly. University graduates will need to know what actions to take based on the output of the AI. This implies that curriculum and training on ethical decision-making will be important for those charged with

actioning AI output. Effectively executing the advice or output of AI tools will also require graduates to have good collaboration, communication, leadership negotiation, intercultural and teamwork skills. Getting things done might be expedited through the use of AI, but subsequent decisions, collaborations, and actions depend on a set of technical and interpersonal skills and knowledge that are competently exercised. Further, users of AI tools will also need to know how to evaluate the results of the actions they have taken and to reflect on how future actions could be improved based on experience.

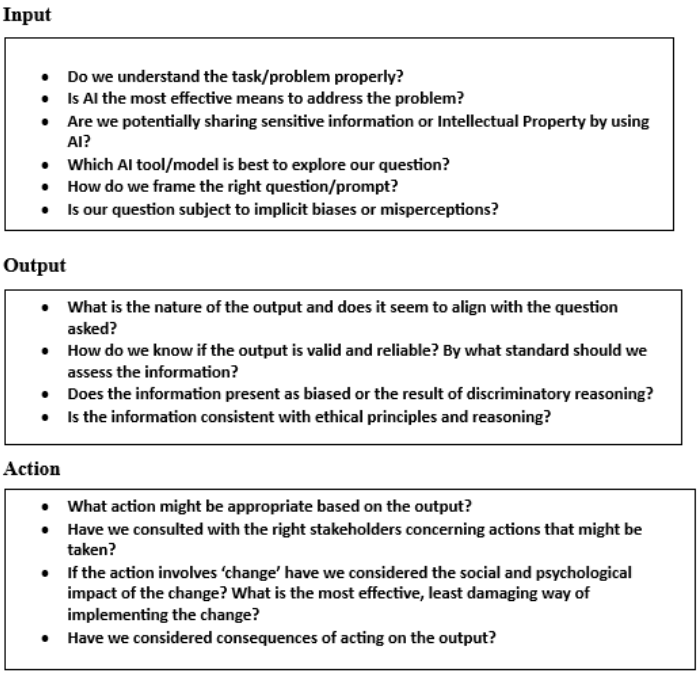

Figure 1. Proposed Input-Output-Action Model.

This simple Input/Output/Action model serves to highlight a set of competencies that are proposed for using AI responsibly and effectively. Universities, in my opinion, need to ensure that their curriculum and student learning experience develop these skills and knowledge. As Cazzaniga et al. (2024) claim, those who can skilfully use AI are more likely to be valued by employers and enjoy higher incomes as a consequence. Although learning, particularly at a tertiary level, is not simply about gaining meaningful and well-rewarded employment, it is undeniably a significant part of the mission of universities to prepare their graduates as best they can for an ever-changing world.

References

Brown, R. (2023, November) *The AI Generation: How universities can prepare students for the changing world.* Demos. https://demos.co.uk/wp-content/uploads/2023/11/The-AI-Generation-2.pdf

Cazzaniga, M., Jaumotte, F., Li, L., Melina, G., Panton, A., Pizzinelli, C., Rockall, E., & Taveres, M. (2024, January 14). *GEN-AI: Artificial Intelligence and the future of work, staff discussion note.* International Monetary Fund.

Irais, S. (2023, October 19). *Flexible minds, a challenge for the future of education: Yuval Harari.* Conecta, www.conecta.tec.mx

Naddaf, M (2023, November 22) *'ChatGPT generates fake data set to support scientific hypothesis'.* Nature News, www.nature.com.

Pan, C. (2024, January 22). *Rabbit, US$200 AI-powered gadget, becomes unexpected hit after CES 2024 launch by Chinese entrepreneur*. South China Morning Post.

Pykes, K. (2024, January). *What is Google Gemini? Everything you need to know about Google's ChatGPT rival.* DataCamp. https://www.datacamp.com/tutorial/what-is-google-gemini

QS (2021). *How Artificial Intelligence is influencing graduate employability and the global higher education sector.* www.qs.com.

Rudolph, J., Tan, S., & Aspland, T. (2023a). Editorial 6(1): Fully automated luxury communism or Turing Trap? Graduate employability in the generative AI Age. *Journal of Applied Learning & Teaching, 6*(1), 7-15. https://doi.org/10.37074/jalt.2023.6.1.35

Rudolph, J, Tan, S., & Tan, S. (2023b) ChatGPT: Bullshit spewer or the end of traditional assessments in higher education', *Journal of Applied Learning & Teaching, 6*(1), 342-363. https://doi.org/10.37074/jalt.2023.6.1.9

TEQSA. (2024). *Higher education good practice hub – Artificial intelligence.* www.teqsa.gov.au

Valentino, A. (2024, April 23). *Will AI customer service kill the call centre?* TechMonitor. https://techmonitor.ai/technology/ai-and-automation/ai-customer-service-llm

Waring, P., Bali, A., & Vas, C. (2020). The fourth industrial revolution and labour market regulation in Singapore. *The Economic and Labour Relations Review, 31*(3), 347-363. https://doi.org/10.1177/1035304620941272

World Economic Forum. (2023). *Future of jobs report 2023.* https://www.weforum.org/publications/the-future-of-jobs-report-2023/

Zhou, J., Zhang, Y., Luo, Q., Parker, A., & Choudhury, M. (2023, April). Synthetic lies: Understanding AI-generated misinformation and evaluating algorithmic and human solutions. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems,* Hamburg, Germany. https://doi.org/10.1145/3544548.3581318