SUBMISSION TO THE STANDING COMMITTEE ON EMPLOYMENT, EDUCATION AND TRAINING'S *INQUIRY INTO THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE IN THE AUSTRALIAN EDUCATION SYSTEM*

The introduction of generative AI tools like ChatGPT has understandably triggered debate about their impact on teaching and learning (ie how we teach and assess).

For schools and universities, but not yet the vocational education and training sector, generative AI in the form of Large Language Models (LLMs) is forcing a fundamental rethink on:

- how educators can appropriately assess student learning
- whether and how to integrate generative AI into student learning
- how generative AI can assist teachers, and
- whether academic integrity tools can accurately detect the use of generative AI where educators choose to continue to use existing written assessment tasks to measure student learning?

These questions clearly reflect the Inquiry's terms of reference examining how generative AI is changing how we teach and assess – but they ignore two more fundamental issues relating to the use of AI in education:

1. How generative AI will force changes to what we teach: Generative AI is making profound changes to white-collar and creative work, in the same way that in the 18th century the industrial revolution changed the way work was done and what work was done. The impact of generative AI on white-collar and creative work means that Australia's VET and higher education providers (and to a lesser extent senior secondary schools offering VET in Schools programs) need to change what they teach as a result of workers using generative AI in their job roles. Further, not only does what they teach need to change but post-compulsory education providers need to be able to continually and quickly change what they teach as the world of work continues to change through ongoing advances in AI and its impact on how work is undertaken; and
2. The lack of focus in Australia on the use of AI in adaptive/personalised learning to significantly improve educational outcomes: The Inquiry's focus on generative AI ignores the significant educational advances that another form of AI, big data and machine learning, is bringing to student learning. Examples are provided in this submission and it is argued that if Australia does not broaden its focus on AI in education, it runs the risk of falling behind other developed and developing countries in the gains our education systems can deliver.

BACKGROUND

The author is a former public servant who worked in a variety of senior education-focussed roles in Australian and New South Wales government agencies – including in specific educational policy and regulatory roles.

Since 2014 she has run an independent education consulting and advisory business. She does not have any commercial relationship or affiliation with any of the organisations cited in this submission.

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[1] EduGrowth (2023) *About us* https://edugrowth.org.au/about-us/

DEFINITION

Generative AI involves the creation of large databases (neural networks) of text, images, videos, sounds, etc. Computers are then trained to process data in these databases in ways that reflect how the human brain processes data.

Users write a prompt with a description or sample of the type of content they want the generative AI tool to 'create'. The generative AI then uses its neural network to create new examples similar to the ones it has been trained on.

Generative AI tools are not, currently, able to determine the accuracy of the responses they create. Instead they can be described as having "ingested an internet's worth of data, weighed up the relationships between things, and are able to generate content that appears to be new and original."[2]

The following is a very useful plain English explanation of ChatGPT and what it can and cannot do:

> *"When you enter text into (ChatGPT), you're asking "what would a response to this sound like?"*
>
> *If you put in a scientific question, it comes back with a response citing a non-existent paper with a plausible title, using a real journal name and an author name who's written things related to your question, it's not being tricky or telling lies or doing anything at all surprising! This is what a response to that question would sound like! It did the thing!*
>
> *But people keep wanting the "say something that sounds like an answer" machine (ie ChatGPT) to be doing something else, and believing it *is* doing something else.*
>
> *It's good at generating things that sound like responses to being told it was wrong, so people think that it's engaging in introspection or looking up more information or something, but it's not, it's only ever saying something that sounds like the next bit of the conversation."*[3]

TERMS OF REFERENCE 1: THE STRENGTHS AND BENEFITS OF GENERATIVE AI TOOLS FOR CHILDREN, STUDENTS, EDUCATORS AND SYSTEMS AND THE WAYS IN WHICH THEY CAN BE USED TO IMPROVE EDUCATION OUTCOMES.

With LLMs like ChatGPT able to use their neural networks and deep learning to generate written content in a matter of seconds which are highly persuasive and can pass many written assessment tasks, this has triggered significant concerns within education systems about how to prevent and detect academic cheating. While the challenges of ensuring academic integrity in an era of generative AI are dealt with below (Terms of Reference 3) they raise the question of what this generational shift in technology means for educators, "if we… provide a test that the machine can answer, then what is the point of doing that test?"[4]

The advent of generative AI provides an opportunity to rethink how we measure student achievement, and as such it is triggering a number of different and competing responses from educators.

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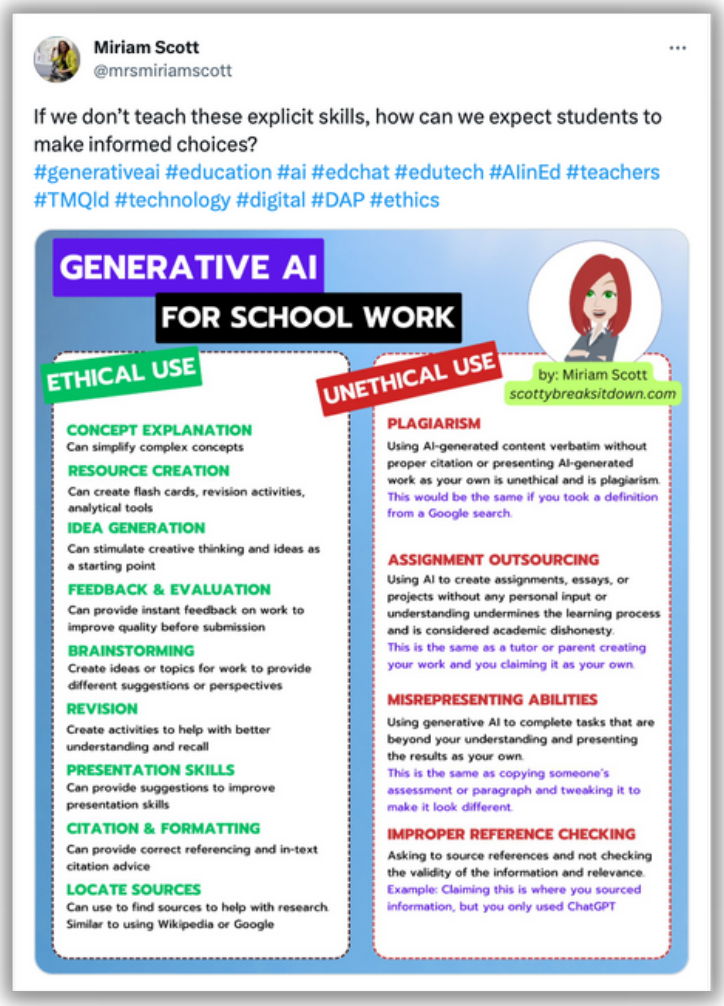
[2] Davidson, J (2023) Is ChatGPT a form of magic or the apocalypse? *Australian Financial Review* https://www.afr.com/technology/is-chatgpt-a-form-of-magic-or-the-apocalypse-20230117-p5cd4p

[3] Drew Kadel [@DrewKadel@social.coop] (2023, April 7) My daughter who has had a degree in computer science for 25 years, posted this observation about ChatGPT [Mastodon Post]. Social Coop, Mastodon https://social.coop/@DrewKadel/110154048390452046

[4] McIntyre, C (2023) Opening keynote address *EdTechX Europe 2023* https://impactx2050.com/edtechx/home

An Australian educator recently produced the following examples of what they consider ethical and unethical uses of generative AI.[5]



As Deakin University's Prof. Phillip Dawson points out[6] the suggested 'unethical' examples place a priority on students' abilities to produce well written assessments. Yet this is the work that generative AI can do readily and which it is now being used for in a wide range of white-collar workplaces (see Section A below).

By contrast the examples given of 'unethical use' of AI deprioritise students' abilities to generate ideas, undertake research and find sources – all of which are examples of the critical thinking skills students will need in a future where generative AI will become increasingly widespread. Otherwise our students are likely to find themselves entering the workforce and confronting situations like those that a lawyer in the US recently found himself dealing with after using ChatGPT to find sources to support a legal case. Because generative AI is not able to distinguish between fact and fiction – ChatGPT used its neural networks to create content, ie legal cases, that were entirely fictitious.[7] Our education systems need to be helping students to critically use and reflect on their use of ChatGPT – and to have the foundational or underpinning knowledge to know when the LLM is wrong.

In the higher education sector there are some emerging models of how educators can respond to generative AI. With respect to LLMs, US educators from Rutgers University and Marin Community College remind us that "the

[5] Scott, M [@mrsmiriamscott] (2023, June 20) As teachers, it is our responsibility to guide students through the use of generative AI in a way that is ethical & responsible [Tweet]. Twitter https://twitter.com/mrsmiriamscott/status/1670976320480878592
[6] Dawson, P [@phillipdawson] (2023, July 3) Useful and interesting - and to me highlights our obsession in education with the final written form of work [Tweet]. Twitter https://twitter.com/phillipdawson/status/1675829754275172352
[7] Weiser, B & Schweber, N (2023) The ChatGPT Lawyer Explains Himself, *New York Times* https://www.nytimes.com/2023/06/08/nyregion/lawyer-chatgpt-sanctions.html

writing process helps students learn."[8] They emphasise that educators need to "make explicit that the goal of writing is neither a product nor a grade but, rather, a process that empowers critical thinking. Writing, reading, and research are entwined activities that help people to communicate more clearly, develop original thinking, evaluate claims, and form judgments."

Generative AI is also being integrated into the teaching of coding. In January 2023, Johns Hopkins University's Alperovitch Institute explicitly incorporated ChatGPT into the teaching of its Malware Analysis and Reverse Engineering short course.[9] Students and educators found that using the software:

- filtered out the 'dumb' questions, ie students chose to ask ChatGPT to answer their basic questions rather than asking their lecturer. This meant the lesson flowed and students who needed additional information could keep up with the lecturer while getting the answers they needed
- this in turn meant that students in a class with "a highly uneven level of technical expertise" could all keep up – whereas previously in these classes (taught intensively over five days) about half of all students usually dropped out by the third day, and
- students got individual 'support' and help in the moment from ChatGPT as they were writing code - making it much easier to teach complex coding than if one educator was trying to help a class full of students many of whom get stuck at different times/on different issues. This in turn gave the class more time for higher level questions and discussions.

More recently Harvard University has embraced the use of generative AI in its Computer Science 50: Introduction to Computer Science course.[10] Students are going to be "encouraged to use AI to help them debug code, give feedback on their designs, and answer individual questions about error messages and unfamiliar lines of code." Of note is that Harvard has built its own LLM, a "CS50 bot" rather than relying on ChatGPT or another commercial LLM chat bot – because Harvard considers these commercial LLMs are "currently too helpful". The intention is that students will be happy to use the CS50 bot rather than ChatGPT, with the aim being to use the technology to "eventually approximate a 1:1 teacher [to] student ratio for every student in the course". The CS50 course and its chatbot will also be available on the edX platform.

Separately edX and Massachusetts Institute of Technology (MIT) are not only offering online courses on ChatGPT, they have created a plugin for ChatGPT so that their content is available to ChatGPT Plus subscribers, and they are also using AI technology to provide assistance to edX students by embedding ChatGPT technology in their platform. [11] edX is a US-based online program manager (OPM), developed by Harvard and now owned by 2U. A number of Australian universities offer courses on the edX and 2U platforms. It is not yet clear if they are using the ChatGPT technology embedded into the platform or if they have created their own ChatGPT alternative chatbots to support their teaching either on their own systems or on an OPM platform.

In the school education system there are few examples so far of the effective use of generative AI. The South Australian government is to be congratulated for their generative-AI trial in eight schools of an app developed in partnership with Microsoft to act as a chatbot and help students learn "how to use AI to support their studies, while also having parameters in place to protect students from inappropriate information."[12]

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[8] Mills, A & Goodlad, L. M. (2023) *Critical AI: Adapting College Writing for the Age of Large Language Models such as ChatGPT: Some Next Steps for Educators* https://criticalai.org/2023/01/17/critical-ai-adapting-college-writing-for-the-age-of-large-language-models-such-as-chatgpt-some-next-steps-for-educators/

[9] Rid, T (2023) *Five Days in Class with ChatGPT* https://alperovitch.sais.jhu.edu/five-days-in-class-with-chatgpt/

[10] Dreibelbis, E (2023) *Harvard's New Computer Science Teacher is a Chatbot* https://uk.pcmag.com/ai/147451/harvards-new-computer-science-teacher-is-a-chatbot

[11] EdScoop Staff (2023) *EdX launches ChatGPT-powered plugin, learning assistant* https://edscoop.com/edx-launches-chatgpt-powered-plugin-learning-assistant/

[12] Boyer, B (2023) *Nation-leading trial in SA schools to focus on the safe use of AI* https://www.premier.sa.gov.au/media-releases/news-items/nation-leading-trial-in-sa-schools-to-focus-on-the-safe-use-of-ai

TERMS OF REFERENCE 2: THE FUTURE IMPACT GENERATIVE AI TOOLS WILL HAVE ON TEACHING AND ASSESSMENT PRACTICES IN ALL EDUCATION SECTORS, THE ROLE OF EDUCATORS, AND THE EDUCATION WORKFORCE GENERALLY.

With ChatGPT and other forms of generative AI being such new innovations, educators in Australia and globally are still working out where and how to use them. The newness of the technology and the rapid changes which have already taken place in the months since its release make it nearly impossible to determine the future impact generative AI will have on teaching and assessment.

Educators in different sectors have shared the following suggestions for how teaching and assessment practices can be changed in response to generative AI. At the University of Sydney academics suggest LLMs can be used by teachers and students in the following ways:
Students:

- learning by teaching
- overcoming writer's block
- discussing with a co-programmer, and
- exploring diverse perspectives.

Teachers:

- writing lesson plans
- designing a draft marking rubric
- writing quiz questions and feedback for students
- generating discussion prompts for use in class, and
- composing exemplars for critique. [13]

With respect to assessment, the Sydney University academics recommend that educators incorporate AI into assessment by explicitly setting boundaries and expectations, breaking up larger assessments into shorter chunks where students visibly "iterate on their work", and being open with students and each other.

A more detailed set of suggestions from AI experts in the US, on how educators can rethink teaching and assessment to reflect the growing use of LLMs, includes the following advice:

- assign prompts that state-of-the-art systems such as ChatGPT are not good at
- require verifiable sources and quotations
- ask students to analyse specifics from images, audio, or videos
- require analysis that draws on class discussion
- ask for analysis of recent events not in the training data for the system
- set assignments that articulate nuanced relationships between ideas, and
- assign in-class writing as a supplement to or launching point for take-home assignments. [14]

At Western Sydney University, a pilot is underway with the Australian OPM, OpenLearning. Its new GPT-4 tools 'streamline' course design and reduce the time and effort required to develop new courses.[15] The pilot also involves University of Wollongong KDU Malaysia and independent higher education provider ECA.

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[13] Liu, D; Ho, E; Weeks, R. & Bridgeman, A (2023) *How AI can be used meaningfully by teachers and students in 2023* https://educational-innovation.sydney.edu.au/teaching@sydney/how-ai-can-be-used-meaningfully-by-teachers-and-students-in-2023/
[14] Mills, A & Goodlad, L. M. (2023) *Critical AI: Adapting College Writing for the Age of Large Language Models such as ChatGPT: Some Next Steps for Educators* https://criticalai.org/2023/01/17/critical-ai-adapting-college-writing-for-the-age-of-large-language-models-such-as-chatgpt-some-next-steps-for-educators/
[15] OpenLearning (2023) *OpenLearning Launches AI-Powered Learning Design Tools* https://solutions.openlearning.com/media-release/openlearning-launches-ground-breaking-ai-powered-learning-design-tools-for-education-providers

An academic at Wharton School at the University of Pennsylvania, looked at whether Chat GPT3 would get an MBA from their highly ranked and highly respected business school.[16] He found the technology would get a B- or B grade, and his experiment with ChatGPT technology led him to the following conclusions about its implications for university business schools:

1. be mindful of what Chat GPT3 can and cannot do
2. continue to teach the foundations
3. deal with the cheating when testing foundational knowledge
4. mimic the workplace by teaching how to evaluate a proposed plan of action
5. let students use Chat GPT3, but simultaneously raise the bar for assignments
6. ask students to imagine the new rather than tweaking the old, and
7. don't be shy using Chat GPT3 to improve the productivity of the teaching process.

Finally, earlier this year UNESCO released an excellent 'Quick Start' guide on the use of ChatGPT in higher education, which includes this summary of different uses of ChatGPT in teaching and learning:[17]

Role[6]	Description	Example of implementation
Possibility engine	AI generates alternative ways of expressing an idea	Students write queries in ChatGPT and use the Regenerate response function to examine alternative responses.
Socratic opponent	AI acts as an opponent to develop and argument	Students enter prompts into ChatGPT following the structure of a conversation or debate. Teachers can ask students to use ChatGPT to prepare for discussions.
Collaboration coach	AI helps groups to research and solve problems together	Working in groups, students use ChatGPT to find out information to complete tasks and assignments.
Guide on the side	AI acts as a guide to navigate physical and conceptual spaces	Teachers use ChatGPT to generate content for classes/courses (e.g., discussion questions) and advice on how to support students in learning specific concepts.
Personal tutor	AI tutors each student and gives immediate feedback on progress	ChatGPT provides personalized feedback to students based on information provided by students or teachers (e.g., test scores).
Co-designer	AI assists throughout the design process	Teachers ask ChatGPT for ideas about designing or updating a curriculum (e.g., rubrics for assessment) and/or focus on specific goals (e.g., how to make the curriculum more accessible).
Exploratorium	AI provides tools to play with, explore and interpret data	Teachers provide basic information to students who write different queries in ChatGPT to find out more. ChatGPT can be used to support language learning.
Study buddy	AI helps the student reflect on learning material	Students explain their current level of understanding to ChatGPT and ask for ways to help them study the material. ChatGPT could also be used to help students prepare for other tasks (e.g., job interviews).
Motivator	AI offers games and challenges to extend learning	Teachers or students ask ChatGPT for ideas about how to extend students' learning after providing a summary of the current level of knowledge (e.g., quizzes, exercises).
Dynamic assessor	AI provides educators with a profile of each student's current knowledge	Students interact with ChatGPT in a tutorial-type dialogue and then ask ChatGPT to produce a summary of their current state of knowledge to share with their teacher/for assessment.

Sabzalieva & Valentini (2023) ChatGPT and artificial intelligence in higher education: Quick start guide, UNESCO

[16] Terwiesch, C (2023) "Would Chat GPT3 Get a Wharton MBA? A Prediction Based on Its Performance in the Operations Management Course", *Mack Institute for Innovation Management at the Wharton School, University of Pennsylvania* https://mackinstitute.wharton.upenn.edu/wp-content/uploads/2023/01/Christian-Terwiesch-Chat-GTP.pdf

[17] Sabzalieva, E. & Valentini, A. (2023) ChatGPT and artificial intelligence in higher education: Quick start guide, *UNESCO* https://unesdoc.unesco.org/ark:/48223/pf0000385146

GOVERNMENT RESPONSES IN AUSTRALIA

In Australia we have seen government officials and agencies in the schools and higher education sectors working to understand and tackle the issues raised by generative AI. Regrettably, to date there has been minimal action in the VET sector.

Schools Ministers recognised in February 2023 the need to understand the opportunities and risks of generative AI. They established a taskforce of experts which is understood to be currently working on a *Draft AI Framework for Schools*.[18] While this action is not as timely as work in overseas jurisdictions (see Terms of Reference 5), it nonetheless shows an appreciation of the scale of the changes generative AI will bring to schools and seeks to introduce a national framework to address them.

In higher education, the Tertiary Education Quality and Standards Agency (TEQSA) has partnered with Deakin University's Centre for Research in Assessment and Digital Learning (CRADLE) to educate the sector on the implications of generative AI through a series of online webinars.[19] The latest TEQSA newsletter states that to date more than 5,000 people have attended these webinars.

By contrast, there has so far been no advice on generative AI and academic integrity from two of the three VET regulators: the Australian Skills Quality Authority and the Victorian Registration and Qualifications Authority.

The Western Australia Training Accreditation Council (TAC) has recently run a workshop on the topic of generative AI for the registered training organisations (RTOs) it regulates,[20] but unfortunately with TAC only regulating 174 RTOs this means that more than 3,800 RTOs are still lacking guidance on what to do about academic integrity in an era of generative AI.

ASQA's silence on generative AI stands in contrast to the leadership role they took during the COVID-19 pandemic, where they identified online learning as a risk and released a range of webinars and educational resources to help RTOs with the shift to online delivery. To date they have issued no guidance to RTOs on generative AI.

While some might argue that the VET sector's use of competency-based assessment means that generative AI and LLMs are yet to have a sector-wide impact on the way VET educators teach and assess, there are some obvious exceptions.

There are currently more than 3,300 RTOs offering courses from the Business Services Training Package (which has a high reliance on written assessment tasks). A further 1,500 RTOs offer courses from the ICT Training Package (which is impacted by the way generative AI can readily write computer code) and 1,250 which offer courses from the Creative Arts and Culture Training Package (which is impacted now that video, images and music can all be created with generative AI).

While these three Training Packages need urgent review to examine their assessment tasks in the context of generative AI – the Jobs and Skills Councils with responsibility for these Training Packages have only just been established. In this vacuum it was reasonable to expect that ASQA would have followed the precedent it had set during COVID in relation to online learning (as well as the example being set by TEQSA) – and assisted the 3,760 RTOs it regulates to understand generative AI and the risks it poses to academic integrity in many key VET qualifications.

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[18] Australian Government Department of Education (2023) *Communiqués from the Education Ministers Meeting 2023* https://www.education.gov.au/collections/communiques-education-ministers-meeting-2023

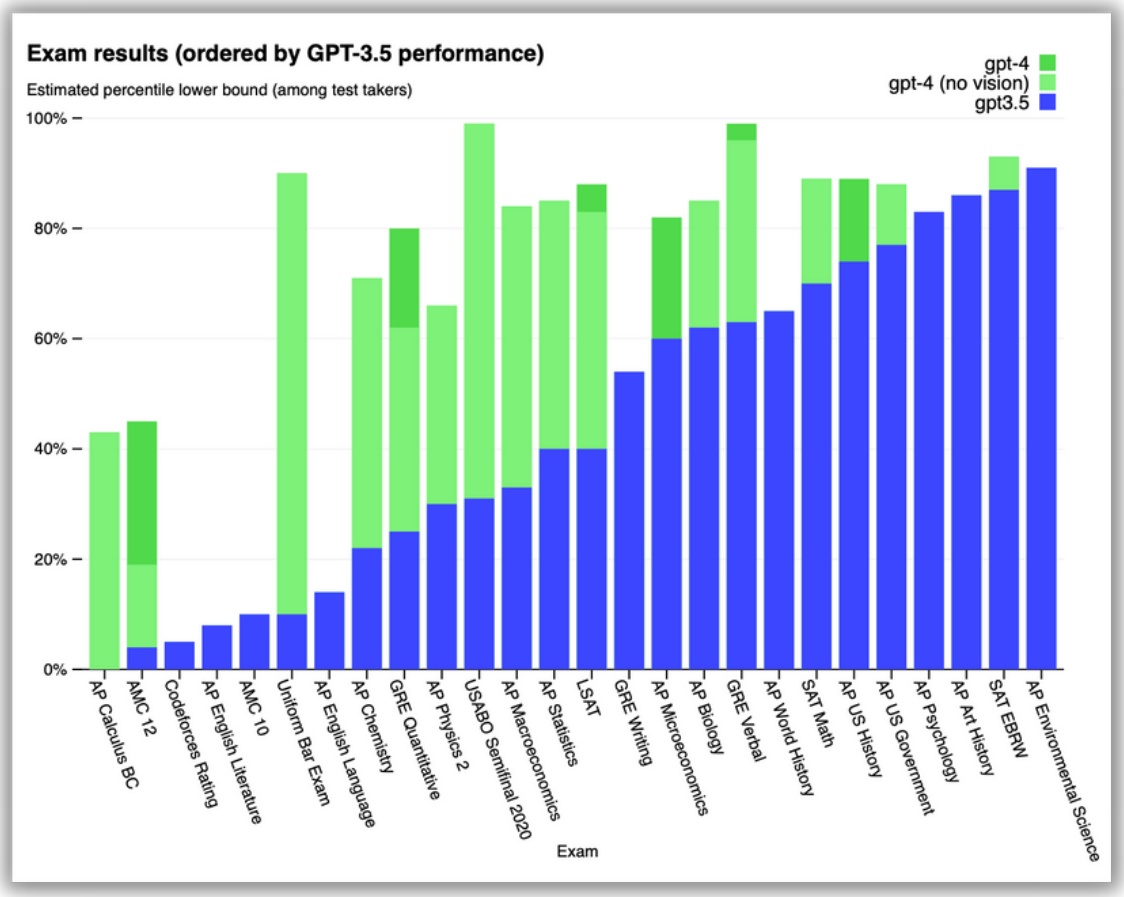
[19] TEQSA (2023) *TEQSA and Deakin University AI webinars launched* https://www.teqsa.gov.au/about-us/news-and-events/latest-news/teqsa-and-deakin-university-ai-webinars-launched

[20] Government of Western Australia Training and Accreditation Council (2023) *Workshop: Generative AI – The Potential and Pitfalls for VET webinar* https://www.wa.gov.au/service/education-and-training/vocational-education/generative-ai-the-potential-and-pitfalls-vet-webinar

With the Jobs and Skills Councils now in place, the VET sector is waiting for the Future Skills Organisation (which has responsibility for the Business Services and ICT Training Packages) and SkillsEQuipped (responsible for the Creative Arts and Culture Training Package) to engage the sector on reforms to the assessment practices in their respective courses in response to generative AI.

TERMS OF REFERENCE 3: THE RISKS AND CHALLENGES PRESENTED BY GENERATIVE AI TOOLS, INCLUDING IN ENSURING THEIR SAFE AND ETHICAL USE AND IN PROMOTING ONGOING ACADEMIC AND RESEARCH INTEGRITY.

There are many, many examples of how proficient ChatGPT is at passing traditional written assessment tasks/exams. OpenAI has published research showing how well ChatGPT 3 and 4 can perform on a range of high-status US academic exams.[21]



OpenAI (2023) GPT-4

This has understandably led many educators to look for ways to detect the undeclared use of ChatGPT.

In Australia in early 2023, and despite the excellent work of Deakin University's CRADLE, a Deakin University academic intended using her own self-developed 'chatbot detector' to identify students in her course using

[21] OpenAI (2023) *GPT-4* https://openai.com/research/gpt-4

ChatGPT. At the time she spoke to the media, she was reported to be "awaiting confirmation as to whether the results of her bot detector will count as a formal breach of academic integrity." [22] Undoubtedly there have been many other instances of academics looking to find their own methods of detecting students using ChatGPT – which is why the leadership of TEQSA and Deakin University on this issue has been so important in the Australian higher education sector.

Since the launch of ChatGPT, many institutions have also looked at systemic approaches to detecting the use of AI but there are data privacy and ethical considerations in using either self-developed or commercial AI bot detection services. The data privacy issues arise when student assessments are uploaded to 'the cloud'/shared with commercial 'bot detection' services. The ethical issues involved in using bot detection services are significant.

That is because, while initially many commercial detection services claimed that they could readily and accurately identify the use of AI, increasingly those claims have been called into question. And at the same time, the issue of bias in AI and AI detection has been brought to the fore. Recent research in the US analysing written assessments by eighth-grade students showed that the commercial AI detectors had an average false-positive rate of 61.3% on essays written by students whose first language was not English.[23]

At the same time that academics are re-thinking their assessment practices a ChatGPT plugin, Tutory, has been launched specifically to help answer students' academic questions, in turn raising more questions about how to ensure academic integrity without changing assessment tasks to reflect the widespread availability of generative AI.[24]

A recently published article by Australian academics from engineering faculties across seven universities highlights the challenges of assessing student performance given ChatGPT's 'ability' to pass some subjects and to excel "with some assessment types".[25] As the authors conclude "as a community we need to understand that the technology is improving rapidly, and we need to be prepared for a very different learning environment in the next twelve to twenty-four months."

The last word on AI detection and ways to prevent cheating should go to the CEO of OpenAI who says that while OpenAI is working to "devise ways to identify ChatGPT plagiarism... creating tools that perfectly detect AI plagiarism is fundamentally impossible... (and he) warns schools and policy makers to avoid relying on plagiarism detection tools".[26]

TERMS OF REFERENCE 4: HOW COHORTS OF CHILDREN, STUDENTS AND FAMILIES EXPERIENCING DISADVANTAGE CAN ACCESS THE BENEFITS OF AI.

There are obvious concerns about what this explosion of AI technology means for students and families experiencing disadvantage, and the potential for them to be left behind as generative AI transforms education. While this is undoubtedly a legitimate concern – it relates to a growing existing problem which came to widespread

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[22] Cassidy, C (2023) Lecturer detects bot use in one-fifth of assessments as concerns mount over AI in exams, *The Guardian* https://www.theguardian.com/australia-news/2023/jan/17/lecturer-detects-bot-use-in-one-fifth-of-assessments-as-concerns-mount-over-ai-in-exams

[23] Liang, W., Yuksekgonul, M., Mao, Y., Wu, E. & Zou, J. (2023) GPT detectors are biased against non-native English writers, *Patterns 4,* https://doi.org/10.1016/j.patter.2023.100779

[24] Tutory (2023) *A learning companion that is ready anywhere, anytime* https://www.tutory.io

[25] Nikolic, S., Daniel, S., Haque, R., Belkina, M., Hassan, G. M., Grundy, S., Lyden, S., Neal, P. & Sandison, C (2023) ChatGPT versus engineering education assessment: a multidisciplinary and multi-institutional benchmarking and analysis of this generative artificial intelligence tool to investigate assessment integrity, *European Journal of Engineering Education, 48*:4, 559-614, https://doi.org/10.1080/03043797.2023.2213169

[26] Mok, A (2023) *CEO of ChatGPT maker responds to schools' plagiarism concerns: 'We adapted to calculators and changed what we tested in math class'* https://news.yahoo.com/ceo-chatgpt-maker-responds-schools-174705479.html

public attention during COVID – that is the technology gap between students from disadvantaged backgrounds and their peers in Australian schools and tertiary institutions.[27]

At this stage it is too early to predict what will happen with generative AI and LLMs. If they do become mainstreamed as Microsoft, Google and the other tech giants are looking to make them, then in time educators will build these tools into their teaching and learning and yet again the emphasis will need to be on reducing the technology gap – ie providing disadvantaged students with access to the hardware and software that most but not all Australian students have at home. That is, the question will continue to be how schools, universities, TAFEs and other VET providers are funded to address this technology gap.

If however OpenAI and other technology companies offering generative AI look to monetise the technology (as OpenAI has started to do with a $20 per month pilot subscription plan offering quicker response times, more features, etc) – then generative AI will serve to widen the technology gap between students experiencing disadvantage and their peers. Only students from more financially secure households will be able to afford the premium versions of these tools, putting them at a further advantage over other students.

The advent of generative AI may not be all bad though for students from disadvantaged backgrounds. Assessment experts suggest that the use of generative AI to give assessment feedback (particularly formative assessment) to students in higher education may assist learners from disadvantaged backgrounds, by removing the power imbalance many feel in asking for feedback from their tutor or lecturer – and instead allowing them to access more feedback to help them improve their work by lowering the stakes and reducing potential anxiety.[28]

TERMS OF REFERENCE 5: INTERNATIONAL AND DOMESTIC PRACTICES AND POLICIES IN RESPONSE TO THE INCREASED USE OF GENERATIVE AI TOOLS IN EDUCATION, INCLUDING EXAMPLES OF BEST PRACTICE IMPLEMENTATION, INDEPENDENT EVALUATION OF OUTCOMES, AND LESSONS APPLICABLE TO THE AUSTRALIAN CONTEXT

This inquiry, called by the Minister for Education, through the House Standing Committee on Employment, Education and Training is welcomed. So too is the Discussion Paper released by the Minister for Industry and Science on *Safe and Responsible AI in Australia*.[29] They do however come a number of months/years after similar initiatives were launched in other countries. For example:

- In November 2019 the government of Singapore released its *National Artificial Intelligence Strategy* which included a specific focus on education[30] (see Section B below for details).
- In October 2022 the European Commission released *'Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators'*.[31] The guidelines sit within the EU's broader '*Digital Education Action Plan 2021-2027*'.[32]

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[27] Graham, A. & Sahlberg, P (2020) Schools are moving online but not all children start out digitally equal *UNSW Newsroom* https://newsroom.unsw.edu.au/news/social-affairs/schools-are-moving-online-not-all-children-start-out-digitally-equal

[28] Ellis, E (2022) The potential of artificial intelligence in assessment feedback, *Times Higher Educatio*n, https://www.timeshighereducation.com/campus/potential-artificial-intelligence-assessment-feedback

[29] Australian Government Department of Industry, Science and Resources (2023) *Supporting responsible AI: discussion paper* https://consult.industry.gov.au/supporting-responsible-ai

[30] Government of Singapore (2019) *National Artificial Intelligence Strategy* https://www.smartnation.gov.sg/media-hub/press-releases/national-artificial-intelligence-strategy-unveiled

[31] European Commission, Directorate-General for Education, Youth, Sport and Culture (2022) *Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators* https://data.europa.eu/doi/10.2766/153756

[32] European Commission, Directorate Generale for Education, Youth, Sport and Culture (2021) *Digital Education Action Plan (2021 – 2027)* https://education.ec.europa.eu/focus-topics/digital-education/action-plan

- In March 2023 the UK Government's Department for Education released a Departmental Statement on '*Generative artificial intelligence in education*'.[33]
- In March 2023, the OECD's Director of Education, Andreas Schleicher, gave a speech to the UK's Higher Education Policy Institute asking "Is higher education fit for the future?" which puts the debates over AI in a broader policy context.[34]
- In April 2023 the Council of Europe followed up the European Commission's work with a discussion on '*Artificial Intelligence and Academic Integrity*'.[35]
- In May 2023 the US Government's Office of Educational Technology released a report on '*Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations*'.[36]
- In June 2023 the UK government followed up on its Departmental Statement with a "call for evidence" on Generative AI to better understand the opportunities and concerns of educators and experts.[37]
- In June 2023 it was indicated that ASEAN member countries were drafting "governance and ethics guidelines for AI.[38]
- In July 2023, the UK's Russell Group of universities (similar to Australia's Group of Eight research intensive universities) issued a new set of principles on the use of AI in education.[39]

If Australia is to keep pace with the discussions, advances and challenges of AI in education then governments and educators need to ensure that the report from this inquiry does not sit on the shelf and instead ensure that there are ongoing, evidence-based discussions and activities underway within the Australian schools, VET and higher education sectors on the impact of generative AI.

TERMS OF REFERENCE 6: RECOMMENDATIONS TO MANAGE THE RISKS, SEIZE THE OPPORTUNITIES, AND GUIDE THE POTENTIAL DEVELOPMENT OF GENERATIVE AI TOOLS INCLUDING IN THE AREA OF STANDARDS.

It is too early in the evolution of generative AI to provide conclusive advice on either how best to seize the opportunities or on how to manage the risks. Australia's education systems need to accept that their current assessment practices, whereby they judge student performance on the basis of written assessment pieces, have to change - with more authentic assessment practices a must.

If, as seems likely (albeit not certain) generative AI continues to be mainstreamed into a variety of technology products and systems – then educators will need to find ways to include it in their teaching and assessment practices – but only after they have agreed on what it is that they are actually wanting/needing to teach students and how they will measure their learning in an era of generative AI.

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[33] UK Department for Education (2023) *Generative artificial intelligence in education: Departmental statement* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1146540/Generative_artificial_intelligence_in_education_.pdf

[34] Schleicher, A (2023) Is higher education fit for the future? *2023 HEPI Annual Lecture* https://www.hepi.ac.uk/2023/03/07/2023-hepi-annual-lecture-by-andreas-schleicher-director-of-the-oecd/

[35] European Council (2023) *EduTalks@Council of Europe – Artificial Intelligence and Academic Integrity* https://rm.coe.int/agenda-of-the-edutalks-council-of-europe-artificial-intelligence-and-a/1680aae5c8

[36] Cardona, M. A., Rodriguez, R. J. & Ishmael, K (2023) *Artificial Intelligence and the Future of Teaching and Learning, Office of Educational Technology* https://www2.ed.gov/documents/ai-report/ai-report.pdf

[37] UK Department for Education (2023) *Generative artificial intelligence in education: call for evidence* https://consult.education.gov.uk/digital-strategy/generative-artificial-intelligence-in-education/

[38] Potkin, F & Wongcha-um, P (2023) Exclusive: Southeast Asia to set 'guardrails' on AI with new governance code, *Reuters* https://www.reuters.com/technology/southeast-asia-set-guardrails-ai-with-new-governance-code-sources-2023-06-16/

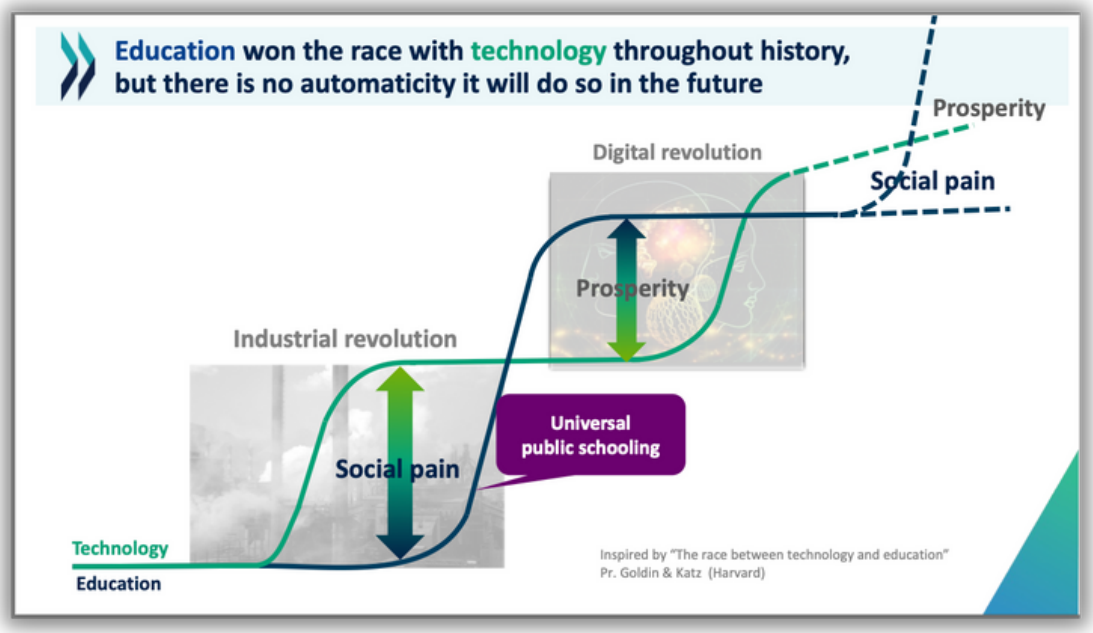
[39] Russell Group (2023) *New principles on use of AI in education* https://russellgroup.ac.uk/news/new-principles-on-use-of-ai-in-education/

In the same way that students still need to understand basic mathematics but are no longer expected, after a certain age, to answer all mathematical problems without the use of calculators or spreadsheets; we are now facing an inflection point in relation to what written assessment tasks demonstrate in terms of student learning. Of course, students need written literacy skills – but in the same way that education systems moved beyond paper and pencil and now accept the use of autocorrect in Microsoft Word and tools like Grammarly – educators now need to prepare students for a world in which the way 'knowledge' work is done is going through a period of rapid transformation and students will need different skills to succeed in that new world.

After all "if we… provide a test that the machine can answer, then what is the point of doing that test?"[40]

While it is too early to predict how this transformation of work, teaching and learning will progress in the era of generative AI – Australia needs to confront it by engaging with overseas counterparts. We have expertise to share but we also have much to learn from other governments and institutions.

As the OECD's Andreas Schleicher pointed out in his speech earlier this year, over the course of our history, education has won the race with technology – but there is no guarantee it will do so this time. The responsibility on all of us involved in education is to ensure that the 'social pain' curve bends downwards and the prosperity curve continues to rise – for all citizens as we embrace this era of generative AI.[41]



Schleicher, A (2023) HEPI Annual Lecture

[40] McIntyre, C (2023) Opening keynote address *EdTechX Europe 2023* https://impactx2050.com/edtechx/home
[41] Schleicher, A (2023) Is higher education fit for the future? *2023 HEPI Annual Lecture* https://www.hepi.ac.uk/2023/03/07/2023-hepi-annual-lecture-by-andreas-schleicher-director-of-the-oecd/

ADDITIONAL ISSUES FOR THE COMMITTEE TO CONSIDER -

A. GENERATIVE AI: CHANGING *WHAT* IS TAUGHT

While the Committee is right to be asking questions about the immediate impact of generative AI on how educators teach and assess – there is a much bigger challenge looming for VET and higher education providers. Not only do tertiary educators need to make changes to how they teach and assess in the era of generative AI – they also need to confront the challenge of what to teach – as generative AI fundamentally disrupts the work that knowledge/white-collar workers do, that coders and software engineers do, and that workers in the creative arts do.

In time it is likely that generative AI will also impact other industries and occupations, eg healthcare. But for now, in just a matter of months, generative AI has already transformed how work is done in a wide range of occupations.

A recent report from McKinsey[42] makes four important points which are critical for VET and higher education providers:

> "*Generative AI has the potential to change the anatomy of work, augmenting the capabilities of individual workers by automating some of their individual activities. Current generative AI and other technologies have the potential to automate work activities that absorb 60 to 70 percent of employees' time today.*
>
> *The pace of workforce transformation is likely to accelerate, given increases in the potential for technical automation.*
>
> *Generative AI can substantially increase labor productivity across the economy, but that will require investments to support workers as they shift work activities or change jobs.*
>
> *The era of generative AI is just beginning. Excitement over this technology is palpable, and early pilots are compelling. But a full realization of the technology's benefits will take time, and leaders in business and society still have considerable challenges to address. These include managing the risks inherent in generative AI,* ***determining what new skills and capabilities the workforce will need, and rethinking core business processes such as retraining and developing new skills.***" (emphasis added)

McKinsey's analysis means that along with the work underway to adapt teaching and learning practices in response to generative AI, Australian governments and tertiary education providers also need to start work on identifying how our VET and higher education systems and processes need to change to:

1. determine what new skills workers need in response to the growing use of AI in workplaces, and
2. rethink current curriculum and qualification development processes – especially in VET.

At last month's *EdTechX Europe 2023* conference representatives from Learning Technologies Group (LTG), a non-accredited training provider listed on the London Stock Exchange's Alternative Investment Market with a 20 year history and currently operating in 35 countries delivering training to medium and large corporates, spelt out how rapid the pace of change currently is in the work people are doing, "with the advent of AI you're now looking at corporate competitiveness and government efficiencies, all of those sorts of things, it's actually going to be how you keep the people up with the technology. And of course you've got to use technology in the process of doing that…"

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[42] McKinsey (2023) *The economic potential of generative AI: The next productivity frontier* https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier

This is a company that is helping upskill Microsoft's own staff on Microsoft's new tools and innovations as they are releasing them to the market… LTG correctly identify, from their own experiences, that education and training providers not only need to help people keep up with technology but educational institutions also need to be using it themselves in the training they offer.

This is the post-school education landscape we now find ourselves in and to date there has been little debate about the importance of being more dynamic in course creation for universities and VET providers in relation to business courses, IT courses and the creative industries (where other forms of generative AI are having a profound impact on how people create images, videos, music, etc).

THE AUSTRALIAN CONTEXT

I raised the issue of generative AI changing what educators teach (and the challenges for the VET sector in particular because of its reliance on national Training Packages) earlier in the year in a webinar for TAFE Directors Australia[43] and in a subsequent Opinion Piece in the Australian Financial Review.[44]

The TAFE sector's leadership understands the implications of generative AI and argues that the VET sector needs a new approach to the development of VET qualifications (allowing TAFE Institutes and other trusted providers to self-accredit their own courses in some occupations).[45]

Another approach is outlined in a submission to the Productivity Commission's 5-year Productivity Inquiry.[46] It argues that while Australia is now "a post-industrial, service orientated, globally integrated economy, however it has a national training system structured for an industrial economy." While the submission was written before the advent of ChatGPT (and focuses more broadly on digital skills) the author, who works in one of the Jobs and Skills Councils (but made their submission on their own behalf) identifies the challenges the VET system faces in meeting the "dynamic, fast moving skills needs of the economy" and that "the increase in non-accredited informal training reflects the current settings" of the VET system. They go on to suggest a new 'skills based' approach with more flexibility than the current qualification model used in VET.

Some individual TAFE Institutes and independent VET and higher education providers are also engaging with the issues (in the form of presentations they have requested from me for their senior executives). I have also been engaged in recent discussions with representatives from Melbourne University's Melbourne Business School and Sydney University's Sydney Business School on these issues and how universities are responding.[47] With universities having self-accrediting powers to update their courses as they need to, it is much easier for them to modify and adapt what they teach. A shift which is already underway within the higher education sector to offer more short courses and microcredentials, also allows for more tailored responses to industry upskilling needs. Nonetheless it will still prove challenging for universities to adapt their course content quickly enough to keep pace with the rate of change being brought by generative AI.

In the VET sector a growing number of key stakeholders have recognised the importance of addressing the issue of generative AI in terms of both how and what is taught in VET. With no advice yet being provided by ASQA or the

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[43] Field, C (2023) The future of learning: ChatGPT, EdTech and the impact on academic integrity, *TAFETalks webinar for TAFE Directors Australia* https://tda.edu.au/tafetalks-the-future-of-learning-chatgpt-edtech-and-the-impact-on-academic-integrity/

[44] Field, C (2023) Old fashioned training under threat from AI, *Australian Financial Review* https://www.afr.com/work-and-careers/education/old-fashioned-training-under-threat-from-ai-20230209-p5cj9j

[45] Dodd, J (2023) TAFEs must be able to self-accredit to avoid redundant qualifications: *Comment by CEO Jenny Dodd* https://tda.edu.au/newsletters/tafes-must-be-able-to-self-accredit-to-avoid-redundant-qualifications-comment-by-ceo-jenny-dodd/

[46] Jackson, R (2022) *Skills for an Economy that is Digitalised: Submission to the Productivity Commission 5-year Productivity Inquiry* https://www.pc.gov.au/__data/assets/pdf_file/0005/348071/sub171-productivity.pdf

[47] Field, C (2023) Claire Field farewells CMM with calls on three big issues, *Campus Morning Mail* https://campusmorningmail.com.au/news/claire-field-farewells-cmm-with-calls-on-three-big-issues/

relevant Jobs and Skills Councils, the following organisations have invited myself and others to speak about AI in VET:

- **Australasian Vocational Education and Training Research Association** – included a keynote address on '*Disruptive Technologies, Industry 4.0 and their Impact on the Australian Skills and Training System*' at their annual conference[48]
- **Independent Tertiary Education Council of Australia** – included a session on '*AI Risks and opportunities for tertiary education providers*' at their annual conference[49]
- **The Teachers Guild of NSW** – I was invited to give a keynote address on AI and its impact on VET at their recent statewide VET in Schools Forum[50]
- **Victorian TAFE Association** – will host a panel discussion on '*AI: new models for learning and cheating*' (ie changes to *how* VET is taught and assessed) and I have been invited to participate in a subsequent panel discussion on '*Disruption and future skills*' (ie changes to *what* VET teaches) at their upcoming annual conference[51]
- **National Centre for Vocational Education Research** – are including a concurrent session on '*Artificial intelligence ChatGPT in VET education*' at their upcoming 'No Frills' annual conference[52]
- **National Apprentice Employment Network** – I have been invited to facilitate a panel discussion on "*It's Time to ChatGPT and AI*" at their annual conference[53]
- **VET Development Centre (VDC)** – I have been asked to run a PD webinar for VET professionals on '*AI – Changing VET Delivery and Assessment*'[54]
- **Community Colleges Australia** – I have been invited to give a keynote address on AI in VET at their annual conference.[55]

There are reforms currently underway to VET qualifications, with the Minister for Skills and Training noting that "Australia's qualifications system has been largely unchanged since the 1990s and is no longer fit for purpose".[56] While these reforms are welcomed – the Department of Employment and Workplace Relations advice is that the newly established Qualifications Reform Design Group "will be the first step of **a multi-year program of work** to deliver on the Skills Ministers' reform ambition..." (emphasis added).[57] Therefore while it is possible that the changes being considered to create more flexibility in VET qualifications, could allow VET providers to ensure what they offer is current in an era of generative AI, there is a question as to whether the pace of change being envisioned will be quick enough?

The Business Services Training Package (which is the repository of all current business qualifications offered in the VET sector) was last updated in January 2022 – ie 10 months before ChatGPT was launched. Since then there have been no updates to the qualifications in the Training Package meaning students undertaking business courses in the Australian VET sector are being taught out-of-date skills which are no longer relevant in a growing number of Australian workplaces. The same is true for students learning coding and software engineering in VET - with the

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[48] AVETRA (2023) *AVETRA 2023 Conference Program* https://az659834.vo.msecnd.net/eventsairaueprod/production-dg-public/9c410636c9fd45198af873c549fd4e05

[49] ITECA (2023) *ITEC23 Conference* https://www.iteca.edu.au/itec23/social-events.aspx

[50] The Teachers Guild of NSW (2023) *VET in Schools Forum program* https://www.teachersguild.nsw.edu.au/public/193/system/eventAttachments/VET%20in%20Schools%20Forum%20PROGRAM%20-%20Monday%2026%20June%202023v2.pdf

[51] Victorian TAFE Association (2023) *TAFE Creates: Day 3 Program* https://www.tafecreates.com.au/conference-days/day-3

[52] NCVER (2023) *National VET Research Conference (No Frills) Program* https://www.ncver.edu.au/news-and-events/events/32nd-national-vet-research-conference-no-frills/2023-national-vet-research-conference-no-frills-program

[53] NAEN (2023) *NAEN National Conference 2023 program* https://az659834.vo.msecnd.net/eventsairseasiaprod/production-conlog-public/8be3cd00748d4d19aa61e0dc6b0bc1b0

[54] VDC (2023) *Webinar: AI – Changing VET Delivery and Assessment – Claire Field* https://vdc.edu.au/professional-learning/?eventtemplate=574-webinar-ai

[55] Community Colleges Australia have asked me to present at their upcoming annual conference on the topic of "*AI's impact on the day to day and the big picture business of VET*". The program is still being finalised https://cca.edu.au/what-we-do/2023-cca-annual-conference/#About

[56] O'Connor, B (2022) *Simplifying VET qualifications* https://ministers.dewr.gov.au/oconnor/simplifying-vet-qualifications

[57] Australian Government Department of Employment and Workplace Relations (2023) *VET Qualification Reform* https://www.dewr.gov.au/skills-reform/vet-qualification-reform

ICT Training Package last updated in June 2022 (once again before the release of Chat GPT) and the Creative Arts and Culture Training Package last updated in October 2022.

Speaking at the *EdTechX Europe 2023* conference, Gerald Jaideep the CEO of Medvarsity, India's largest healthcare EdTech organisation which offers more than 200 healthcare courses to students in more than 70 countries, spoke about how Medvarsity is using AI in course creation:

> "*... we realised that we have to build new roles while we are using technology tools like ChatGPT and others… we have to bring in more technical language model people to frame the tool on our end. That was a requirement we never had before. We have 30,000 hours of content, which now becomes a training source, but we also required more medical doctors to come to do more clinical reviews because (of our introduction of ChatGPT)… As a nonclinical person, if I read (what ChatGPT has created) it sounds very intelligent because it's using all these Latin and big words but how do I know it's real? And that's a competency that we had to consciously invest in.*"[58]

He went on to add that: "the bigger challenge is not knowing the competency that we need to develop as you look at the next six months or the next year..."

The World Economic Forum use the term "the era of automation" to describe the current business/economic environment.[59] As Australian businesses and workers try to navigate this era – they are entitled to ask if our VET and higher education systems can remain current in the skills they teach? If not, surely more businesses will use companies like LTG for their training needs?

WHICH JOBS ARE CHANGING?

Researchers at OpenAI, the University of Pennsylvania and OpenResearch have already started to publish on the potential impact of ChatGPT on different jobs. In doing so they use a variety of models – human and machine – to identify the occupations at greatest risk of being disrupted or displaced by LLMs.[60]

The displacement impact of LLMs and other forms of generative AI looms as a significant issue for affected individuals, governments who will need to provide support for those facing unemployment, and for education systems (which will need to offer re-training). The larger problem however, in terms of the number of people affected, is likely to be the 'disruption' generative AI causes to the work people do.

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[58] Jaideep, G (2023) Panel session, *EdTechX Europe 2023* https://impactx2050.com/edtechx/home
[59] Jesuthasan, R (2023) Here's how companies should navigate generative AI in the world of work, *World Economic Forum* https://www.weforum.org/agenda/2023/04/how-companies-should-navigate-generative-ai-in-future-of-work/
[60] Eloundou, T., Manning, S., Mishkin, P. & Rock, D (2023) *GPTs are GPTs: An Early Look at the Labor Impact Potential of Large Language Models: Working Paper* https://arxiv.org/pdf/2303.10130.pdf

Group	Occupations with highest exposure	% Exposure
Human α	Interpreters and Translators	76.5
	Survey Researchers	75.0
	Poets, Lyricists and Creative Writers	68.8
	Animal Scientists	66.7
	Public Relations Specialists	66.7
Human β	Survey Researchers	84.4
	Writers and Authors	82.5
	Interpreters and Translators	82.4
	Public Relations Specialists	80.6
	Animal Scientists	77.8
Human ζ	Mathematicians	100.0
	Tax Preparers	100.0
	Financial Quantitative Analysts	100.0
	Writers and Authors	100.0
	Web and Digital Interface Designers	100.0
	Humans labeled 15 occupations as "fully exposed."	
Model α	Mathematicians	100.0
	Correspondence Clerks	95.2
	Blockchain Engineers	94.1
	Court Reporters and Simultaneous Captioners	92.9
	Proofreaders and Copy Markers	90.9
Model β	Mathematicians	100.0
	Blockchain Engineers	97.1
	Court Reporters and Simultaneous Captioners	96.4
	Proofreaders and Copy Markers	95.5
	Correspondence Clerks	95.2
Model ζ	Accountants and Auditors	100.0
	News Analysts, Reporters, and Journalists	100.0
	Legal Secretaries and Administrative Assistants	100.0
	Clinical Data Managers	100.0
	Climate Change Policy Analysts	100.0
	The model labeled 86 occupations as "fully exposed."	
Highest variance	Search Marketing Strategists	14.5
	Graphic Designers	13.4
	Investment Fund Managers	13.0
	Financial Managers	13.0
	Insurance Appraisers, Auto Damage	12.6

Table 4: Occupations with the highest exposure according to each measurement. The final row lists the occupations with the highest σ^2 value, indicating that they had the most variability in exposure scores. Exposure percentages indicate the share of an occupation's task that are exposed to GPTs (α) or GPT-powered software (β and ζ), where exposure is defined as driving a reduction in time it takes to complete the task by at least 50% (see exposure rubric A.1). As such, occupations listed in this table are those where we estimate that GPTs and GPT-powered software are able to save workers a significant amount of time completing a large share of their tasks, but it does not necessarily suggest that their tasks can be fully automated by these technologies.

Eloundou, T., Manning, S., Mishkin, P. & Rock, D (2023) GPTs are GPTs: An Early Look at the Labor Impact Potential of Large Language Models: Working Paper

In addition to the work of academic researchers calculating how work is being disrupted by generative AI, there have also been a flurry of media reports of how businesses are changing their operations and therefore the work their employees do since the launch of ChatGPT and other forms of generative AI. Jobs which are being changed by the use of generative AI include:

- **Actors and screenwriters** – the labour strike which is currently underway in Hollywood is driven in part by workers' concerns about the impact of generative AI on their jobs.[61]
- **Architects, lawyers and tech sector workers** - in January the ABC had already found examples of Australian businesses using generative AI tools. The journalist who wrote the article noted that "many (of the employers) who spoke with the ABC say that within a few years - by the time today's students graduate - these new tools

[61] Stevens, M (2023) What to Know About the Actors' Strike? *New York Times* https://www.nytimes.com/article/actors-strike-why.html

will be essential parts of the white-collar workplace…"[62]

- **Healthcare, education, call centres, agriculture workers** and **defence personnel** - The Guardian spoke to experts on how AI, including LLMs, is changing work across a range of fields, with one quoted as saying the changes in how work is being done are so profound "Why would we employ people?"[63]
- **Journalists**: international titles like Rolling Stone[64] and Buzzfeed[65] have both said they will start using Chat GPT, and at the same time Buzzfeed announced they would be laying off 12 per cent of their workforce. Just this month a regional Australian newspaper started publishing articles 'written' by ChatGPT.[66]
- **Lawyers and paralegals**: one of the UK's largest law firms, Allen&Overy, announced it had been trialling a chatbot developed specifically for legal work, Harvey, and after more than 40,000 queries of the chatbot by 3,500 of the firm's lawyers they were integrating it into their work practices. They noted that Harvey can "automate and enhance various aspects of legal work, such as contract analysis, due diligence, litigation and regulatory compliance… (although) the output (still) needs careful review by an A&O lawyer".[67]
- **Marketing**: WPP which is reported to be the world's largest marketing services company is reported in The Guardian to be winning clients "hungry to embrace the potential of a new technology". The CEO went on to say that he did not see the use of AI resulting in "swathes of redundancies" but "as a tool in a marketer's kit, used to make workflows more efficient".[68]
- **Marketing interns**: Codeword, a US-based tech-marketing agency, has recently 'hired' two AI interns (software models) developed using ChatGPT and generative AI image generator Dall-E 2 to "work on graphic designs, do research and generate editorial content."[69]
- **Paralegals, coders, customer-service agents, digital marketers**: a recent article in The Atlantic noted that "no technology in modern memory has caused mass job loss among highly educated workers." It goes on to ask "will generative AI be an exception?" and finds examples of significant changes to job roles in a range of white-collar work.[70]
- **Tech sector workers**: IBM reported that they are planning to no longer hire thousands of future workers "for jobs AI can do". Their estimate is that about 30% of their 26,000 "non-customer facing" roles could be replaced by AI in the next five years – equivalent to 7,800 workers.[71]
- **Video game illustrators**: reports from China indicate that AI is already taking video game illustrators jobs. The journalist speaks to a number of illustrators, including one who explains that "AI is developing at a speed way beyond our imagination. Two people could potentially do the work that used to be done by 10."[72]

Further underlining the need for both higher education and VET providers to be urgently rethinking course content for their business, management and IT courses to incorporate examples of the business use of generative AI – is the news this month that leading tech companies including Amazon, Salesforce and Oracle amongst others are

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[62] Purtill, J (2023) How ChatGPT and other new AI tools are being used by lawyers, architects and coders, *ABC* https://www.abc.net.au/news/science/2023-01-25/chatgpt-midjourney-generative-ai-and-future-of-work/101882580
[63] Kelly, P (2023) 'Why would we employ people? Experts on five ways AI will change work, *The Guardian* https://www.theguardian.com/global-development/2023/may/12/why-would-we-employ-people-experts-on-five-ways-ai-will-change-work
[64] Gray, G (2023) Start it up: Rolling Stone to trial AI-generated articles, *The Australian* https://www.theaustralian.com.au/business/media/start-it-up-rolling-stone-to-trial-aigenerated-articles/news-story/70218626a7de73571ab89b9c8bbc5893
[65] Westfall, C (2023) BuzzFeed to use ChatGPT's AI for Content Creation, Stock Up 200%+, *Forbes* https://www.forbes.com/sites/chriswestfall/2023/01/26/buzzfeed-to-use-chatgpts-ai-for-content-creation-stock-up-200/?sh=d938817eaec4
[66] Miles, D (2023) ChatGPT writes for South Gippsland newspaper Sentinel-Times, MEAA raises ethics concerns, *ABC* https://www.abc.net.au/news/2023-06-29/artificial-intelligence-chatgpt-journalism-sentinel-times/101761856
[67] Wakeling, D (2023) *A&O announces exclusive launch partnership with Harvey* https://www.allenovery.com/en-gb/global/news-and-insights/news/ao-announces-exclusive-launch-partnership-with-harvey
[68] Sweney, M (2023) 'It's fundamental': WPP chief on how AI has revolutionised advertising, *The Guardian* https://www.theguardian.com/technology/2023/feb/23/ai-artificial-intelligence-wpp-global-advertising-revolution-technology
[69] Hawkins, E (2023) Marketing agency enlists AI "interns", *Axios* https://www.axios.com/2023/01/11/marketing-ai-interns
[70] Lowery, A (2023) How ChatGPT Will Destabilize White-Collar Work, *The Atlantic* https://www.theatlantic.com/ideas/archive/2023/01/chatgpt-ai-economy-automation-jobs/672767
[71] Reimann, N (2023) IBM will stop hiring humans for jobs AI can do, report says, *Forbes* https://www.forbes.com/sites/nicholasreimann/2023/05/01/ibm-will-stop-hiring-humans-for-jobs-ai-can-do-report-says/
[72] Zhou, V (2023) AI is already taking video game illustrators' jobs in China, *Rest of World* https://restofworld.org/2023/ai-image-china-video-game-layoffs/

rolling out “AI-related products to help workplaces become more efficient and productive”.[73] The roll out comes off the back of significant employer demand for generative AI tools to help their workers while wanting to keep their business information private.

ADDITIONAL ISSUES FOR THE COMMITTEE TO CONSIDER -

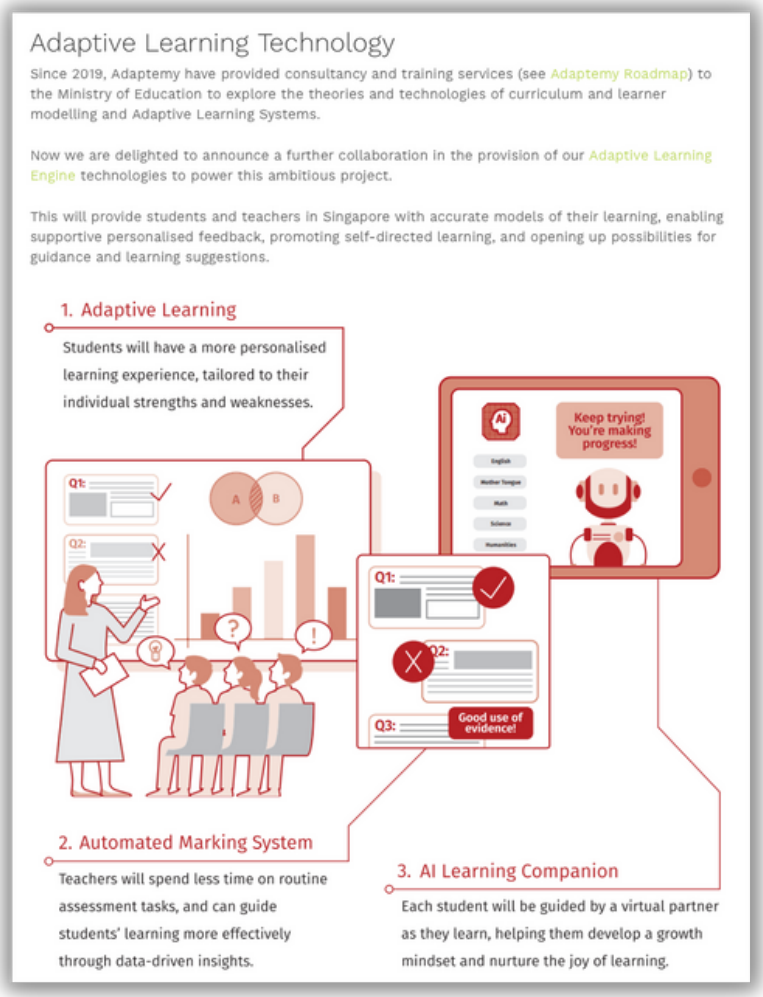
B. AI: DRIVING IMPROVEMENTS IN STUDENT LEARNING THROUGH PERSONALISATION

The Singapore government was prescient in the launch of their *National AI Strategy* in 2019 by including a pilot focussed on “Personalised Education Through Adaptive Learning and Assessment”.

The pilot was based on leveraging the Singapore Student Learning Space (SLS) platform which was introduced in 2018 as an online learning platform for all students and teachers in Singapore. The AI pilot saw the SLS enhanced by the introduction of an AI-enabled Adaptive Learning System which uses machine learning to understand how each student responds to learning materials and activities, and which recommends a “step-by-step pathway customised for each learner.” The educational benefits are significant, and “teachers (are) able to assess students’ work more efficiently and effectively with an AI-enabled Automated Marking System”.[74]

Adaptemy (2023) Supporting adaptive learning in Singapore

[73] Lu, Y (2023) As Businesses Clamor for Workplace A.I., Tech Companies Rush to Provide It, *New York Times* https://www.nytimes.com/2023/07/05/technology/business-ai-technology.html
[74] Smart Nation Singapore (2019) *National Artificial Intelligence Strategy: Advancing Our Smart Nation Journey* https://www.smartnation.gov.sg/files/publications/national-ai-strategy.pdf



Adaptemy (2023) Supporting adaptive learning in Singapore

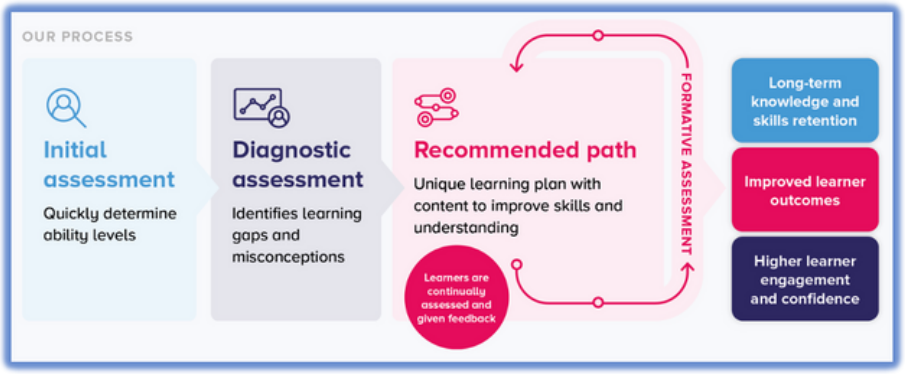
The pilot has been so successful in improving student educational outcomes and assisting teachers with their workload, that the Singapore government has now moved to a 10 year partnership with Irish EdTech provider, Adaptemy, to apply AI technologies into schools to personalise student learning "in the context of a teacher-led classroom."[75] The National University of Singapore is also involved in the project – providing ongoing research and analysis of the educational benefits of an AI-driven personalised learning approach.

I first learned about AI, in the form of personalised/adaptive learning, being used to improve student learning in 2019. Speaking at the *EdTechX Europe 2019* conference, representatives of the UK's Century-Tech explained their partnership with University College London and Imperial College London to develop a platform that uses learning science, artificial intelligence and neuroscience, to create constantly adapting learning pathways for students and powerful assessment data for teachers.[76] Their results are impressive:

- 30% improvement in student learning
- learners from disadvantaged backgrounds learning at the same pace as other learners
- reduction in teacher workload of 6 hours per week, and
- real-time analytics for teachers and administrators.

The following infographic from their website[77] provides a simple diagrammatic representation of how they use personalised learning to improve students' learning outcomes:

[75] Adaptemy (2023) *Supporting adaptive learning in Singapore* https://www.adaptemy.com/supporting-adaptive-learning-in-singapore/
[76] Team EdTechX (2019) *Global Startup Super League – 27 Innovators Transforming Future of Learning & Work* https://medium.com/edtechx360/https-medium-com-edtechxglobal-global-start-up-super-league-2019-70d2fc7f0df3
[77] 1] Century Tech (2023) *Century: Online Learning, English, Maths and Science* https://www.century.tech



Century-Tech (2023) Our process

Representatives from Sweden's Sana Labs spoke at the EdTechX Europe 2019 conference and at the HolonIQ 2019 Sydney Future of Education and Work Summit, about the educational benefits that they were achieving with AI in the form of big data and machine learning. Amongst the examples they shared was that of a global education company involved in upskilling workers in the finance industry who had used Sana Labs' personalised learning technology to improve their courses. The result was:

- 1.8x increase in student proficiency (ie students learned more)
- 19% increase in student retention rates, and
- 91% accurate predictions of future performance of learners.[78]

During the COVID-19 pandemic Sana Labs partnered with the New York Academy of Sciences and Mount Sinai Health System to use their AI-driven personalised learning approach to help upskill nurses who were returning to the health care system during the pandemic. Using curriculum from the American Association of Clinical Care Nurses and Mount Sinai, Sana's team created a 16 hour course to ensure all nurses returning to hospitals were appropriately refreshed in their nursing skills and ready to step onto hospital wards.[79] Although all learners undertaking the course were already trained nurses, they had all had different experiences since leaving the health care sector and been out of nursing for different lengths of time. Sana's personalised learning approach meant that the hospitals could be confident all returning nurses had the requisite skills to step back into frontline nursing roles. Sana's pro bono *Project Florence* ended up training 80,000 healthcare workers across 2,000 hospitals in 70 countries.[80]

It is not just in the developed economies that AI-backed personalised learning is making a difference. UNICEF has established a Learning Innovation Hub which focusses on improving K-12 education globally using tested EdTech solutions. The Hub is a start-up within UNICEF's Office of Innovation, with a mandate to re-imagine the future of learning and how technology can play a role in transforming education.[81]

Angeles Cortesi, Head of Global Learning in the Innovation Hub, addressed the *2023 EdTechX Europe* conference and explained that UNICEF is looking to "identify the game-changing EdTech tools, digital learning tools, that can really work in multiple countries and with millions of children."[82] The Learning Hub focusses on improving educational outcomes for learners by helping identify proven EdTech that delivers real educational improvements by investing in pilots to test the efficacy of the EdTech, generating evidence, and working closely with governments to share information on what works.

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[78] HolonIQ (2019) *Future of Education and Workforce Summit* https://web.archive.org/web/20220707143313/https://www.holoniq.com/summit/sydney/
[79] Torda, R (2020) Empowering New York's Nurse Heroes to Handle the Worst of the Pandemic, *New York Academy of Sciences* https://www.nyas.org/news-articles/academy-news/empowering-new-york-s-nurse-heroes-to-handle-the-worst-of-the-pandemic/
[80] Forbes (2021) Forbes 30 under 30 - Joel Hellermark: Founder, Sana Labs, *Forbes* https://www.forbes.com/profile/joel-hellermark/
[81] UNICEF (2023) *Co-creating inclusive, quality learning innovations: UNICEF and Finnish National Agency for Education (EDUFI) deepen collaboration on innovation in education* https://www.unicef.org/innovation/learning-innovation-hub/edufi-finceed-collaboration
[82] Cortesi, A (2023) Panel presentation *EdTechX Europe 2023* https://impactx2050.com/edtechx/home

One of the recent EdTech platforms UNICEF has seen work well is Eduten, which is a spin off of Finland's University of Turku, and is an AI, gamified adaptive maths platform. It has been used by more than 1.4 million users since 2011 and was a winner in 2022 of UNICEF's Blue Unicorn Award. It has been independently proven to improve student learning using a personalised, adaptive learning approach.

Cortesi shared the results of a recent pilot in Mongolia which ran for just 12 weeks with a randomised, control group.[83] Eduten delivered a 22% improvement in the learning outcomes of children using the platform and 94% of the children involved said it had helped make it easier for them to learn mathematics.

These organisations (and others) are at the forefront of the integration of AI into the education process using personalisation and predictive analytics, combined with big data and machine learning, to track learner engagement and respond in real time – and in doing so improve the efficacy of student learning. Once again, when Australia looks overseas, there are a number of examples of other countries moving ahead in the introduction of personalised learning, with their students and teachers benefitting from the significant educational gains students are making and teachers seeing a concurrent reduction in their workloads.

It is my understanding that some OPMs in Australia (working predominantly with universities) are using personalised learning to underpin their offerings. Beyond that, personalised/adaptive learning is not widely understood or used in Australia.

It is beyond time that Australian governments and educators were thinking about and discussing personalised learning and trialling its introduction in Australian schools (with appropriate safeguards for data privacy, etc). Personalised learning should also be on the radar of Australian VET providers and universities as they look to improve their performance and to support their students and teachers.

RECOMMENDATIONS

1. Work on concluding the *Draft AI Framework for Schools* should be a priority for Education Ministers - and the Framework should focus on the impact of both generative AI and AI-driven personalised learning in schools.
2. ASQA should be asked to follow TEQSA's lead and start communicating with the VET sector on the issue of generative AI.
3. The VET sector's Qualifications Reform work needs to be progressed as a priority - with a specific focus on helping the VET sector keep the content of what it teaches current given the impact of generative AI on the world of work.
4. If the VET Qualifications Reform work cannot deliver the flexibility RTOs need to keep their course offerings current to meet the needs of business in this era of generative AI and automation, then new tri-partite models (for designing/approving VET courses) need to be considered in the business services, ICT and the creative arts industries.
5. The Jobs and Skills Councils for the business services, ICT and the creative arts industries (ie Future Skills Organisation and SkillsEQuipped) need to be asked to undertake a review of the assessment requirements in their Training Packages as a priority - with a focus on ensuring academic integrity in the VET sector.
6. TEQSA needs to be commended for the work it has done with Deakin University. It also needs to be asked to review its own course accreditation procedures to ensure they are sufficiently timely to accommodate the changes to courses which non-self-accrediting higher education providers will need to make in response to the continuing use of generative AI in different industries and the need to keep their course content current.

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[83] Eduten (2023) *Revolutionizing Education: The Eduten Platform Shows Massive Impact in Math Learning Results Across Mongolia* https://eduten.com/blog/eduten-platform-drives-impressive-learning-outcomes-in-a-12-week-pilot-in-mongolia.html