JOURNAL OF PROFESSIONAL LEARNING

YOUR CLASSROOM • YOUR STAFFROOM • YOUR FUTURE

THE NEW WAVE OF CHANGE: ARTIFICIAL INTELLIGENCE AND EDUCATION

LESLIE LOBLE AND KELLY STEPHENS

In a world of rapidly advancing Artificial Intelligence, Leslie Loble and Kelly Stephens provide teachers with a framework of questioning when making decisions on edtech to enhance teaching and learning…

In an era characterised by rapid technological advancements, particularly in the field of artificial intelligence (AI), we find ourselves at the brink of a 'fourth industrial revolution.' This revolution, fuelled by AI, is not just about the technology itself but about the profound impact it has on our daily lives – 'a fundamental change in the way we live, work and relate to one another.'(World Economic Forum, 2024)

What does this mean for education? As teachers we are always encountering change as we strive to support students to live and learn in the contemporary world. Inherently curious and questioning, teachers are frequently early experimenters with new ways of doing things, especially if they sense benefits for their students or their profession. At the same time, teachers and education leaders are highly developed critical thinkers, with an inclination always to test the 'why' before adopting the 'what'.

Nobody is better placed to navigate this new technological wave.

It is a little over a year since ChatGPT was released, creating excitement and alarm in equal measure. Oh wow, it can write a Shakespearean sonnet about a microwave, or help create a lesson plan. Oh dear, it can write to a rubric and generate a very passable essay. What does this mean for high-stakes assessment tasks? What does this mean for day-to-day teaching?

Before ChatGPT, the educational technology landscape was already being shaped by AI, with tools like adaptive learning platforms and predictive analytics available to support teaching and learning experiences. Only a year on, many applications have already incorporated generative AI into their platforms, and this number will doubtless grow. For example, the Microsoft suite offers the AI-enabled Copilot tool, Google now has Gemini and Khan Academy its Khanmigo chatbot.

Teachers are always looking for the best ways of supporting learning for the students in their classroom. NSW public school teachers are also always looking for ways to help lift the experiences, learning and outcomes for students experiencing disadvantage, and to tackle the enduring problem of educational inequity. There is strengthening evidence that good technological tools might be able to help us in this quest. To do so, however, they need to meet certain conditions. As outlined in the report *Shaping AI and edtech to tackle Australia's learning divide* (Loble and Hawcroft, 2022) , to create positive impact and avoid harm, edtech must be well designed, effectively used, and carefully managed.

There is more work for us to do as a society to ensure that these conditions are met – to make sure the edtech our students and teachers use are of high educational quality, ethical, safe and effective – without creating additional work for teachers and schools.

This article contributes to the conversation by suggesting five questions you might like to ask when considering using edtech in your teaching program. Spoiler alert: it's all about doing what you already do – teaching first, technology second. Used well, good edtech can, and should, enhance and amplify your professionalism and expertise. In education, it is imperative we keep the human in the lead.

FIVE KEY QUESTIONS TO CONSIDER

1.Which tool or resource should I choose?

We know that quality teaching tools and resources can make a difference in the classroom; teachers can, and do, invest significant time creating or find-

ing resources they believe will work best. Edtech, including generative AI, has only increased the range of resources available to choose among. For example, even five years ago, there were nearly 500,000 learning applications just on the Apple and Google app stores.(Holon IQ, 2019) Resource publishers, including edtech providers, frequently approach schools with the intent of selling their products, often with a significant, ongoing price tag.

In making any choice:

- Start with your whole-school strategy. We know that cohesive effort across a school community drives results. What are the key priorities in your school plan? Is there a useful app on the NSW Department of Education's approved list?
- Think about the curriculum and your pedagogy. We know that teachers have the greatest in-school impact on student outcomes. Does the tool align with, and support, quality teaching practice in your subject/s? A good edtech application should amplify teacher expertise and professionalism, not diminish it. For example, the right tool might help you carve out time to work with individuals or groups of students with differing needs, by providing an adaptive platform for others to use during that time.
- Ask about the evidence base. Is it easy to find out what research informed the development of the tool? Was it informed by how students learn? Is there any research showing how well it has worked, in what circumstances and for whom?
- Other markers of a quality tool include accessibility, and the security, privacy and ethical use of teacher and student data. There is more about accessibility and inclusion below, as well as about schools' and teachers' responsibilities regarding student data. Beyond this, it is worth asking, what type of student data a tool captures? (for example, does it include keystroke data and other monitoring of student behaviour?), who owns the data, and how it might be used?

It is often difficult to find the answers to these questions, and even when it is possible, it can take up precious time. There are some organisations that seek to make this process easier for teachers. Closest to home is the Department's Online Learning Tools Catalogue. Tools listed here have been through an assessment process and integrated with the Department's single sign on. Further afield, other organisations that review materials include EdReports,[1] Edtech Impact,[2] or Digital Promise.[3]

2. (How) Does this app help me understand more about my students' learning?

Technology-based learning applications typically offer the ability to tailor student learning through adaptable lessons, activities, and assessments. For example, one tool offers possible lessons and activities around three broad levels – 'core, deeper learning, or challenging' – to allow teachers to scaffold and differentiate their instructional strategies based on student and class capabilities. Another tool gives students the option to select 'something easier,' or 'something harder'; others use adaptive 'branching' to meet a student's ability level and then move onto a greater challenge.

Most technology-based tools also now incorporate data dashboards for teachers, with displays that provide quick, easily accessed insights to student understanding and progress. Some tools also offer data on learning 'flow' or engagement. These data can be at quite granular levels (for example, by student, task, skill, curriculum unit and so forth) giving detailed, useful feedback to support a teacher's plan and approach. Where a learning application also allows students to see their own data, it may help develop metacognitive skills (which are aligned with positive learning behaviours and outcomes (OECD, 2012).

But not every tool will work equally well or match a teacher's classroom and students. The utility and impact of any tool rests strongly on how and when teachers decide to integrate it in their programming. Teachers deserve good information to understand the capabilities of the tool and its pedagogical design (as outlined above) and professional support to keep education technology use in proportion and firmly within their plan and control.

3. (How) does this application help me teach the

full range of students in my classroom?

The craft of teaching depends on meeting a student at their point of learning development and need. We know that any classroom will have students working at a span of levels, sometimes a very wide span. NAPLAN data tells us that by Year 9, the range can be as great as five years.[4] At the same time, approximately one in four students in NSW public schools are living (and studying) with disability. (ACARA, 2023) Eighty-six percent of these are studying in mainstream classes in mainstream schools. (NSW Department of Education, 2022) Meeting the needs of all these learners is key to improving the equity of learning outcomes for students in NSW and beyond.

Technology should have an inbuilt advantage in meeting the needs of diverse learners, due to the potential to adjust even simple settings, such as font size, or incorporate translational functions (e.g., text to speech, or speech to text). These inbuilt functions are worth looking for. In addition, many applications are web-based. The Web Content Accessibility Guidelines (WCAG) 2.2 cover a wide range of recommendations for making web content more accessible, including accommodations for blindness and low vision, deafness and hearing loss, limited movement, speech disabilities, photosensitivity, and combinations of these, and some accommodation for learning disabilities and cognitive limitations. These guidelines address accessibility of web content on desktops, laptops, tablets, and mobile devices.[5]

Adaptive learning systems are some of the best researched edtech applications and can help support students to develop mastery, including identifying and filling in learning gaps, and providing stretch learning opportunities.[6] Teachers are also exploring the use of generative AI to make it easier and less time-consuming for them to adapt resources so that all students can effectively access the curriculum. For example, generative AI can quickly and easily rewrite passages of text for students with different reading levels. Of course, it is critical that teachers check any output from a generative AI tool for accuracy and suitability, from the perspective of their professional expertise.

Accessibility and inclusion don't stop at technical adjustments and adaptability. Edtech – like all human creations – can be culturally insensitive or biased. An aspirational goal is that developers listen to and work with the communities most likely to be impacted by their products. Over time, we hope to see greater use of co-design and universal design for learning principles.

4. What type of AI does this application include?

Not all edtech includes AI and when it does, it is not necessarily generative AI. Very broadly, AI can be thought of in two types:

- 'Good Old-Fashioned AI' (known as GOFAI) – This encompasses a range of technologies including the chess program (Deep Blue) that beat Grandmaster Garry Kasparov in 1997 and the technology that serves up recommendations to us in our daily life – videos to watch, songs to listen to, people to befriend. These technologies have advantages of memory and computational force that far exceed human capacities (Tegmark, 2017). An upside of some of these applications is that they can learn from your choices and improve their advice to you. A downside is that they can contribute to a polarisation of views. You may notice that you rarely see suggested information that offers a different perspective from the one you already hold (hence the term 'echo chamber').
- Generative AI – This technology is distinctive in that it doesn't just analyse existing data and predict the future on the basis of the past but creates new data instances that resemble the data it 'trained' on. For example, ChatGPT was trained on large sections of the internet, including all of Wikipedia – approximately 300 billion words. (Hughes, 2023) Generative AI tools can generate language, but also images and increasingly long video segments. Unlike older types of AI, the generative AI models are so complex that even the creators cannot understand exactly why a tool produces the output that it does. (Heikkila, 2024)

Generative AI has raised particular concerns from an educational perspective, not least because it is known to 'hallucinate.' Because ChatGPT writes like

an articulate human, it can be hard to spot when the tool is just making things up.

Other issues – such as bias – can arise regardless of the type of AI involved. The output of any algorithm is only as good as the data set it draws on, and the rules it applies to that data, both of which may reflect systemic inequity.[7]This has been shown across many fields including education.[8] For example, the use of an algorithm to predict A-level results for UK students during COVID was found to systematically disadvantage students from state schools and had to be abandoned. (Gulson et al, 2021) Examples like this are powerful reminders that humans, not machines, remain accountable for decisions. When we do use technology to support student learning or streamline our work load, we need to stay abreast of its recommendations and adjust them when necessary.[9]

5. What data or information should I put into an app?

Personalisation can come at a price, and that price can be privacy. Recommendation engines improve the more they 'know about' (the more data they have on) the user. Data is highly valuable to many companies, including edtech companies . Data that can be linked to specific students, known as personally identifiable information (PII), falls under the Australian Privacy Act 1988 due to its sensitive nature. Personal information is any information that can be used to identify an individual directly or indirectly. It could be a student's name, address, class, school, family details, fingerprints, or a combination of information from which a student or other individual can be identified.[10]Applications accessed via the NSW Department of Education's Online Learning Tools Catalogue have data safeguards in place. Outside of that framework, the responsibility for the appropriate treatment of personal data rests with teachers and schools, with advice available.[11] It is worth noting that ChatGPT uses your content – uploaded files, prompts and chat history – to train the model, unless you choose to opt out.[12]

CONCLUSION

Artificial Intelligence can be a polarising topic, represented as the answer to all our problems, or an impending risk to humanity. Educators are well positioned to avoid such extremes, approaching edtech firmly as a tool, not oracle, in service of the human pursuit of teaching and learning. If you would like to stay connected with our work seeking to ensure that edtech is leveraged for quality and equity across Australian schools, consider signing up to our mailing list here.

END NOTES:

1. https://www.edreports.org/

2 https://edtechimpact.com/

3 https://digitalpromise.org/

4 https://saveourschools.com.au/funding/close-the-achievement-gaps-between-rich-and-poor/; https://grattan.edu.au/news/our-schools-abound-in-under-achievement/

5 https://www.w3.org/WAI/standards-guidelines/wcag/

6 A synthesis by Escueta et al. ('Upgrading education with technology: Insights from experimental research', *Journal of Economic Literature*, Vol. 48, No. 4, 2020) finds that adaptive learning systems offer 'enormous promise,' with two-thirds of the high-quality research studies examined demonstrating substantial and statistically significant effects. Similarly, a meta-review of Intelligent Tutoring Systems by Kulik & Fletcher ('Effectiveness of intelligent tutoring systems: A meta-analytic review', *Review of Educational Research,* Vol. 86, Issue 1, 2016) reports a mean effect size of 0.62 from their analysis of 50 controlled experimental or quasi-experimental evaluations of ITS in elementary, secondary, and tertiary institutions. This effect size is considered moderate-to-large in social sciences and well above many other traditional education interventions.

7 For example, a data set 'may not be representative or may contain associations that run counter to policy goals' (U.S. Department of Education, Office of Educational Technology, *Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations,* Washington DC, 2023), p.33.

8 For a very readable look at the way AI and algorithms can replicate and reinforce existing inequities, see Ellen Broad, *Made by Humans: The AI Condition* (Melbourne University Press, 2018).

9 Even when automated processes are explicitly designed as decision-support tools, we humans can defer overly to them due to our 'trust in automated logic, lack of time and the convenience of relying on pre-processed data' (Anna Huggins, 'Addressing Disconnection: Automated Decision-Making, Administrative Law and Regulatory Reform,' *UNSW Law Journa*l, Vol. 44, No. 3, 2021), p.1060.

10 https://education.nsw.gov.au/teaching-and-learning/education-for-a-changing-world/guidelines-regarding-use-of-generative-ai

11 https://education.nsw.gov.au/policy-library/policyprocedures/pd-2024-0481/pd-2024-0481-01

12 https://help.openai.com/en/articles/5722486-how-your-data-is-used-to-improve-model-performance

REFERENCES

ACARA (2023) 'School Students with Disability' ACARA website: https://www.acara.edu.au/reporting/national-report-on-schooling-in-australia/school-students-with-disability

Cobbold, T (2023 November 28) 'Close the Achievement Gap Between Rich and Poor' Save Our Schools (SOS) Australia website: https://saveourschools.com.au/funding/close-the-achievement-gaps-between-rich-and-poor/

Digital promise website: https://digitalpromise.org/

EdReports website: https://www.edreports.org/

EdTech Impact website: https://edtechimpact.com/

Gulson, K et al (2021 November 22) 'Algorithms can decide your marks, your work prospects and your financial security How do you know they're fair?' *The Conversation*: https://theconversation.com/algorithms-can-decide-your-marks-your-work-prospects-and-your-financial-security-how-do-you-know-theyre-fair-171590

Heikkila, M (2024) 'Nobody Knows How Technology Works'MIT Technology review website: https://www.technologyreview.com/2024/03/05/1089449/nobody-knows-how-ai-works/

Holon IQ website (2019 May 9) 'Global Education Apps and the Android Ecosystem' https://www.holoniq.com/notes/global-education-apps-the-android-ecosystem

Hughes, A (2023 September 26) 'ChatGPT: Everything you need to know about OpenAI's GPT- 4 tool' BBC Science Focus website: https://www.sciencefocus.com/future-technology/gpt-3

Hunter, J (2023 January 29) 'Our schools abound in under achievement' Grattan Institute website: https://grattan.edu.au/news/our-schools-abound-in-under-achievement/

Loble, L and Hawcroft, A (2022) *Shaping AI and Edtech to Tackle Australia's Learning Divide*, University of Technology Sydney:).

NSW Department of Education (2022) *Progress Report: Improving outcomes for students with disability:* https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/disability-learning-and-support/our-disability-strategy/Progress_Report_Improving_outcomes_for_students_with_disability_2022.PDF

OECD (2012) *Equity and Quality in Education: Supporting Disadvantaged Students and Schools,* OECD Publishing: https://asiasociety.org/files/equity-and-quality-in-education_0.pdf

Tegmark, M (2017) *Life 3.0: Being human in the age of Artificial Intelligence,* Penguin: p.78.

W3C Web Accessibility Initiative (WAI) website: https://www.w3.org/WAI/standards-guidelines/wcag/

World Economic Forum (2024) Fourth industrial revolution website: https://www.weforum.org/focus/fourth-industrial-revolution/

ABOUT THE AUTHORS

Professor Leslie Loble AM is Chair of the Australian Network for Quality Digital Education. Leslie is a recognised leader of public purpose reform, both in Australia and the US. Leslie has spearheaded significant reform in school, tertiary and early childhood education, including the Gonski funding reforms, and establishment of the Centre for Education Statistics and Evaluation, the Centre for Learning Innovation and the Catalyst Lab, within the NSW Department of Education. Leslie holds governance roles at the Australian Education Research Organisation and Copyright Agency and appointments to government expert advisory panels in education. She is Industry Professor at the University of Technology Sydney and affiliated with its Centre for Social Justice & Inclusion. Leslie is also a Paul Ramsay Foundation Fellow.

Dr Kelly Stephens is an experienced education policy and research leader. Kelly served as Director, Strategic Analysis within the NSW Department of Education's Centre for Education Statistics and Evaluation for a decade, where she played a leading role in the development of the School Excellence Framework and the fostering of evidence-based practice through What Works Best. Kelly has also held leadership roles in the Centre for Learning Innovation, the Education for a Changing World program, and as Director, Schools Policy, where she managed the strategic policy framework for K–12 education. Kelly supports the Network and its associated work program as Director, Edtech and Education Policy.