Submission in response to the House Standing Committee on Employment, Education and Training's inquiry into the use of generative artificial intelligence in the Australian education system

Our Organisation

Submission by: Members of the University of Technology Sydney (UTS), Centre for Research on Education in a Digital Society (CREDS)

Authors: Simon Knight*, Keith Heggart, Camille Dickson-Deane, Heather Ford, Jane Hunter, Amelia Johns, Kirsty Kitto, Dilek Cetindamar Kozanoglu, Damian Maher, Bhuva Narayan
**contact person*

The authors of this submission include researchers with significant experience as school teachers, technologists, staff or trustees of advocacy groups particularly in the Open Knowledge area, publishing, and of course as researchers. As researchers we have been awarded both Australian Research Council (ARC) funding and other categories including via state government, school systems, and industry partners.

The authors provide expertise across key areas we draw on here, including: teacher education; the open knowledge movement; digital literacies and digital citizenship; educational technology (edtech) – particularly edtech grounded in AI – and its design, development, evaluation, and practitioner use.

This submission represents the views of the authors, not the position of UTS or any of its individual units.

Overview of CREDS response

The authors thank the House Standing Committee on Employment, Education and Training for the opportunity to respond to the inquiry into the use of generative artificial intelligence in the Australian education system.

Generative AI (genAI) are a set of broad-use systems built on foundation models such as large language models, to generate content from user provided inputs. These include text-based models such as GPT-3 and Google's BARD, and text-to-image such as DALLE and midjourney, with newer systems including multi-modal approaches (i.e., they can receive and output both text and images, or indeed audio and video, and 3D virtual reality simulations).

Emerging applications include generation of content from prompts, including text responses (e.g. in chatGPT), and images (DALLE). These applications can generate 'original' content, or edit content provided to them. Approaches building on 'neural style transfer' also offer tools, for example for applying one artistic style to another work; these approaches will likely extend to text and other media in the near future with a range of uses across professions.

Since the launch of chatGPT and DALL-E 2 in late 2022 there's been enormous growth in users, and interest in these systems. This includes the UK Government's 'Generative artificial intelligence in education' position statement (Department for Education (DfE), 2023), the UNESCO 'quick start' guide (Sabzalieva & Valentini, 2023), and the US Office of Educational Technology report: *Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations* (Cardona et al., 2023). As the latter notes (p.2-3), addressing AI in education matters now both because of the scale of potential in addressing

educational priorities, and the increasing awareness of risks and the scale of these risks arising from use of AI.

We first provide an overview of our recommendations against the Terms of Reference, addressing TOR 2 before TOR 1 because any assessment of strengths and limitations is contingent on the values and desired futures to which genAI is put. We then provide detailed context to these recommendations.

1 Overview of Recommendations

Underpinning our response to these Terms of Reference (TORs) are three recommendations. Understanding the potential and risks of genAI is a cross-sector, cross-discipline, societal concern; national priorities should reflect this through recognition of and support for interdisciplinarity and the social sciences in genAI innovation across sectors.

- ***Recommendation 1:*** *support interdisciplinary and cross -sector learning for ethical engagement with genAI, in the short term through support for targeted professional learning or microcredentials, and in the mid-term through addressing concerns raised regarding the jobs ready graduates package of reforms.*

Evidence is a central requirement of ethical AI (merit in the National Statement; justification and transparency in many AI ethics frameworks). It is crucial that investments in EdTech are underpinned by evidence that any tools used will support the outcomes they claim to target. Support the critique, creation, and dissemination of evidence regarding claims of genAI supporting learning through:

- ***Recommendation 2:*** *Development of funding streams, and support for innovative approaches to evidence development and sharing across sectors, regarding genAI. By its nature this work must include social scientists which may require new funding streams, or/and reform of the R&D tax credit.*
- ***Recommendation 3:*** *Support of interdisciplinary teams for genAI research both on fundamental evaluation of tool uses, and the dissemination of this evidence with and across education systems (including educators, learners, and developers).*

TOR 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;
Learning environments are one space where genAI will clearly have significant impact; understanding this impact and appropriate (dis)engagement with genAI in learning requires a focus on the fundamental purposes and processes of learning.

- ***Recommendation 4:*** *Values underpin both our aims in education, and our aims for genAI, shaping what we learn (e.g., 'AI literacy'), and how we learn (e.g., new AI tools). Support the convening of public fora and engagement activities to develop collective, democratic, values-led responses regarding the kinds of futures Australians want in use of genAI in education.*

TOR 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;

- ***Recommendation 5:*** *Understanding, evaluating, and sharing effective practices: There can be no strengths of genAI in education without teachers who will work with, create approaches for, and thus need to learn about genAI. This has implications, drawing on our other recommendations.*

- Any consideration of and planning cycles towards use of genAI in education should be with respect to the values and aims identified in **Recommendation 4**
- Resourcing should be provided to develop models to assess AI literacy across the range of stakeholders, and identify needs and strategies to develop this literacy; resources derived from this activity can feed into guidelines to help navigate the ethics of genAI (***Recommendation 6***)
- Support should be provided for bespoke professional learning for teachers from all sectors, to develop algorithmic literacy to learn to engage with genAI and capacity for designing to learn with genAI tools **Recommendation 1**; **Recommendation 7**).
- Evidence should underpin any incorporation of genAI (see **Recommendation 3**). This evidence should be shared and co-developed with and by teachers, informed by student voice, and in mentoring and partnerships with research universities and education institutions. It may also be appropriate to target resourcing to creation of evidence-informed models that encode shared values (**Recommendation 4**), and the body of existing evidence regarding learning technologies, to create tuned models or/and educationally-tailored system prompts (prompts that modify user input to provide context). Sharing among teachers has been shown to be an effective mechanism for supporting innovative approaches, particularly through creation of toolkit resources that provide practical guidance for design for learning alongside evidence and high-level principles.

TOR 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;

- ***Recommendation 6:*** *The concerns of applying genAI in education in Australia specifically are unclear, with few practical guidelines available for stakeholders to understand or navigate these issues. Support should be provided for development of practical guidelines for a range of stakeholders regarding use of genAI in Australian learning contexts.*

TOR 4: **How cohorts of children, students and families experiencing disadvantage can access the benefits of AI;**

- ***Recommendation 7:*** *Provide support for Professional Learning to target skills for staff across institutions serving diverse communities, to support communities in effectively (dis)engaging with tools, and to target support of vulnerable populations and specific risks.*
- ***Recommendation 8:*** *Ensure equitable access to genAI through tackling digital divides in affordability, accessibility, and capability. Target schools that are most impacted by digital divides.*

2 Key issues underpinning our recommendations

In the below we set out our understanding of the key context for these ToR, flagging emerging policies and practices (ToR 5) and key recommendations (ToR 6).

We first discuss our overarching perspective on genAI and education with respect to emerging strategies and key recommendations, before addressing the specifics of TOR 1-4. We have addressed TOR 2 before 1, because it is only through considering desirable futures and the values that underpin potential future impacts, that we can consider the strengths and of genAI to address those possible directions.

3.1 AI as a Social Issue Requires Cross-Sector, Cross-Discipline Responses Towards Worthwhile genAI

3.1.1 Supporting cross-sector, cross-discipline research

Context: AI, and generative AI, have potential to disrupt many aspects of our lives. How this disruption unfolds, and to whom the benefits and costs accrue is fundamentally a social problem. Despite the hype, genAI cannot act alone, and so to understand its development, uses, and its potential for benefits across society, we must look to society.

The challenges will not be solved by one sector or discipline. National priorities should reflect this through recognition the significant contribution social sciences make to addressing the Australian Science and Research Priorities, through support for interdisciplinary research, and through requirements for evidence generation and reporting in public use of genAI.

Emerging Responses:
As highlighted by Science and Technology Australia in their submission to the Accord "philosophy, critical thinking and scientific literacy are essential as we navigate the regulation and ethics of new technologies" (Science and Technology Australia, 2023), a view shared by others who flagged the importance of interdisciplinary and ethical thinking (Nous, 2023). The social sciences play a central role in tackling global challenges, including the implications and underpinnings of genAI tools (Academy of the Social Sciences, 2023). Reviews of European AI strategies indicates that the social sciences are not only noted, but a key part of funded centres and activities, across a number of countries (European Commission. Joint Research Centre. & Organisation for Economic Co operation and Development., 2021)

Recent policy shifts have hampered Australia's capacity to respond to these challenges, through undercutting HASS disciplines and the ability to draw on their expertise (Go8, 2022). Despite the significance of interdisciplinarity, two analyses of Australian Research Council funding outcomes (Bromham et al., 2016; Woelert & Millar, 2013) indicate that interdisciplinary projects are less likely to be funded. Moreover, although ARC success rates are broadly comparable across disciplines areas, the social sciences are less likely to have access to other funding streams, with the ARC having no clear equivalent of the large interdisciplinary multi-year projects seen in some other systems (Academy of the Social Sciences, 2021). For example, the social sciences are explicitly excluded from the R&D tax credit, indeed the example of exclusions draws on a term usually implying a discredited theory (learning styles) going on to say: "*If your dominant purpose to conduct the study is to help you understand how individuals learn, then it would not be eligible as a supporting R&D activity*" (Department of Business, 2023). The closure of the Office of Learning and Teaching further hampered national strategic response that had positioned Australia as a global leader (Hicks, 2016); a dedicated body such as the 'National Centre for Student Success' (Johnson et al., 2023) may serve to address this gap, and recommendations 1-3.

Recommendation 1: *support interdisciplinary and cross -sector learning for ethical engagement with genAI, in the short term through support for targeted professional learning*

or microcredentials, and in the mid-term through addressing concerns raised regarding the jobs ready graduates package of reforms

Recommendation 2: *Development of funding streams, and support for innovative approaches to evidence development and sharing across sectors, regarding genAI. By its nature this work must include social scientists which may require new funding streams, or/and reform of the R&D tax credit.*

This recommendation is consistent with previous recommendations regarding the R&D tax credit (IRU, 2016; Universities Australia, 2016), Science & Technology Australia recommendation 21, calling for cross-discipline and cross-sector funding (Science and Technology Australia, 2023), and Go8 Recommendation 9 to fund HASS has adding value to the Australian economy and wellbeing (Go8, 2022).

3.1.2 The importance of evidence critique, generation, synthesis, and integration[1]

Context: The EdTech industry in Australia comprises both uses of EdTech (including non-Australian products) across our sector, and: "13,000 people are employed by Australian EdTech companies […] [The] sector generates $1.6 billion revenue in the domestic market and $600 million from exports." (EduGrowth, 2020).

It is crucial that investments in EdTech are underpinned by evidence that any tools used will support the outcomes they claim to target. Failure to do so is at best an opportunity cost, and at worst misinformation that could lead to significant harms. We have a tendency to focus on tools as 'things', rather than instruments that can be skilfully used in interactions for particular purposes, and thus we can neglect the purposes tools focus on, the skills required to engage with them, and the interactions they are created and used in (Wise et al., 2021). Both AI ethics principles and the Australian National Statement on Ethical Conduct in Human Research recognise these concerns through principles such as Transparency, Justification, and Competence, and in the National Statement 'Merit and Integrity'. Here we refer to these as 'Worth':
Worth, as in 'is this worthwhile?' implies both (1) that there is some agreement regarding the value of the ends being targeted (the values claim), and (2) that there is some assurance that the intervention will in fact target those outcomes (the validity claim) (Knight, 2023).

However, the evidence base for many EdTech tools and their uses in particular contexts is not strong. A recent review of the 100 most frequently used EdTech tools in US schools found that 26/100 met any level on a formal evidence scale, where the lowest level requires just that there is some formalised background evidence synthesis that supports a theory of change for the tool use. This aligns with other evidence indicating that principles derived from research on learning are often not adhered to in app development (Meyer et al., 2021) and that in the specific context of ebook apps targeting children, app features may distract from comprehension (Furenes et al., 2021; Kucirkova, 2023). This may lead to underuse, poor use, or simply poor procurement of technologies (ITSE, 2019). Australian values and the specific needs and contexts here should be an important consideration in the evaluation for particular uses of global products that are trained on web data that may not represent Australian values or experiences

Similarly, in the rush to claim market share in niches specific to the new suite of technologies, and address emerging concerns in the market, EdTech vendors may rush to release early prototype tools. Without a strong evidence base to support them these tools

[1] We avoid using the term translation here as – in some uses – that term can imply a uni-directional transfer of knowledge from universities to stakeholders. Across the phases of evidence critique, generation, synthesis, and integration we see important roles for expert researchers and stakeholders in teaching, institutional leadership, technology provider, etc. roles as well as parents and learners.

hold a very real potential for harm. For example, in response to genAI for writing, Turnitin released a GenAI detector (https://www.turnitin.com/solutions/ai-writing). However, little information was provided prior to the tool being made available. Moreover, there are gaps in testing data or evidence regarding the tool's efficacy, exacerbated by ongoing updates of the tool in light of changes to (primarily) chatGPT, which makes it very difficult to assess the tool and its potential harmful impact on students.

We consider it essential that regulation and guidelines be used to protect consumers from these types of ad hoc industry responses.

Emerging Responses: A number of global responses have emerged to the need for evidence critique, generation, synthesis, and integration including calls for standards, guidelines particularly with respect to transparency (and transparency of evidence), and the call for new oversight or expert advisory bodies. A multi-pronged approach is needed, including support for evidence-work such as funding, and incentives such as standards. .

Beyond the education context, the interaction of evidence, risks of harms, and commercial nature of much AI has led for calls for an IPPC-like body, driven by underpinning human values to investigate the potential and risks of AI across sectors (Bak-Coleman et al., 2023). The funding models described above would be a more immediate approach to developing interdisciplinary bodies for this investigation. Alongside this, bodies such as the IEEE have produced a variety of standards for autonomous systems (IEEE Standards Association, 2022), including some targeting young people and learning. It is important that any use of such standards does not precede the question "is the tool-use proposed worthwhile?" – i.e., consideration of whether to use specific genAI in education should leave open the possible answer: "no".

Internationally there have been various calls, and projects, addressing the need for evidence in EdTech. These include the UK EDUCATE project (and UCL EdTech labs) which offer models of partnership between university, peak body, research-funder, and private funder collaboration to work with EdTech companies and educators to build capacity for evidence in the sector (EdTech Labs, 2020; EDUCATE, 2020). This work might be combined with a framework for EdTech tool use addressing "values and benefits; opportunity costs or risks (including in relation to future education or employment); usability and accessibility; interoperability; data protection and privacy; security" (Digital Futures Commission, 2023). Some of our own work has sought to automatically evaluate features of learning apps in app stores, targeting this concern (Haering et al., 2021), and the ways that teachers can use technology to share their knowledge regarding new technologies (Hunter, 2021; Kearney et al., 2020; Kolber & Heggart, 2022).

Recommendation 3: *Support of interdisciplinary teams for genAI research both on fundamental evaluation of tool uses, and the dissemination of this evidence with and across education systems (including educators, learners, and developers**).***

3.2 Worthwhile genAI for worthwhile learning

TOR 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;

Context: Learning environments are one space where genAI will clearly have significant impact; understanding this impact and appropriate (dis)engagement with genAI in learning requires a focus on the fundamental purposes and processes of learning. So, it is a learning

question because we must understand what learners and teachers need to know about genAI.

Beyond this, across society in formal and informal learning, ethical engagement with genAI is a learning challenge. It is a learning challenge with respect to the algorithmic literacy required to understand genAI for example in the context of informed consent; it is a learning problem with respect to the ways we can openly share learning regarding (in)effective uses of genAI for community learning; and it is a learning challenge because these processes – the development of literacies and ethical understanding towards a genAI-entwined digital citizenship – are fundamentally about learning, whether they occur in schools, the workplace, or the chatbot embedded in our flight-booking system. The aims of our educational systems, and how we deliver on them are bound up with our values, and shared futures. To understand these shared values, and desirable futures, we must engage people, both in sharing their views and in supporting them to navigate how these values in the context of emerging technologies like genAI. This requires approaches for supporting algorithmic literacy alongside participatory consultative models, grounded in the Alice Springs (Mparntwe) Declaration (Education Council, 2019).

The recent US Department of Education report on AI in education put's it well:

> *"AI technologies are grounded in models, and these models are inevitably incomplete in some way. It is up to humans to name educational goals and measure the degree to which models fit and are useful—or don't fit and might be harmful. Such an assessment of how well certain tools serve educational priorities may seem obvious, but the romance of technology can lead to a 'let's see what the tech can do' attitude, which can weaken the focus on goals and cause us to adopt models that fit our priorities poorly." (Cardona et al., 2023, p. 54)*

Emerging Responses: In 2021 The Ada Lovelace Institute ran a "prototyping AI futures" (ADA Lovelace Institute, 2021; British Academy, 2022), and the British Academy has a 'Digital Society' program – these involve funding and collaboration over longer periods to engage stakeholders with imagining desirable futures with AI. In education, any recommendations must be developed and implemented with relevant stakeholders, including teachers, and recognise that the technology landscape is likely to change.
Examples of work adopting values-led approaches to understanding the implications of technology for education and educational futures can be found in Gulson et al's participatory approach to automated essay scoring in Australia; in Schuck et al's work on education futures and futuring approaches; and the collaboratively authored UTS human rights and technology issues paper (Gulson et al., 2022; Schuck et al., 2018; UTS, 2018). As particularly the last of these highlights, in Australia this must reflect attention to opportunities for Indigenous Australian peoples relating to equitable outcomes in education.

Recommendation 4: *Values underpin both our aims in education, and our aims for genAI, shaping what we learn (e.g., 'AI literacy'), and how we learn (e.g., new AI tools). Support the convening of public fora and engagement activities to develop collective, democratic, values-led responses regarding the kinds of futures Australians want in use of genAI in education.*

TOR 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;

We outline key potential of genAI against a set of themes as follows. Our overarching position is that "there is a need to move beyond AI-centred views of capabilities and consider the ecology of technology, cognition, social interaction, and values" (Markauskaite et al., 2022, p. 1) – to understand the strengths of genAI, requires understanding our educational

aims (see **Recommendation 4**), and the interactions between learners, educators, and tools.

Recommendation 5: *Understanding, evaluating, and sharing effective practices: There can be no strengths of genAI in education without teachers who will work with, create approaches for, and thus need to learn about genAI. This has implications, drawing on our other recommendations.*

- Any consideration of and planning cycles towards use of genAI in education should be with respect to the values and aims identified in **Recommendation 4**
- Resourcing should be provided to develop models to assess AI literacy across the range of stakeholders, and identify needs and strategies to develop this literacy; resources derived from this activity can feed into guidelines to help navigate the ethics of genAI (***Recommendation 6***)
- Support should be provided for bespoke professional learning for teachers from all sectors, to develop algorithmic literacy to learn to engage with genAI and capacity for designing to learn with genAI tools **Recommendation 1**; **Recommendation 7**).
- Evidence should underpin any incorporation of genAI (see **Recommendation 3**). This evidence should be shared and co-developed with and by teachers, informed by student voice, and in mentoring and partnerships with research universities and education institutions. It may also be appropriate to target resourcing to creation of evidence-informed models that encode shared values (**Recommendation 4**), and the body of existing evidence regarding learning technologies, to create tuned models or/and educationally-tailored system prompts (prompts that modify user input to provide context). Sharing among teachers has been shown to be an effective mechanism for supporting innovative approaches, particularly through creation of toolkit resources that provide practical guidance for design for learning alongside evidence and high-level principles.

3.2.2.1 Centre learning and values

GenAI must not be treated as a panacea for wider concerns in education systems, including teacher shortages (Hunter et al., 2022). The mantra ‘Always Center Educators (ACE)’ (Cardona et al., 2023, p. 25) has been suggested as a way to drive AI for enhancement of teaching and learning. In this approach, AI is seen as not only a way to make teachers’ jobs easy, or to speed up administrative tasks, but as a tool for understanding students better, and supporting teachers in directing their creative responsiveness to learners effectively (Cardona et al., 2023). The evaluation of genAI in education requires an understanding of education systems, including the values underpinning those systems, shared perspectives on desirable educational futures, and a respect for the stakeholders – including educators – involved, and support for their developing practices. In this way, genAI offers an additional tool for intelligence augmentation (Knight & Buckingham Shum, 2017), complementing but not replacing human expertise.

3.2.2.2 Generating to learn

With the emergence of earlier tools such as search engines, and common learning processes such as writing, a distinction is sometimes made between ‘learning to search vs searching to learn’ and ‘learning to write’ vs ‘writing to learn’ respectively (Knight & Littleton, 2016). This helpful distinction focuses attention on the prerequisite skills to do the particular thing (search, writing), *alongside* the value of such tasks for supporting wider learning. We can draw on earlier work on the impact of technology on learning process to inform genAI (Knight, 2020; Knight & Littleton, 2016) as we now describe.

There will be a need for resources to support learning to use generative AI tools. But it would be an impoverished view of the potential of genAI to focus on this individual, tool-oriented, learning. GenAI holds potential to provide information to individual learners, but depending on the *affordances* of particular platforms, different kinds of possibilities for action – and learning – are opened. This might include, the affordance provided by 'prompt histories', in making visible the process of genAI question-answering undertaken, as an artefact for discussion by educators or other learners. There is a long lineage of work on design affordances in EdTech and computer supported collaborative learning (CSCL) which should inform design of emerging tools. The presence of these tools also creates space for discussion of their properties, and in the context of genAI discussion of these socio-technical underpinnings provides important insights into their strengths and limitations, of the social contexts they emerge from, and uses to which they are put (Warschauer et al., 2023). Perhaps the strongest way genAI might shape learning, is in the way that learners can create objects (most commonly images and texts, but 3D printing and other media are possible), that can become both objects to share, critique, and learn from, while also being objects that others can build on, improve, and change; because genAI produces digital materials that can be shared, and digitally discussed, the potential for new kinds of collective prototyping and knowledge building is significant, with potential to connect us and our world in new ways.

For example, genAI can stimulate creative thinking and improve innovation through helping to identify open areas to explore. In terms of design, it can enable much faster iteration cycles for product/service design. For example, for design thinking sprints, it can produce large volume of ideas, and prioritise them based on various parameters, so the learners can check it against their own ideas and move quickly toward prototyping and testing them.

3.2.2.3 Design for learning, toolkits, and OER

The processes described above can also help enable educators to work with and collaborate with designers and developers of AI; even as developers themselves are figuring out what can and cannot be done with genAI. There is significant potential in combining this experimentation with existing practices used to build and share professional knowledge in social media communities and open educational resources (OER).

Emerging Responses: At a content level, preliminary work is already indicating that genAI may be able to support making generic versions of learning materials, and support development of content with learners (Khosravi et al., 2023). Early work has also explored its use in assisting peer assessment, creating assessment prompts, providing writing feedback, and providing more ongoing formative feedback to support learners including on learning processes, not just outputs, and provide information to teachers in their pedagogical decisions (Swiecki et al., 2022). Tools are emerging, such as Khan Academy's Khanmigo, that build genAI into existing learning platforms; it will be important to support learners in critical engagement with these genAI, through opportunities to engage, and resources to support their questioning of tools (Shibani et al., 2022).

Resources collating designs of learning tasks are already emerging (Mills, 2023; Nerantzi et al., 2023; Sabzalieva & Valentini, 2023), largely in higher education (while relevant beyond). Fostering communities for professional learning is likely to increase innovation, diffusion and practical evaluation of approaches to using genAI, and social media may provide avenues for this (Kearney et al., 2020; Kolber & Heggart, 2022). Investment should be provided for development of toolkits to share evidence informed practices, their underlying evidence, and practical examples (Burden & Kearney, 2018) (**Recommendation 2**, **Recommendation 3**). OER repositories offer one approach for sharing these resources, however work is required to support their sustainability and usefulness in practice (Bossu et al., 2016; Haßler et al., 2014; Tlili et al., 2021). If successful, OER repositories offer an approach to tackling some copyright concerns in genAI, while also providing mechanisms for using genAI to take

resources that have been produced for one context, and adapting them for different audiences, educational levels, cultural setting, etc. all with little technical skill required to produce useful output. However, the potential of these uses must be evaluated; teachers will be well placed to decide how to use tools in this space, and must have capacity to explore without the tools being treated a as a panacea for existing workload concerns regarding resource creation.

TOR 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;

In considering the impact of genAI on learning we must distinguish key concerns:

1. **Assurance of learning** is the most commonly discussed concern in current media coverage of genAIin higher education (Sullivan et al., 2023), this comprises two features:
    1. Integrity – i.e., assuring that learners are engaging in the activities they say they are. A number of helpful documents have been produced A number of helpful documents have been produced including from the UK's QAA (QAA, 2023) and JISC (Webb, 2023), the European Network for Academic Integrity (Foltynek et al., 2023), and the Australian Academic Integrity Network (AAIN) Generative AI Working Group, (AAIN, 2023a), alongside individual institutional responses (see, AAIN, 2023b) with UTS developing five student-centred principles to guide use of genAI (LX at UTS, 2023)
    2. Validity – i.e., assuring that the tasks we ask learners to engage with are good indicators of the outcomes claimed when gaining an accredited qualification. This feature of genAI is less explored, although see UTS principles below (LX at UTS, 2023)
2. **Learning processes and outcomes** – may be impacted by genGPT; it was this – the concern that chatGPT would hamper critical thinking – that underpinned New York City Department of Education's ban on chatGPT in early 2023 (later lifted). **Threshold concepts** describe the key knowledge or concepts required in order to progress to a deeper level of understanding regarding a topic; once we grasp them, they change our understanding. They interact with particular methods and tools, such that sometimes new technologies mean we no longer need to learn a particular skill. For example, tools for calculating, from the abacus to the pocket calculator, through obviating understanding of manual use of log tables. It is not yet clear what impact being able to 'shortcut' via genAI will have, and where we should still require learning of the underlying composite skills in order to assure understanding of the higher-level skill.
3. **Normative features of learning** – are about values, or the kinds of learning we think are important. Technologies may shift these values (Heersmink & Knight, 2018), and particular domains – including the professions – may make value judgements regarding the skills and knowledge it is important to 'have' manually, and those we can augment with technology. Understanding both these values, and what different communities are doing is important. Aspects of this concern are addressed through analyses of employer needs and university offerings (Kitto, 2022), however the impact of genAI, and the potential for genAI to support learners in navigating professional needs, is not yet clear.
4. **Human dignity and rights** – are expressions of fundamental values and rights, which may be impacted by genAI in a range of ways (Fergusson et al., 2023). Issues in this space include concerns regarding the right to privacy, creation and spread of misinformation, exacerbation of discrimination, impacts on intellectual property and related access to cultural heritage, and impacts on labour relations (Fergusson et al.,

2023). It was this concern that appeared to underpin NSW and QLD Departments of Education from restricting chatGPT access in public schools, due to safeguarding concerns regarding potential access to explicit and harmful content (Cassidy, 2023). Understanding these issues in the particular contexts of learning environments is important for tackling them, with consideration of both the *legal* context – as yet unclear – and ethical concerns.

Considering these distinct concerns will help focus strategies to addressing them. Nevertheless, there are key themes that cut across these issues, which we discuss further below.

Emerging approaches: There is a lack of resources for *practical guidance* of both the regulatory and ethical concerns (such as those derived in **Recommendation 4**). Our recent work (Knight, 2023) indicates that although there are ~200 documents internationally collated as 'guidelines', many provide little guidance, and only a handful are targeted at education or educators (one notable exception is European Commission, 2022). While across professions many have been excited to see the potential of chatGPT and other generative AI, even at the time of writing there are many cases of errors in the tool, and misuse or poor use. One site that acts as an observatory for 'AI incidents' has collated 241 already (AI Incidents, 2023). However, the concerns reflected in these documents, and other repositories regarding risks and incidents, tend to be a narrow lens onto the concerns in education (Knight, 2023). Other jurisdictions have commissioned reports regarding the values, risks, and strategies to ethically navigate use of AI. Worthwhileness, or justification, is a central component of ethics, applying to our use of genAI in learning, just as it applies to any student use or use in research processes; if we do not have evidence something will work to produce a shared outcome, we should treat it as research and take a risk proportionate approach, drawing on research ethics. While there is no shortage of ethics guidelines, nevertheless there is a complex regulatory and ethical space and support is needed in learning to navigate this space, and corresponding algorithmic and privacy literacy particularly as they relate to teaching and learning in Australia.

Recommendation 6: *The concerns of applying genAI in education in Australia specifically are unclear, with few practical guidelines available for stakeholders to understand or navigate these issues. Support should be provided for development of practical guidelines for a range of stakeholders regarding use of genAI in Australian learning contexts.*

3.2.3.1 Misaligning genAI and human capabilities

Globally, governments and individuals are considering the risks of inappropriate use of genAI, along with risks of not engaging with genAI. These concerns are bound up with what people should learn *about* genAI, and what people should learn *with* or *through* genAI. These concerns include a risk of misalignment in needs, and breakdowns in capacity.

Challenge: Misalignment of professional needs – that education institutions, professional bodies, and professional practice become misaligned in terms of how genAI is used and what is taught, in ways that hamper professional sectors or their learning.

Challenge: Breakdowns in capacity – that genAI may hamper human capacity, through (1) overreliance thus hampering human capacity through reduction in individual capabilities, (2) workforce restructuring that reduces human autonomy and input into decision processes, or (3) overwhelming systems through mass production of content.

These concerns regarding appropriate use impact both learner use of resources, and the creation of those resources, including in the world's largest open educational resource Wikipedia (as discussed in an interview with Ford, Harrison, 2023).

Emerging Responses: To address these risks we must understand practices across educators, learners, and the professions, to ensure that flexibility in learning environments is maintained appropriate to the target learners, while there are also clear alignments between different parts of the education sector and the professional contexts into which learners enter. Tackling this may require:

- Coordination between professional bodies and their stakeholders, and universities, to understand learning opportunities, changing practices in professions, and risks
- Mapping of these needs and the educational offerings, for example through projects like TRACK which maps skills in the job market to those in study units (Kitto, 2022), and consideration of appropriate assessments with, and without, access to technologies
- Stakeholder engagement to understand how to support their agency, underpinned by guidelines for appropriate use of technology, and 'AI literacy' (see below)

These drivers are consistent with UTS' (LX at UTS, 2023) recent "five student-centred principles to guide usage of GenAI.

1. Students understand the significance of GenAI for society, careers, and studies.
2. Students understand legitimate use of GenAI in their studies.
3. Students are equipped to engage critically and ethically with GenAI.
4. Students experience GenAI's strengths and limitations as aids to learning.
5. Students are assessed on what they need to know in an AI world."

3.2.3.2 Literacies required for democratic engagement with genAI

A set of skills, including technical and social skills, will underpin the effective use of genAI; correspondingly, there is a risk that failure to cultivate this capacity in Australia, or in specific sectors, or parts of the population, will lead to harms and inequities.

AI literacy is a bundle of four core capabilities: technology-related, work-related, human-machine-related capabilities, and learning-related capabilities (Cetindamar et al., 2022). This definition of AI literacy highlights that organisational capacity to deliver on its aims is built on a range of individual capabilities. It is crucial that education system should consider how to support students to develop these capabilities whatever their occupations. Only then, today's students and tomorrow's employees could become part of the design and use of AI at workplaces to ensure AI's rapid and equitable uptake. Other sets of skills and knowledge of relevance to genAI include privacy literacy (Pingo & Narayan, 2019), and digital literacy particularly for children (Nascimbeni & Vosloo, n.d.). Crucially, while technical approaches – such as explainability – may support engagement with AI, explainability interacts with understanding both of the human decision being made and the data/model implicated (Khosravi et al., 2022).

Informed decisions regarding (dis)engagement with genAI are also linked to societal values (see **Recommendation 4**), with Australian research seeking to address the challenge of supporting diverse stakeholders in navigating the socio-technical systems of AI through participatory models (Buckingham Shum, 2022; Gulson et al., 2021).

3.2.3.3 Risks to fundamental rights from genAI

The Electronic Privacy Information Centre (EPIC) (Fergusson et al., 2023) provide a recent overview (contextualised to US law) of genAI and fundamental rights. These risks derive from three issues: (1) harms in the nature of genAI models, their data, and use (e.g., environmental impacts); (2) harms in unintentional inappropriate use (e.g., lack of awareness regarding poor ability for certain tasks); (3) harms through intentional maleficent use (e.g., creation of misinformation). Across these, genAI has potential to foster a breakdown in trust between people, and biases in representation of people and cultures that may lead to

inequitable outcomes. It is important that learners and educators understand this context, including any legal obligations. Three particular areas of concern are:

Privacy: In learning contexts, there are new privacy concerns in the context of genAI with respect to use of tools *on* learner/educator created materials and use of tools built *from* learner/educator created materials. Clear guidance is required regarding any use of learner or teacher data in genAI tools – this includes upload by 'authorities' (e.g. teachers), as well as by learners themselves (e.g., activities involving video). It may be appropriate to further regulate use of learning data, for example by holding any data in an escrow system (see, IEEE Standards Association, 2022, p. 115).

Intellectual property: The creation of new targeted learning materials through genAI, and the sharing of learning strategies through open educational resource platforms, for tailoring with genAI hold significant potential. However, there are risks regarding intellectual property given a lack of transparency regarding the underlying training data ('Better Sharing for Generative AI', 2023).

Information manipulation and representation: GenAI creates new potential for mis- and dis-information. These uses also create potential for new harms through novel forms of bullying including of staff. Learners must be taught how to engage with this. While Australian education is largely English language, aligning with the largest training data in genAI, Australia's history and cultures may not be adequately represented

TOR 4: How cohorts of children, students and families experiencing disadvantage can access the benefits of AI;

Justice and inequitable experience of benefits and harms in genAI use: The potential of genAI to further exacerbate existing issues relating to marginalisation and poorer outcomes must be considered, alongside any potential benefits of genAI and ensuring that access to these benefits follows a justice principle; that the greatest benefits should flow to the most marginalised. Ample evidence exists that while existing technologies provide significant benefits across communities, there is inequitable exposure to harms including for Aboriginal and Torres Strait Islander families (eSafety Commissioner, 2023a), LGBTIQ+ people (eSafety Commissioner, 2021; Johns et al., 2022), culturally and linguistically diverse communities (eSafety Commissioner, 2020; Harris & Johns, 2021), and women (eSafety Commissioner, 2022c), with negative online experiences common across communities (eSafety Commissioner, 2022a), and young people keen for support in navigating eSafety (eSafety Commissioner, 2023b). Teachers face particular risk of harms, with high numbers reporting abuse (Burns et al., 2019; Williams, 2010) and emerging indications of new kinds of online abuse (Schultz, 2023).

Justice and inequities in the burdens of data scraping and model outcomes: the burden of your data being scraped should not lead to inequitable outcomes in the benefits of models trained on that data. In a report commissioned by UNESCO in 2021, Johns et al. (2022) found that the safety of LGBTQ+ young people across the Asia Pacific region had been hampered by a rising tide of hate speech and misinformation during the COVID-19 pandemic, which targeted LGBTQ+ youth. Platform regulation, user tools and safety education designed to address these harms were regarded ambivalently by some young people in the study who spoke of the importance of social media in providing forums for community building and connection, while acknowledging that platform algorithms and business models also promote and exacerbate hate speech and harm (Johns et al., 2022, p. 30). Recent reports have equally found that ***automated hate detection systems were inadequate*** in addressing hate speech across many non-English speaking countries given the systems have been trained primarily on English speaking populations, raising equity concerns (Sinpeng et al., 2021). In a forthcoming book on WhatsApp Johns et al., (2023)

examine increasing concerns around user data privacy on WhatsApp accompanying changes to WhatsApp's design. Specific concerns have been raised around increased data sharing with third parties and the integration of generative AI and chatbots to facilitate business transactions and e-commerce. These changes have raised fears that the protection end-to-end encryption offers users has already been compromised, and that the integration of fintech and generative AI bots will continue to raise concerns as the technology and potential data capture becomes more sophisticated. These shifts have significant implications for school children protection.

Justice and inequities in access to opportunities to learn with and about genAI: Digital divides are comprised of inequities in affordability of devices and connectivity, accessibility across learners with diverse needs, and the abilities to engage effectively with these tools as both educators and learners. Australia has a significant digital divide, associated particularly with income and regional and remote location, and their intersection (Ingrid, 2020). Compounding concerns regarding exacerbation of digital divides is the challenge that those in regional and remote communities may have less access to professional learning opportunities, impacting capacity to support learning in schools.

Accessibility and learning support: GenAI may also afford opportunities for supporting accessibility of materials, helping learners with disabilities (Marino et al., 2023). Potential uses include checking for structure and clarity of definitions, visual accessibility and genAI-automated modifications for different kinds of visual needs (e.g. variations in colour perception), video captioning, etc. (McMurtrie, 2023; Young & Maher, forthcoming). However, there is also potential for these tools to have different impacts on disabled students (Guo et al., 2020), for example through impacts on learning processes, and different intersections with existing learning needs, neither of which are currently well understood. Outside of formal learning contexts, there are also concerns that tools provided to support people may also expose that data inappropriately, for example in hiring processes that provide accessibility options, but without making it clear if that data will be visible to the hiring organisation (Wall & Schellmann, 2021). This concern of justice could exacerbate existing negative online experiences of people with intellectual disability (eSafety Commissioner, 2022b). Moreover, although there are some potentials in this space, caution must be taken that genAI does not substitute for appropriate resourcing to fulfil statutory obligations, particularly where the worth of the tools is not well established with respect to efficacy.

Australian values: In the context of genAI it's also important to consider the particular values and context of Australia, which may not be well represented in the underlying data on which generative AI is trained, nor respect fundamental concerns of justice in Australia. While Nature has set out principles of genAI use in scholarship, as has COPE, they focus on authorship issues (Nature, 2023) rather than broader issues of justice in research. Uses of generative AI should not result in any diluting of information regarding Australia and our commitments and challenges. For example, there should be protections for Indigenous Cultural and Intellectual Property (ICIP). "Those who could be exploited by AI should be shaping its projects" (Kalluri, 2020).

Recommendation 7: *Provide support for Professional Learning to target skills for staff across institutions serving diverse communities, to support communities in effectively (dis)engaging with tools, and to target support of vulnerable populations and specific risks.*

Recommendation 8: *Ensure equitable access to genAI through tackling digital divides in affordability, accessibility, and capability. Target schools that are most impacted by digital divides.*

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