

Fostering AI literacy: A teaching practice reflection

Lynette Pretorius

Faculty of Education, Monash University, Melbourne, Australia

Email: lynette.pretorius@monash.edu ORCID: <https://orcid.org/0000-0002-8998-7686>

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This paper provides the reflections of an educator regarding the pedagogical use of generative artificial intelligence and the need for students to develop artificial intelligence literacy. It starts by providing an overview of generative artificial intelligence and the controversy that surrounds the technology in the contemporary higher education context. This is followed by an argument highlighting that the controversy in the field ignores the pedagogical applications of generative artificial intelligence. Finally, this paper demonstrates an example of how generative artificial intelligence has been used as part of a teaching strategy to help research students develop their artificial intelligence literacy. The paper argues that explicit modelling by educators can help students develop an understanding of generative artificial intelligence as a tool to improve their learning.

Key words: generative artificial intelligence; ChatGPT; artificial intelligence; AI literacy; academic integrity.

1. Introduction

Artificial intelligence (AI) has been present in society for several years and refers to technologies which can perform tasks that used to require human intelligence. This includes, for example, computer grammar-checking software, autocomplete or autocorrect functions on mobile phone keyboards, or navigation applications which can direct a person to a particular place. Recently, however, there has been a significant advancement in AI research with the development of generative AI technologies.

Generative AI refers to technologies which can perform tasks that require creativity. Lim et al. (2023, p. 2) define generative AI as “a technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts (e.g., languages, instructions, questions)”. In other words, these generative AI technologies use computer-based networks to create new content based on what they have previously learnt. For example, generative AI technologies now exist which can write poetry or paint a picture. In fact, I recently entered the title of one of my published books ([Research and Teaching in a Pandemic World](#), Cahusac de Caux et al., 2023) into a generative AI which paints pictures ([Dream by WOMBO](#)). The response it generated accurately represented the book’s content, was eye-catching, and would have been a very suitable picture for its cover (see Figure 1). These types of artistic creations have previously been thought to be only the domain of human intelligence and, consequently, the introduction of generative AI has been hailed as a “game-changer” for society in general, and the field of education in particular (see, e.g., Lim et al., 2023, p. 3).

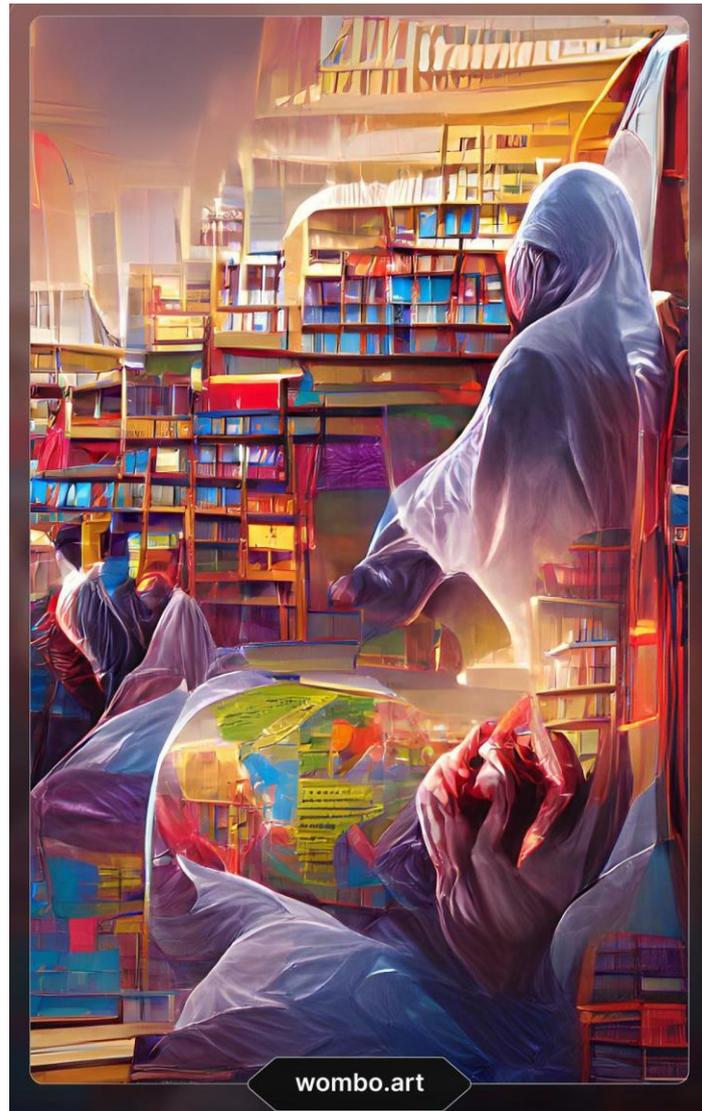


Figure 1. The use of generative AI to create an artwork for a book.

(*Note:* This artwork was created using the generative AI Dream by WOMBO (WOMBO Studios, Inc., <https://dream.ai/>) on December 12, 2021. To generate this response, I entered the words “research and teaching in a pandemic world” into the generative AI and selected my preferred style of artwork.)

The introduction of generative AI has, however, led to a certain amount of panic among educators; there has been a flurry of workshops, discussions, policy debates, and curriculum redesign sessions, particularly in the higher education context (see, e.g., TEQSA, 2023). Some have acknowledged that there is a need to accept that generative AI can also be leveraged to support student learning (see, e.g., AAIN Generative AI Working Group, 2023; Dai et al., 2023; Lim et al., 2023; TEQSA, 2023; Roose, 2023). In fact, it has been noted that students will likely be expected to know how to use this technology when they enter the workforce (AAIN Generative AI Working Group, 2023; TEQSA, 2023; Roose, 2023). Importantly, though, there has also been significant concern that generative AI would encourage students to cheat (see, e.g., Miles, 2023; Roose, 2023; TEQSA, 2023). Educators fear that students could enter their essay topic into a generative AI and that it would generate an original piece of work for them which would meet the task

requirements to pass, with Miles (2023, para. 10) noting some consider this “akin to students outsourcing their homework to robots”. Therefore, generative AI is thought by some to demonstrate a violation of academic integrity where the student has cheated the assessment system. As a result, there have been calls to either ban the use of generative AI entirely or create surveillance strategies or tools to detect the uses of these technologies in written work and thereby safeguard the integrity of the assessment system (see, e.g., Miles, 2023; Roose, 2023; TEQSA, 2023; West-Smith, 2023).

In recent years, academic integrity discussions have focused on a dichotomy between enforcing forms of surveillance on students to safeguard academic integrity or nurturing a culture of academic integrity through educative practices (see [Defending Assessment Security in a Digital World](#), Dawson, 2021, for more contextual detail). In a [previous paper](#) (Cutri et al., 2021), however, my colleagues and I argued that this dichotomy is counterproductive. Instead, we argued that it is possible to use surveillance technologies (such as Turnitin) as a tool to help students develop the academic integrity of their work, thereby engendering a culture of academic integrity (Cutri et al., 2021). I have done this in my own practice, where I have developed the “Practice Turnitin Assignment” which students can use to learn how to better paraphrase and summarise their work. I believe this approach is also how we, as educators, should address the use of generative AI. This new technology should not be seen as a threat to academic integrity which will encourage students to cheat. Rather, we should approach generative AI as a tool to improve our students’ (and our own) practices of generating and communicating ideas.

I believe what is missing from the aforementioned academic integrity discussions regarding generative AI is the fact that assessment regimes focus predominantly on the *product* of learning. This focus assumes that the final assignment is indicative of *all* the student’s learning but neglects the importance of the learning *process*. This is where generative AI can be a valuable tool. Using the generative AI artwork previously mentioned as an example, WOMBO Studios, Inc. (2022) notes that “users own all artworks created by users with assistance of the Service” (para. 9), asking only that users “attribute or give appropriate credit to WOMBO for its *assistance* in generating any artwork” (para. 19, italics added for emphasis). From this perspective, the technology should be considered as an *aide*, with the intellectual work of the user residing in the choice of an appropriate prompt, assessment of the suitability of the output, and further modification of that prompt if the output does not seem suitable. For example, some generative AIs can aid students by helping them brainstorm ideas or develop an outline for an assignment. Generative AI could also be used to provide feedback to students on their work, aiding them in learning how to improve the communication of their ideas (see, e.g., Dai et al., 2023). Roose (2023) has also suggested that generative AI could be used as an after-hours tutor or a way for English-language learners to improve their written skills. Using generative AI in this more educative manner can, therefore, help students better engage with the process of their learning.

I believe that, in a similar way to when word-processing software first introduced a spell-checker, generative AI will become part of our everyday interactions in a more digitally-connected and inclusive world. It is important to note, though, that while generative AI may help the user create something, it is also dependent on that user’s skillset. As mentioned above, the user is responsible for providing appropriate prompts, evaluating the accuracy or usefulness of what is generated, and modifying any prompts as needed. Consequently, we need to help our students learn how they can use generative AI effectively and in ways that can enhance their learning. This highlights the importance of teaching students how to communicate effectively and collaboratively with generative AI technologies, as well as evaluate the trustworthiness of the results obtained – a concept termed *AI literacy* (see AAIN Generative AI Working Group, 2023). I believe AI literacy will soon become a key graduate attribute for all students as we move into a more digital world which integrates human and non-human actions to perform complex tasks.

It appears that my employer, Monash University, has reached the same conclusion in its recently released generative AI policy. As noted on its website (Monash University, 2023b), [students and researchers at Monash University are allowed to use generative AI](#), provided that appropriate acknowledgement is made in the text to indicate what role the generative AI played in creating the final product. The University has also created a whole range of resources which are freely accessible to students and the wider public to help them [learn how to use generative AI ethically](#) (see Monash University, 2023b). This policy emphasises the use of generative AI as a tool to improve work, rather than as a strategy to cheat the system.

2. Teaching practice reflection

In my teaching practice, I now advise students to use generative AI as a tool to help them improve their approaches to their assignments. I suggest, in particular, that generative AI can be used as a tool to start brainstorming and planning their assignment or research project. I also highlight that generative AI may be able to assist a researcher in generating some starting research questions, but it is the researcher's responsibility to refine these questions to reflect important aspects such as their particular research focus or theoretical lens. I emphasise to students that generative AI will not do all the work for them; they need to understand that they are still responsible for deciding what to do with the information, linking the ideas together, and showing deeper creativity and problem-solving in the final version of their work.

I have recently showcased this approach in two videos which are freely available on YouTube. The first video ([Using generative artificial intelligence in your assignments and research](#), Pretorius, 2023b) explains what generative AI is and what it can be used for in assignments and research. The second video ([Using generative AI to develop your research questions](#), Pretorius, 2023a) showcases a worked example of how I collaborated with a generative AI to formulate research questions for a PhD project. These videos can be reused by other educators as needed.

The worked example video starts by showing students how I have used [ChatGPT](#) (currently the most frequently used generative AI technology) to brainstorm a starting point for a research project by asking it to "Act as a researcher" and list the key concerns of doctoral training programmes. In this way, I show the students the importance of prompt design in the way they collaborate with the generative AI. In the video, I show that ChatGPT provided me with a list of seven core concerns and note that, using my expertise in the field, I have evaluated these concerns and can confirm that they are representative of the thinking in the discipline. In the rest of the video, I showcase how I can continue my conversation with the generative AI by asking it to formulate a research question that investigates the identified core concerns. I demonstrate how I collaborated with the generative AI to refine the research question until, finally, a good quality question is developed. Table 1 shows the iterations of the prompts I provided ChatGPT and the responses I received as I worked with the generative AI to develop my research question. As demonstrated at the end of Table 1, the final research question incorporates the specificity and theoretical positioning necessary for PhD-level research.

Table 1. Prompt design to generate research questions using generative artificial intelligence.

(Note: The responses to my prompts were generated by ChatGPT (OpenAI, <https://chat.openai.com/>) on January 24, 2023. I have added the italics for emphasis.)

Researcher prompt	Response from ChatGPT
Act as a researcher and list the core concerns associated with doctoral education programmes	As a researcher, I have identified the following core concerns associated with doctoral education programmes: <i>Quality of supervision:</i> One of the major concerns in doctoral education is the quality of supervision provided to students. Inadequate

supervision can lead to prolonged completion times and low-quality dissertations.

Funding: Funding for doctoral education is another major concern. Many students struggle to find financial support for their studies, which can lead to stress and difficulties in completing their degrees.

Workload: Doctoral students often face a high workload, including coursework, research, and teaching responsibilities. This can lead to burnout and negatively impact the quality of their work.

Time to completion: The length of time it takes to complete a doctoral degree is a concern for many students. Prolonged completion times can result in increased financial burden and decreased motivation.

Career outcomes: Another concern is the lack of clear career paths and job opportunities for doctoral graduates. Many doctoral students struggle to find relevant employment after completing their degrees, which can lead to feelings of frustration and disappointment.

Lack of diversity: There is also a lack of diversity in many doctoral programs, which can limit opportunities for students from underrepresented groups and limit the diversity of perspectives in research.

Mental health: The intense nature of doctoral programs can have a negative impact on the mental health of students. Many students face stress, anxiety, and depression, which can negatively impact their well-being and their ability to complete their degrees.

These are some of the core concerns associated with doctoral education programs and highlight the need for ongoing efforts to improve the quality and accessibility of these programs for students.

Create a research question to investigate some of these core concepts in a qualitative research study

A research question that could be used to investigate some of the core concepts in a qualitative research study of doctoral education programs might be:

“How do doctoral students experience and perceive the challenges and supports of their doctoral education program with respect to supervision, funding, workload, time to completion, career outcomes, diversity, and mental health?”

This question allows for an exploration of the students’ perspectives and experiences regarding the various core concerns associated with doctoral education programs. The use of qualitative research methods, such as in-depth interviews or focus groups, would allow for rich, detailed data to be collected and analyzed. The findings of such a study could inform efforts to improve doctoral education programs and better support doctoral students in their journeys.

Refine this question to focus specifically on mental health

A refined research question focusing specifically on mental health in the context of doctoral education programs could be:

“What are the experiences and perceptions of doctoral students regarding the impact of their doctoral program on their mental health, and what strategies do they use to manage and maintain their well-being during their studies?”

This question focuses specifically on the mental health of doctoral students and aims to understand their experiences and perceptions in this area. The use of qualitative methods would allow for an in-depth

	<p>exploration of this issue and could provide valuable insights into the challenges and supports that doctoral students face with respect to their mental health. The findings of such a study could inform the development of support programs and interventions aimed at promoting the mental health and well-being of doctoral students.</p>
<p>Incorporate the theory of discourse as outlined by Michel Foucault into this new research question and reformulate</p>	<p>A research question that incorporates the theory of discourse as outlined by Michel Foucault into the study of mental health in doctoral education programs might be:</p> <p><i>“How is the discourse surrounding mental health constructed and negotiated by doctoral students in the context of their doctoral education program, and how does this discourse shape their experiences and management of mental health issues?”</i></p> <p>This question takes a Foucauldian perspective and seeks to understand the ways in which mental health is discursively constructed and negotiated by doctoral students within the context of their doctoral education programs. The use of qualitative research methods would allow for an in-depth exploration of the discursive practices and power relationships involved in the construction of mental health as an issue in this context, and could shed light on the ways in which this discourse influences the experiences and management of mental health by doctoral students. The findings of such a study could have important implications for efforts to support the mental health and well-being of doctoral students and promote more positive and empowering discourses in this area.</p>

It is important to note that students are likely not yet experts in their field when they are designing their research questions. Therefore, it is important to provide them with guidance as to how to evaluate the ideas produced by generative AI. This includes highlighting that a generative AI is not always accurate, that it may disregard some information which may be pertinent to a specific research project, or that it may fabricate information. Students need to learn that a generative AI is not a tool like an encyclopaedia which contains all the correct information. Rather, generative AI is a tool which responds to prompts by generating answers it “thinks” would be appropriate in that particular context. Consequently, I advise students to use generative AI as *a starting point*, but that they should then explore the literature to further assess the accuracy of the core concerns identified earlier as well as the viability of the research question for their project.

Students should also be taught how to appropriately acknowledge the use of generative AI in their work. Monash University (2023a) has provided [template statements](#) for students to use. I use these template statements as part of my regular referencing and academic integrity workshops. In this way, I show students that ethical practice is to acknowledge which parts of the work the generative AI did and which parts of the work were done by a person.

It is also worth noting that generative AI could be used as a way to help students see what a good research question might look like, rather than using it specifically to develop a research question for their particular research project. Generative AI may also be useful in helping students see how to organise the themes in the literature. In this way, we encourage students to use generative AI as part of the learning process, allowing them to scaffold their skills so that they can use their creativity and other higher-order thinking skills to further advance knowledge in their discipline.

3. Potential challenges and risks

As with all new technologies, there are potential challenges and risks that should be considered. The first of these concerns I have already previously highlighted. Generative AI technologies can generate results which seem correct but are factually inaccurate or entirely fabricated (see, e.g., Hillier, 2023; Lim et al., 2023). This emphasises the need for educators to help students develop their AI literacy. The second concern that is of particular relevance to educators is the issue of equity of access. It is incumbent upon us as educators to ensure that all students have equal access to the technologies they may be required to use in the classroom. If these technologies were to require a paid subscription for access, this would pose a significant challenge to the democratisation of education, potentially increasing socio-economic disadvantage (Lim et al., 2023). The final concern that is particularly relevant to research is the ethical implications associated with the use of generative AI platforms. There is the risk of bias propagation, where the tool may reiterate biases present in the dataset that was used to train it (Lund & Wang, 2023). There are also ethical concerns relating to the retention and possible generation of potentially sensitive data, such as personal, financial, or medical information (Lund & Wang, 2023). Consequently, further work needs to be done to consider the educative implications of students sharing potentially sensitive information with these technologies.

4. Conclusion

Generative AI is, at its core, a natural evolution of the technology we already use in our daily practices. In an increasingly digital world, generative AI will become integral to how we function as a society. Therefore, it is incumbent upon us as educators to teach our students how to use the technology effectively, develop AI literacy, and use their higher-order thinking and creativity to further refine the responses they obtain. In this way, we focus on the process of learning rather than being so focused on the ultimate product for assessment. I believe that this form of explicit modelling is how we, as educators, can help students develop an understanding of generative AI as a tool to improve their learning.

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