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Improving students' generative AI literacy: A single workshop can improve confidence and understanding

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Abstract

With the emergence of generative artificial intelligence (genAI), it has become increasingly important to ensure that students are equipped with AI literacy to use these tools effectively and appropriately. We ran a 90-minute, optional workshop for students to demonstrate how to use genAI in the assessment process appropriately. By the end of the workshop, participants felt significantly more confident in using genAI, had more intentions to use genAI, and understood the University's genAI policy better. The types of genAI use that participants envisioned shifted from general academic and life uses to specific, acceptable uses for learning. Students could identify some methods for assessing the output of genAI. However, it is suggested that this skill needs more development.

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Introduction

Large language models (LLMs), like ChatGPT and other forms of generative artificial intelligence (genAI), represent a significant shift in the field of artificial intelligence and are transformative for education as a whole (Rudolph et al., 2024). Models like GPT are capable of processing data in its original, unaltered state, making it possible to mine unstructured data like raw text, images, sounds and videos effectively, giving it the ability to generate more coherent and contextually accurate text, from providing personal relationship advice to creating entire research articles (Dwivedi et al., 2023).

GenAI tools are ethically dubious in both design and application. To list just a few ethical issues with AI design, LLMs are frequently trained on materials without the creator's permission, hallucinate incorrect information, reinforce societal biases, encourage technology monopolies, have high environmental impacts, and have limited privacy protections for users (reviewed in Rudolph et al., 2024). AI tools can also be deliberately applied in unethical ways, such as producing deepfakes (e.g. Roe & Perkins, 2024), plagiarising assignments (Kumar et al., 2024), and fabricating research (Elali & Rachid, 2023). Nevertheless, outright banning of AI tools is increasingly difficult to enforce (e.g. Chaka, 2024; Hassoulas et al., 2023; Weber-Wulff et al., 2023) and undesirable according to university regulators (e.g. Lodge et al., 2023). The efficiency of genAI tools will likely see them becoming ubiquitous in our personal and work lives, and our preparedness for the impact this will have on employment, teaching, learning, and academic research will determine how successful we will be at navigating the advancing world of AI (Farrelly & Baker, 2023). Academic institutions particularly play a pivotal role in equipping students and staff with practical digital and AI literacy skills to ensure that the use of these genAI tools aligns with the broader educational mission of integrity that fosters good practice and ethical and responsible use (Romero-Rodríguez et al., 2023). Graduates will be expected to effectively prompt, interrogate, and influence AI output, especially as entry-level graduate tasks will likely be replaced with technology (Waring, 2024).

Research shows that a lack of adequate functional digital literacy training affects the academic success of higher education students, impacting their learning performance, achievements, self-efficacy, attitude, and motivation (Cabero-Almenara et al., 2023; Chan & Hu, 2023; Morgan et al., 2022). The Tertiary Education Quality and Standards Agency of Australia (TEQSA) (Lodge et al., 2023) and other international bodies, like UNESCO (Sabzalieva & Valentini, 2023), emphasise that the explicit teaching of digital literacy skills, like searching, evaluating sources, preparing targeted prompts for genAI and critiquing its output will improve students' critical thinking skills and confidence. Early research into the consequences of using genAI at university by Abbas et al. (2024) suggests that it may lead to procrastination and a poorer GPA. However, this study only asked if students had used ChatGPT and did not look at how it was used. Students who are confident in their capabilities tend to engage in a deep learning approach, relying on meaningful ways of learning that focus on understanding and integrating ideas, leading to better utilisation and engagement with genAI (Chan & Hu, 2023; Duong et al., 2023). Yilmaz and Yilmaz (2023) found that students who received training in effective genAI use had positive learning outcomes.

Surveys conducted at different institutions have uncovered different rates of genAI usage. For example, at the start of 2023, less than 20% of students were using genAI in an Australian study (Kelly et al., 2023), with later surveys increasing to approximately 40% of students in Asian and African countries (Ahmad et al., 2024), half of the students sampled in India (Biri et al., 2023), 67% in Hong Kong (Chan & Hu, 2023), and reaching a high of about 90% in Indonesia (Malik et al., 2023). Many factors can influence the proportion of students using genAI tools, including age and discipline (Chan & Lee, 2023; Kelly et al., 2023). While most students seem to be generally open to the idea of using genAI tools and perceive many benefits such as timesaving, personalised feedback, and increased motivation (Caratiquit & Caratiquit, 2023; Chan & Hu, 2023; Idroes et al., 2023; Malik et al., 2023), they also have many concerns, including equity, privacy, and accuracy (Chan, 2023a; Chan & Hu, 2023; Malik et al., 2023). The best predictors of genAI tool use appear to be perceived ease of use, social influences, habit, performance expectancy, and a supportive environment (Strzelecki & ElArabawy, 2024; Wang et al., 2023). The main barriers for students considering using genAI appear to be a low level of knowledge about how to use the tools (Biri et al., 2023; Chan, 2023a) and fear of committing academic misconduct (Chan, 2023b; Chan & Hu, 2023; Prather et al., 2023).

Multiple surveys found that students are worried about accidentally plagiarising or falling afoul of academic misconduct rules if they use genAI tools (Chan, 2023a; Chan & Hu, 2023). This is despite students having a good sense of what constitutes genAI plagiarism (also known as AI-giarism) (Chan, 2023b). Chan (2023b) found that although students had a strong sense of a continuum of genAI use from acceptable to unacceptable, scenarios that involved co-writing with genAI tools fell into the middle ground. They suggest that the ambivalence from students results from a lack of clear university policies and guidelines on what AI-giarism is and what constitutes ethical use. This is perhaps unsurprising given that less than half of the top 50 ranked universities have publicly available guidelines on genAI use (Moorhouse et al., 2023). Students want their university's policies to be very clear about what is and is not considered misconduct when it comes to genAI tool use (Chan, 2023a).

There is a strong correlation between student's self-rated knowledge of genAI and their use of genAI tools (Chan & Hu, 2023; Kelly et al., 2023), even when students have an otherwise positive attitude towards genAI (Biri et al., 2023). The traditional media coverage of genAI tools tended to be negative and focused on the academic integrity risks (Sullivan et al., 2023), while on Tiktok, the coverage is more promotional and positive but lacks criticality (Haensch et al., 2023). There is a need for more support, training and educational interventions at universities to support students to improve their genAI literacy knowledge and skills (Biri et al., 2023; Chan, 2023a; Moorhouse et al., 2023). It is important that this training is specific to genAI literacy, as general computer literacy may not necessarily automatically

translate to genAI use. For example, in Prather et al.'s early 2023 international survey of primarily computer science students, approximately 40% had not attempted to use genAI in their courses, and Hou et al.'s (2024) study of computing students found that those who had less experience were also less trusting of genAI tools.

Several studies have started to explore the effectiveness of training in genAI literacy. Kong et al. (2021) found that a diverse group of university students who completed a 7-hour course in AI had improved AI literacy and felt more empowered to use AI in their studies and life, even if they had no prior programming experience. Yilmaz and Yilmaz (2023) found that students who had genAI training embedded into their undergraduate programming course over five weeks significantly improved on survey measures for computational thinking, self-efficacy and motivation. Similarly, Korte et al. (2024) found that students who attended five hours of online AI literacy lectures improved their understanding of AI and felt more confident using it in their everyday lives. Theophilou et al. (2023) found that just two interactive lectures on genAI for high school students were enough to reduce their fears about genAI and improve their prompting skills. Many universities and academic skills centres are creating resources and training to develop students' AI literacies. However, to date, little evaluation shows whether these are effective, particularly for short interventions.

In this study, we present the evaluation of a single 90-minute, optional workshop on genAI for university students. The workshop demonstrated how to appropriately use genAI in the assessment process, with the aim of providing students with the necessary digital literacy skills to increase their confidence in using these tools and to support their understanding of the University's policy on genAI use.

Methods

Context

This study took place at a mid-sized Australian university. Although we did not collect demographic data from students who participated in the study, the university's student population is mostly part-time (63%), undergraduate (61%), and female (63%), with an appreciable portion of fully online (23%) and international students (21%). The disciplinary areas from the smallest to the largest are Education, Arts and Humanities (including Psychology and Counselling), Nursing and Midwifery, Medical and Health Sciences, Business and Law, Science (including Cybersecurity), Engineering and Performing Arts (Edith Cowan University, 2023). Early in 2023, the university announced a policy that genAI was allowed for learning purposes as long as it was correctly acknowledged at the point of assignment submission. Students were discouraged from copy-pasting or directly quoting genAI output, but information was provided on how to cite the tool if they wished to do so correctly. This information was communicated in the first half of 2023 through all-student emails and accompanied by a Library website.

Workshop development

The workshop was developed by the authors, who are a collaborative team of learning advisers and librarians. The librarians designed the sections on digital literacy and information searching, while the learning advisers created the sections on improving writing, editing, and academic integrity. The workshop was run as part of a broader, ongoing workshop programme that is available for students to upskill in information literacy and academic skills.

The workshop began by introducing the concepts of genAI and prompt engineering, followed by the assignment writing process. At each stage of the process, we explained what students should and should not use genAI for in an assessment context and gave examples of specific prompts they can use to get their desired output. For example, for editing, we advised students not to get the tool to 'fix' their writing, which could lead to a breach of academic integrity, but rather to ask the tool to 'list' corrections that the student can then apply, and therefore maintain editorial control over their work. The workshop was piloted by a larger group of learning advisers, librarians, and student peer-learning staff. Minor revisions were made to content and flow based on their feedback.

Data collection

We ran four workshops, one on campus and three online, from June to September 2023. Throughout the workshop, we used Mentimeter to poll participants on their attitudes and understanding of genAI. Mentimeter was chosen because it creates an interactive and engaging experience for students while maintaining anonymity (Mayhew et al., 2020; Rudolph, 2018). Students were made aware that we would use their Mentimeter responses in a research project, both via email before the workshop and verbally at the start of the workshop. Workshop attendees who did not wish to be included in the research project could still participate by answering the questions in the Teams chat (for online sessions) or out loud (in the face-to-face session). The Mentimeter questions came in two forms: sliders, which allowed students to answer on a 5-point Likert scale, or text-entry questions, which allowed responses of up to three words. Mentimeter responses are completely anonymous, but students can see a summary of the responses as they are generated, appearing on the screen as a graph or word cloud. The full set of questions is provided in Supplementary File 1.

Data analysis

Participants' confidence in the use of AI, experience in the use of AI, and knowledge of Edith Cowan University's (ECU) 2023 Generative AI policy were measured using on-screen sliders equating to 5-point Likert scales pre- and post-workshop. The Likert scale questions were analysed in Microsoft Excel using descriptive statistics: t-tests for pre-post comparisons and ANOVA for between-group comparisons. As explained by Norman (2010), these statistics are robust and appropriate for ordinal data, even with non-normal distributions.

For the text entry questions, broad codes were created to categorise the data during analysis. The first and second authors both coded a subset of the data and then discussed discrepancies and refined the category descriptions to create a final coding sheet (see Appendix 2). Both coders then coded all of the data separately and resolved any remaining discrepancies together. The original categories were coded in agreement 70% of the time, which improved to 84% with the final coding sheet. Note that this type of coding is not truly qualitative thematic coding but rather follows the guidance of LaDonna et al. (2018) for analysing short, open-ended survey responses.

Results

Participants

Across the four workshops, we reached 171 students. Not all students participated in the Mentimeter, and not all those who participated answered every question. A total of 95 students answered at least one question in the Mentimeter poll, with individual questions ranging from a low of 52 to a high of 90 responses.

Repeated measures

Overall, 83 students responded to the pre-workshop questions, and 52 responded post-workshop. At the start of the workshop, students had a low level of confidence in their ability to use genAI (M = 2.58, SD = 1.34), which significantly increased by the end of the workshop (M = 3.788, SD=1.04) t(133) = 5.5672, p<0.000 (see Figure 1). Similarly, at the beginning of the workshop, students expressed that they lacked experience with genAI (M = 2.29, SD = 1.26), but at the end of the workshop had a higher level of intention to use it in the future (M = 3.63, SD =1.05) t(133) = 6.4138, p<0.000. Students felt they understood ECU's policy on genAI significantly better by the end of the workshop (M = 2.51, SD = 1.28 increased to M = 4.37, SD= 0.79); t(133) = 9.3877, p<0.000.

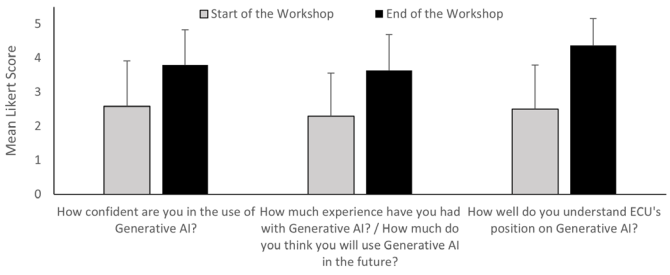

Figure 1. Confidence, experience and understanding of policy at the start and end of the workshop. Error bars represent standard deviation.

Students were also asked what they had and would use genAI for at the beginning and end of the workshop, respectively. A significant difference was observed comparing students pre- and post-responses (X2 (9, N = 195) = 30.52, p < 0.001). As can be seen in Figure 2, at the beginning of the workshop, students' responses were primarily categorised as general academic or life-related, for example, "uni work" or "shopping lists". When asked what they planned to use genAI for following the workshop, there was an increase in the proportion of answers dealing with specific uses throughout the assessment process.

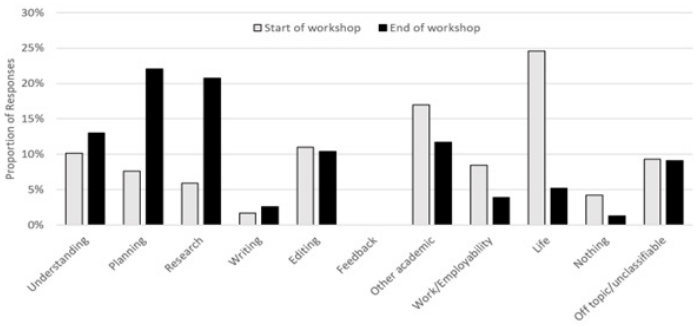

Figure 2. Participants' current use of genAI, compared to intended use after attending the workshop.

Single measures

At the start of the workshop, students were asked how much they expected various groups to use genAI in the future. No difference was observed between themselves (M = 3,6, SD = 1.1), their classmates (M = 3.9, SD = 1.0), their educational institution (M = 3.5, SD = 1.1), and their future employer (M = 3.6, SD = 1.2) F(3,336) = 1.69, p > 0.05. However, it should be noted that most students believed that genAI would be used in the future as all groups had a mean of 3.5 or higher on a five-point Likert scale.

Students were asked to rate a variety of behaviours from correct/ethical (Likert score of 1) to incorrect/unethical (Likert score of 5). Behaviours included copy-pasting from AI (M = 4.7, SD = 1.0), editing and adjusting AI output (M = 3.2 , SD = 1.3), combining multiple AI responses (M = 3.2, SD = 1.3), getting feedback to improve from AI (M = 2.4, SD = 1.2), getting ideas from AI (M = 2.4, SD = 1.4), and not using any AI (M = 1.4, SD = 1.1). Overall, students clearly differentiated between AI uses they considered ethical and unethical (F(5, 534) = 79.9, p < 0.001). A post-hoc comparison using the Tukey HSD test indicated all differences are significant except for the conditions using AI with human input (editing and adjusting and using multiple prompts) and the conditions using AI as a study buddy (feedback to improve from AI and ideas from AI).

Towards the end of the workshop, after viewing a sample of AI-generated content and discussing its strengths and weaknesses, students were asked how they could evaluate the output of genAI. Answers were classified as fact-checking (cross-checking information against a different source), source checking (verifying the sources provided by the AI), language (proofreading, checking grammar), general (related words that do not indicate a clear action or process e.g. critical thinking, verify), or unrelated (e.g. random words such as 'math' or 'assignment') (Figure 3).

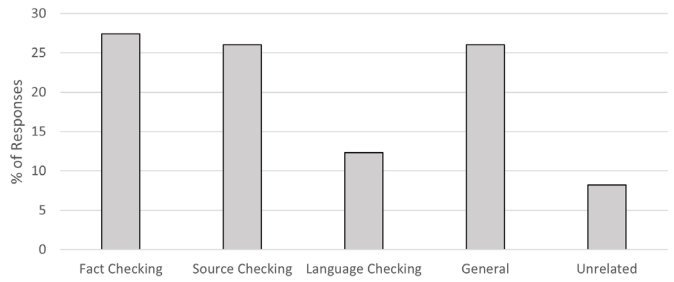

Figure 3. Suggestions from participants as to how the output of genAI tools can be assessed (n=73, participants could write up to three responses each).

Discussion

Students markedly improved their confidence using genAI, intention to use genAI, and understanding of university policy after a single, 90-minute workshop. The increase in understanding and intention to use reflects findings from evaluations of AI literacy training (Kong et al., 2021; Yilmaz & Yilmaz, 2023). However, in this case, our workshop was much shorter, which suggests that students do not need extensive training in order to see positive results. It should be noted that this research was being conducted at a time when genAI is still relatively new to most students (Chan & Hu, 2023; Kelly et al., 2023). Over time, we would expect an introductory workshop such as this one to show less dramatic improvements in confidence and use intentions, as students will be starting from a higher baseline of familiarity with genAI.

At the start of the workshop, students indicated that they were primarily using genAI for non-academic and general purposes. By the end of the workshop, they had more specific uses in mind, particularly for planning and creating research terms for their assessment. Given that a low level of experience using genAI is a barrier for students (Biri et al., 2023; Chan, 2023a), we suggest that this may be overcome with specific prompt templates that were provided for each part of the assignment process. The only part of the assignment process covered in the workshop that was not reflected in students' intentions was understanding and applying their assignment feedback. Although providing clear, useful feedback before the assessment due date has been identified as one of the potential strengths of genAI (e.g. Escalante et al., 2023; Oliveira et al., 2023), encouraging students to read and apply feedback from markers is more challenging (Winstone et al., 2021).

Although the workshop had overall positive results, it is concerning that more than half of the respondents could not identify a specific method they could use to verify output from a genAI tool. The tool used for the survey (Mentimeter) did limit open-ended response lengths, so students may have struggled to articulate a method in just a few words. Nevertheless, the results are consistent with Shibani's (2024) observation that most students have a shallow level of engagement with genAI tools, and Ding et al. (2023) found that students place a high level of trust in genAI output. Hou et al. (2024) observed that students tended to fall into two dichotomous camps: either treating genAI as an expert, or understanding that genAI is a tool that they take responsibility for using; obviously, the goal of genAI literacy training is to shift students into the second camp. Genuinely critical evaluation and engagement with genAI tools will likely take longer to develop than a single workshop. Theophilou et al. (2023) observed that students improved their prompting strategies after a second workshop. However, another study by Sheese et al. (2024) found that over a 12-week introductory computer science course, students continued to use relatively simple prompts and did not effectively use the provided genAI tool (CodeHelp) to help deepen their understanding. Sheese et al. (2024) suggest that this could be avoided by providing genAI tools that provide feedback on the prompt itself before answering the student's query. Unfortunately, once students have developed their preferred process of engaging with genAI, it may be hard to change – as Bhatt and MacKenzie (2019) found, university students tend to develop ritualised processes of research and writing that lead to passive engagement with digital technologies.

Our participants displayed a similar understanding of AI-giarism to those of Chan (2023b) in that they clearly rated a low level of use as ethical and copy-pasting as unethical, but shared models of authorship with genAI tools sit in a grey middle area. This did not shift at the end of the workshop, despite the students reporting a greater understanding of the university policy on AI. Interestingly, Kerr (2024) reported that although a high proportion of their students stated that they did understand their university policy, upon further questioning, they believed it was completely banned, even though they were allowed to use it for learning purposes. In our participants, the shift in the planned use of genAI tools from life-related to helping plan and identify research strategies suggests that the students understood specific methods of using genAI for learning more clearly.

Participants in our study were voluntarily attending the genAI workshop as an extra-curricular in addition to their normal degree work. Adjunct workshops on various study skills and information literacies are commonly offered by universities, normally targeting new students to support them in adjusting to university expectations. While these workshops normally receive positive feedback from students (Ma, 2018) and improve grades and retention (Grills, 2017), attendance is often poor (Dougherty, 2022). We had good attendance at our genAI workshops relative to other academic skills workshops, but we still only directly reached less than one per cent of the entire student cohort. As central student support services, our workshop also focused on general information that is broadly relevant to learning skills and the assignment process. Discipline-specific, embedded content may reach more students and help them apply genAI more directly relevant to their programme of study (Kelly et al., 2023) and to create a more supportive environment for the development of AI literacy (Wang et al., 2023).

Limitations and future directions

In this research, we measured intentions rather than actual post-workshop behaviour. Although intentions are known to have a relatively strong relationship with behaviour, the correlation is by no means perfect (Webb & Sheeran, 2006), and longitudinal and qualitative studies would better

evidence behaviour change, such as the reflective journals used in Korte et al. (2024). There is also a possibility that students' responses were influenced by knowing that their responses would be visible to peers and used by researchers. Connors et al. (2019) found that even when survey responses are de-identified, the respondents experience a tension between wanting to give accurate answers to the researchers and wanting to give a socially desirable response.

Conclusion

As we continue to develop specific genAI workshops for students, we must evaluate the impact these workshops have on students' understanding of the policies, capabilities and limitations surrounding genAI, critical thinking skills, ethical usage, and their overall academic development. Our study highlights the impact of a brief genAI workshop on students' confidence, intention to use genAI, and understanding of university policies regarding AI usage. While previous literature has emphasised the importance of extensive AI literacy training, our findings suggest that even a single 90-minute workshop can yield substantial benefits. However, ongoing training may be required to improve students' ability to critically evaluate genAI output and reinforce digital literacy skills beyond introductory workshops. Universities need to include explicit teaching of AI literacy in their academic skills development practices and policies.

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Declaration

ChatGPT 3.5 was used to brainstorm titles, assist with the conclusion to this paper and grammar checking.
The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

Ethics approval was obtained from the Human Research Ethics Committee (2023-04561). Before the workshop, participants were informed about the study's purpose and provided with alternate methods of engagement if they did not want their data included.

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Appendices

Appendix A. Mentimeter questions

1. *Three five-point sliding scale questions from 'No/Not at all' to 'Yes/Very'*

How confident are you in the use of generative AI?

How much experience have you had with generative AI?

How well do you understand ECU's position on generative AI?

2. *One open-ended question*

What have you used generative AI for (Think of three things)

3. *Six five-point sliding scale questions, from 'Good/Correct use of AI' to 'Bad/Incorrect use of AI'*

John plugged a prompt into an AI copied and pasted the response & submitted it.

AI created the response. Jane read, edited, adjusted and submitted it.

John created multiple AI responses, used the best parts edited, and submitted.

Jane wrote the main ideas. AI generated a draft and offered feedback to improve.

John used the AI for ideas then wrote and submitted.

Jane wrote all the content without using AI.

4. *Four five-point sliding scale questions, from 'Good/Correct use of AI' to 'Bad/Incorrect use of AI'*

You

Your classmate

Your education institution

Your future employer

5. *One open-ended question*

What are some ways we can assess the output of generative AI? (Think of 3).

6. *One open-ended question*

What have you learnt in this workshop that you will use? (Think of 3 things).

7. *Three five-point sliding scale questions from 'No/Not at all' to 'Yes/Very'*

How confident are you in the use of generative AI?

How much do you think you will use generative AI in the future?

How well do you understand ECU's position on generative AI?

Appendix B. Codes for short-response answers: Before and after suggested codes

Code Name	Examples
Understanding	understanding concepts, help understanding the assignment topic, getting started, definitions, question breakdown
Planning	brainstorming, structure, generating ideas, planning, scheduling
Research	search terms, summarising, note taking, key words, alternative phrases
Writing	writing, expression , linking words
Editing	grammar checking, editing, proofreading
Feedback	I didn't see any, but leaving it in since it's one of the things mentioned
Other academic, including non-specific academic	exam prep, studying, 'assignment', time management, study schedules, programming, 'university', maths, coding, speeches
Work/Employability	emails, resumes, interviews
Life	fun, gym plans, recipes, art, advice, stories, experimenting or asking questions, writing letters
Nothing/No use	as a stand-alone term or 'haven't used it' or similar
Unclassifiable or unclear	'ethical use', 'drama'

Appendix C. Assessing GenAI Output

Code Name	Definition	Examples
Fact Checking	Student checks the facts in independent sources not provided by the AI	Fact check, cross reference, Google, Library, supporting evidence
Source Checking	Student checks the sources that are provided by the AI i.e. to make sure they exist or have the same information	Check references, find sources, read sources, checking the link, repeating the question to the same AI to check consistency
General Checking	Not clear if they are checking the fact or source specifically- the process of how to do so is not clear	Verify, check, legitimate, accuracy, credibility, critical
Language checking	Suggests proofreading or checking the tone	Grammar, proofread, tone
Unrelated	Answers that do not match the question asked	Project management, math, image processing