RESEARCH ARTICLE:

"Am I in Control of My Own Writing?": Training Postgraduate Candidates in the Responsible Use of Generative Artificial Intelligence in Academic Writing

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Abstract

There is concern in higher education about the widespread use of generative artificial intelligence (GAI) tools in academic writing. Consequently, many institutions are creating policies to regulate their use. Despite these efforts, the use of GAI continues to expand. With free GAI tools readily available, the issue to be addressed is their ethical and responsible use. This study addresses this issue through the evaluation of a training intervention that integrated GAI tools to enhance postgraduate students' academic writing skills. The research question addressed was: How does training and supporting postgraduate students in the responsible use of GAI tools impact their academic writing? The research design integrated formative, summative and reflective forms of evaluation. The study drew on Cultural Historical Activity Theory to analyse postgraduate students developing understandings of integrity in academic writing while using GAI tools. The study found that although initially impressed with GAI tools, participants became more critical over time. Drawing on insights from the study, a reconceptualisation of the role of GAI tools in postgraduate students' academic writing across disciplines is proposed, and guidelines for responsible implementation are made, ultimately contributing to the ongoing discourse on the intersection of technology and education.

Keywords: *generative artificial Intelligence; academic writing; activity theory; evaluation research*

Introduction

> *Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks* (Hawking, 2016).

The emergence of generative artificial intelligence (GAI) has stimulated both interest and concern regarding the application of these technologies in academic writing. "Generativity" is the "ability of a technology or technical system to create, generate, or produce new outputs, structure, or behaviour, beyond that envisioned by the system's originator" (Karanasios *et al*., 2021: 239). Key characteristics of GAI include "content generation, generalization ability, and reinforcement learning based on human feedback" (Nah *et al*., 2023: 247). Technological advances in state-of-the-art generative pre-trained transformers (PGTs) are progressing rapidly (Straume and Anson, 2022: 3) and such tools can now perform a range of language tasks and generate human-like responses. Although machine learning and natural language processing have been embedded within educational applications for many years, large language models (LLMs) have only recently reached mainstream users (Raiaan *et al*., 2024). A large language model is a form of GAI that uses deep learning techniques and very large data sets to analyse, summarise, or generate new content (Straume and Anson, 2022). The rapid adoption of GAI in higher education has forced academics to consider its optimal use (Hosseini *et al*., 2023). Widespread concern in higher education about the impact of GAI on teaching, learning and assessment has caused many institutions to create policies to

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regulate, limit, or prohibit the use of GAI (Bekker, 2024). Nevertheless, the use of GAI in education continues to expand (Hosseini *et al*., 2023).

An area that has received considerable attention is the use of GAI in academic writing (e.g., Adams and Chuah, 2022; Conroy, 2023; Dergaa *et al*., 2023; Khabib, 2022; Nazari *et al*., 2021; Shofiah *et al*., 2023). With free GAI applications readily available, the training of students in the ethical and responsible use of these applications has become critical (Raiaan *et al*., 2024). This is the issue that this study addresses through the evaluation of an academic writing intervention that integrated GAI tools to enhance the academic writing skills of postgraduate students across a range of disciplines. The context of this study is a postgraduate students' writing-for-publication workshop, in this case one that used GAI tools. The reason for introducing GAI tools was not only to keep up with the times, but also because practically all the postgraduate students were second language speakers of English, and could potentially benefit from learning how to use GAI as an editor or research assistant.

The research question that the study addresses is: How does training postgraduate candidates in the responsible use of GAI impact their academic writing? The novelty of this study is the use of a systemic level theoretical framework, namely Activity Theory, to reconceptualise the role of GAI in enabling an ethical and inclusive environment for postgraduate students' academic writing across disciplines, ultimately contributing to the ongoing discourse on the intersection of technology and education.

Review of the Literature: GAI in Academic Writing

AI applications have been commonly used in academic writing, for example: grammar checkers, citation managers, paraphrasing tools, and similarity detection software (Adams and Chuah, 2022). More recently GAI applications have become available to academic writers (Tang *et al*., 2023). This brief review of GAI tools in academic writing focuses first on potential positive outcomes, second on potential negative outcomes, and third highlights the ethical considerations involved in using GAI in academic writing intended for scholarly publication.

Potential positive outcomes

Several studies found that GAI tools had the potential to enhance academic writing and research efficiency (e.g., Adams and Chuah, 2022; Conroy, 2023; Dergaa *et al*., 2023; Khabib, 2022; Nazari *et al.,* 2021; Shofiah *et al*., 2023). ChatGPT, for example, was able to generate an academic paper from the data sets provided by scientists (Conroy, 2023: 444). Similar GAI technologies were found to both ease the burden of academic writing while also enhancing its quality, particularly regarding data analysis, reviewing literature and improving language style and fluency (Adams and Chuah, 2022: 170). GAI seems to improve students' academic writing in six areas: 1) idea generation, 2) content structuring, 3) literature synthesis, 4) data management, 5) editing and 6) ethical compliance (Khabib, 2022: 114). Some GAI tools performed research assistant-type duties, such as "summarising an area or a series of papers" (MacGregor, 2024: 4). The benefits of implementing GAI in academic writing extend to "personalized feedback" through which students were able to learn from their mistakes (Shofiah *et al*., 2023: 175). GAI-generated feedback was found to be non-threatening and improved students' competence in self-assessment (Hapsari *et al*., 2023). Shofiah *et al*. report that GAI tools provided multilingual support, enhanced collaboration and were interactive, thus provide "ease of access and inclusiveness" to diverse student groups (2023: 178). GAI-powered writing tools also promoted the "emotional engagement" of postgraduate students for whom English was an additional language (Nazari *et al*., 2021).

Potential negative outcomes

Many of the same studies that demonstrated the potential of GAI to enhance academic writing, also pointed out the challenges that the applications posed to academic integrity (Adams and Chuah, 2022; Conroy, 2023; Dergaa *et al*., 2023; Khabib, 2022; Nazari *et al.,* 2021; Shofiah *et al*., 2023). Even tools that seem quite straightforward, such as automated citation tools, could have negative outcomes as they replace a "critical appraisal of the literature", while facilitating "a rather thoughtless way of citing, requiring little scrutiny from the authors" (Horbach *et al*., 2022: 325). Accelerating research and writing processes are not desirable if they lead to a less reliable research study. GAI tools impact the speed and efficiency of tasks, but in doing so increase the "dangers of LLM hallucination and manipulation" (Bekker, 2024: 17). Hallucinations are a feature of LLMs and show that GAI systems are not always factually correct (MacGregor, 2024). The scientists who used ChatGPT to write a paper based on the data they provided, maintained that the result was "competent" but "not close to being novel" (Conroy,

2023: 444). Thus, while GAI tools can analyse large data sets, they are not able to analyse data at the same expert level as a human researcher (Dashti *et al*., 2023).

An overriding concern is "the separation of knowledge and the knower" (Blackie and Luckett, 2024: 2). For example, "traditional assessment tasks, such as writing an essay, can no longer uncritically be assumed to be evidence of learning" (2024: 4). This makes the role of the research supervisor or writing facilitator crucial in understanding the limitations of AI (Shofiah *et al*., 2023). Without such understanding students will "operate with a reductive understanding of …how science is practised" (Blackie and Luckett, 2024: 10). Overreliance on GAI is likely to result in underdeveloped academic writing skills (Shofiah *et al*., 2023), while Straume and Anson warn that:

> *If students do not see the need to read, engage with ideas, hone their thinking skills, and through these efforts, experience the joy of taking part in an enduring, scholarly conversation, they are missing out on the greater pleasures of fulfilment that come with (hard) work and engagement over time* (2022: 3).

Ethical Considerations

Integrating GAI into academic writing raises many ethical issues, including academic integrity and the potential for bias acquired from the GAI tool, as well as the overall validity of the research study (Shofiah *et al*., 2023). In the interests of transparency, it is necessary to declare the use of GAI in academic writing (Tang *et al.,* 2023). Brewen suggests four levels of declaration: 1) Has any text been *generated* using AI? 2) Has any text been *improved* using AI? 3) Has any text been *suggested* using AI? 4) Has the text been *corrected* using AI? (2024: 75). Concerns about the impact on the authenticity and credibility of academic work highlight the need to consider the limitations and threats posed by GAI, while foregrounding "ethical and academic principles, with human intelligence and critical thinking at the forefront of the research process" (Dergaa *et al*., 2023: 615).

Bekker suggests five tiers of GAI control: 1) banning its use, 2) using AI as proofreading tool, or 3) copyediting tool, 4) a drafting consultant, or 5) putting no limits on its use (2024: 16-17). In a study of policy documents related to the use of GAI in higher education, Saheb identified six overarching themes: "principles, the protection of personal data, governmental roles and responsibilities, procedural guidelines, governance and monitoring mechanisms, and epistemological considerations" (2024: 9). The possibility exists that GAI tools could make it easier for researchers to engage in dishonest practices such as "P-hacking", a practice in which "scientists test several hypotheses on a data set, but only report those that produce a significant result" (Conroy, 2023: 444). Plagiarism of original content is also a major concern when using GAI, and this raises the question of whether there should be a threshold for an acceptable amount of GAI-generated content, and also whether its frequent use, in the long term, would result in the production of similar information, structures, and written text in papers within the same field (Macdonald *et al*., 2023).

While GAI can support and enhance postgraduate students' academic writing, teachers should explicitly address issues of "fairness, accountability, transparency, bias, autonomy, agency, and inclusion" (Holmes *et al*., 2022: 504). In postgraduate teaching, it is also pertinent to raise students' awareness about threats to academic integrity and manage the risks associated with the use of GAI in academic writing. Yeo (2023) argues that it is not sufficient to train students in the use of these tools, for example, to "paraphrase, summarize, extend, and even create original texts with minimal original input", but rather to begin by "problematizing the use of these tools, and … raising questions about authorship and academic integrity". Holmes *et al*. (2022) argue that teachers should differentiate "between doing ethical things and doing things ethically, to understand and to make pedagogical choices that are ethical, and to account for the ever-present possibility of unintended consequences" (2022: 504).

Summary of the Literature on AI in Academic Writing

Table 1 shows the variety of GAI tools that are currently in use; these are categorised according to their functions, their potential positive outcomes, their potential negative outcomes, and the ethical considerations that their use in academic writing raises.

Table 1: Summary of the literature on GAI tools in academic writing

Function of GAI tool	Example of AI tool	Potential positive outcomes	Potential negative outcomes	Ethical considerations
Literature search	Citeseer	Finding relevant literature quickly	Superficial literature review	Reliability, bias
Citation management	Mendeley	Well organised references	Errors in references	Accuracy
Citation checking	Reciteworks	Correct citation formatting	Underdeveloped referencing skills	Accountability, agency
Reading texts	ChatPDF	Understand key ideas	Underdeveloped reading skills	Credibility, academic integrity
Paraphrasing and synthesising texts	Quillbot	Speed and efficiency	Underdeveloped paraphrasing skills	Transparency, bias
Figures and tables	Datawrapper	Constructs tables, graphs, and diagrams	Underdeveloped technical drawing skills	Accountability, agency
Content generation	ChatGPT, Gemini, etc.	Informative, feedback, suggestions	Hallucinations, over-reliance on the AI tool	Trustworthiness, plagiarism
Data analysis	ChatGPT, Gemini, etc.	Competent data analysis	Lack of original insights/critical thinking	Data security, originality, bias
Writing assistance	Jenni AI	Improved text through co-writing	Underdeveloped writing skills	Authorship, agency
Feedback	ChatGPT, Gemini, etc.	Improvement to text, self-assessment	Over-reliance on AI tool	Agency
Grammar checking, editing, proofreading	Grammarly	Clear, error-free writing	Underdeveloped writing skills	Authenticity
Plagiarism detection	Turnitin	Similarity checking, avoidance of plagiarism	Imperfect checks	Academic integrity

Theoretical Framework: Activity Theory

Activity theory is a useful framework for analysing the impact of technology within a human activity system (Kaptelinin and Nardi, 2009; Karanasios, *et al*., 2021; Yang and Kyun, 2022), including learning with "digital assistants" (Dolata *et al*., 2023: 57) and other GAI applications (Nah *et al*., 2023). An activity theoretical approach enables researchers to analyse "complex and evolving" practices (Foot, 2014: 329) and is therefore well suited to examining how the introduction of GAI might enable and/or constrain academic writing. Figure 1 represents a generic academic writing-for-publication activity system. Briefly, the elements refer to: 1) who the participants are (subjects), 2) what they are working on (the object), 3) how they are doing this work (tools), 4) how the roles are divided up (division of labour), 5) who else is involved with, or benefits from, the activity (community), and 6) the policies and cultures (rules) in which they operate.

In an academic writing-for-publication activity system (Figure 1), the subjects are postgraduate writers and the object that they are working on is a text that they are preparing for publication. The subjects use a range of tools and resources as well as writing facilitators to support the work of writing a publishable text. The community of significant others consists of the people who share an interest in and involvement with the object, such as journal editors and reviewers, as well as the wider disciplinary community who might read the published paper. The community "is always a community of multiple points of view, traditions and interests" (Engeström, 2001: 136). Relations between the subject and the community are mediated by the last two components. The rules usually have "cultural and historical dimensions" (Foot, 2014: 331) and regulate the subjects' actions on the object (the text), and their relations with other participants in the activity, and the division of labour, or "who does what" (such as main author and co-authors), including both the "horizontal" division of tasks and the "vertical division of power, positions, access to resources, and rewards" (Foot, 2014: 331). The activity system is oriented towards the outcome, in this case a published article. The subjects represent postgraduate writers using GAI, as well as other tools and resources, with the object of writing a publishable academic text. The academic community and the "rules" of academic writing are important as meeting their standards is needed for the text to be published. The use of GAI, with its ability to generate content, to provide feedback, and to edit, bring about new possibilities, as well as potential challenges to the writer and the text (Nah *et al*., 2023).

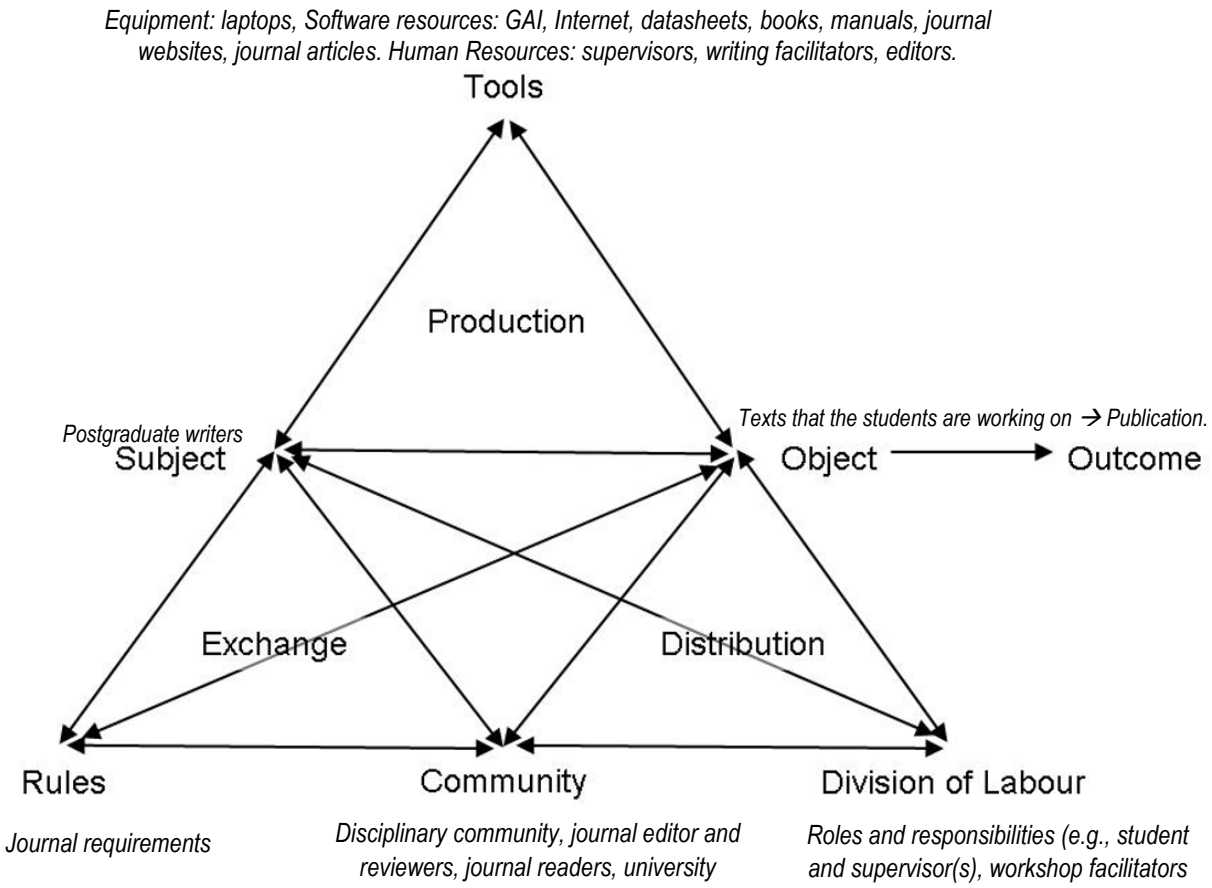

Figure 1: An academic writing-for-publication activity system (Adapted from Engeström, 2001).

Contradictions in the Activity System

In all activities, people experience difficulties, conflicts, and dilemmas, which are underpinned by "historically accumulated contradictions" (Engeström, 2001:137). Such contradictions are not entirely negative, as they can motivate people to seek innovative solutions and to find new ways of working. These new ways of working often require fresh ideas that have not previously been thought of. Developing new ideas requires innovative ways of thinking about academic writing and making these ideas progressively more concrete. Thus, in activity theory, contradictions are the "motive force of further change and development" (Engeström, 2001: 139). By analysing the contradictions brought about by GAI tools in the activity system, we can begin to envision an improved system. In this paper we focus on two levels of contradiction:

1. Contradictions within a node of the activity system (e.g., the limitations of GAI);
2. Contradictions between nodes of the activity system (e.g., the appropriateness of the GAI tool for achieving the object).

Methodology

In much educational research, there are intersections between research and practice, researchers, and practitioners. This was the case in this study. The description of the research methods below explains the different strands of educational intervention, evaluation research, and their inter-relationships.

An intervention in the form of a two-day writing-for-publication short course that integrated GAI tools, was offered to postgraduate candidates across a variety of disciplines. The short course included training on GAI tools that could provide constructive feedback on writing, assist with structuring, and so on. A critical approach to the strengths and weaknesses of AI tools was central to the training and frequently discussed by the group. Because the facilitators had not engaged in such training before, an evaluation process including formative, summative, and reflective feedback were elicited during and after the workshops. Ethics clearance was obtained from the Education

Faculty's Research Ethics Committee to conduct the evaluation and to use the evaluation data for course improvement and scholarly publication.

The evaluation framework, developed from both the research literature and theoretical framework, was used to analyse the extent to which GAI tools enabled positive or negative outcomes, as well as a consideration of the ethical implications of GAI-support writing practices. The research design thus comprised a "theory-driven evaluation" (Chen, 2006: 75). In their classic study Chen and Rossi point out that a major problem in programme evaluation is the adoption of "conventional, common-sense understandings of social problems and their treatments, without considering the appropriate social science theory" (1980: 107). Coryn *et al*. (2011), in a meta-analysis of theory-driven research, found that theoretical approaches were key in designing rigorous evaluation projects. For this study, a mixed method approach including formative feedback, summative evaluation, and reflections were used (Table 2). This approach is justified by the nature of online training, including the need for immediate formative feedback, as well as externally facilitated generic summative feedback, and longer-term reflection on how students were using GAI in their academic writing activities.

The participants comprised fifteen postgraduate candidates who attended the writing-for-publication short course and three course facilitators. The postgraduate participants provided formative feedback in the MS Teams chat feature (this feedback is attributed as C1-C15), eleven participants completed the online external evaluation form, and seven postgraduate participants submitted their reflective feedback (attributed as P1 – P7) six months after the short course. The three facilitators (attributed as F1 – F3) each wrote individual reflective reports.

Table 2: Summary of data collection and data analysis methods

Type of data	Source of data	Data collection method	Unit of analysis	Data analysis method
Formative	Feedback from postgraduate participants in the MS Teams chat (C1-15) (n =15)	Extracted comments posted during the workshop	The academic writing activity system	Level 1: description of activity system; Level 2: contradiction analysis
Summative	External (postgraduate office) (n =11)	Provided by postgraduate student centre		
Reflective	Postgraduate participants (P1-7) (n = 7) and facilitators (F1-3) (n = 3)	Post-workshop structured participant reflections and unstructured facilitator reflections		

Analysis methods

The evaluation data were analysed using the theoretical lens of activity theory to understand how postgraduates' academic writing was enabled and/or constrained in the application of GAI tools (Figure 2).

Table 3: Example of two levels of data analysis

Participant	Reflective Evaluation	Activity Elements	Contradiction Analysis
3	I think we all have different individual attitudes towards AI and we all have different levels of confidence in our own research skills. I think the danger is in using AI too much, being too dependent, before you build your own knowledge and writing skills – without AI. Otherwise you are passing on your learning to AI. AI should only be used once you know how to do research and to write yourself. It's like using a calculator. First learning to do arithmetic otherwise you can't do anything without a calculator. The same with ChatGPT or other AI tools.	**Subject** (different attitudes, different levels of confidence); **Tools** (too much, too dependent… cf calculator – passing on your learning); **Outcome:** – Build own knowledge	**Secondary: Subject-Tool** (impact on subject's agency); **Secondary: Tool-outcome** (too dependent… can't do anything)

Findings: Writing for Publication as an Activity System

In the following subsections we draw on the evaluation data to unpack the complex relationships between writers, GAI tools, and their texts. The intention of the intervention was to support postgraduates in writing up their studies

for publication. In preparation for the workshop prompts were "worked on and refined" (F1). The prompts had to do with generating ideas, obtaining generic information (such as statistics on a particular issue) and with giving feedback. The students were also shown how they could train the GAI tool to edit a piece of text in alignment with their chosen journal's style requirements. The thinking behind the intervention was that many postgraduates were already using GAI tools in their writing endeavours: "so rather approach it transparently and encourage them to use the tool responsibly" (F2). F3 similarly supported the need for students "to know about these tools and how to use them effectively", but also "to understand the potential hazards to their learning that can result from indiscriminate or excessive dependence on these tools". Consequently, almost every PowerPoint slide that introduced a GAI activity, included a caveat, such as the following example:

> *We need to be critical about what GAI produces, always check for bias and accuracy, and ensure that we are using the power of GAI ethically. Be guided by research ethics and integrity (PowerPoint slides, Day 1).*

"The pros, the cons, and the hallucinations"

The postgraduate candidates' formative and summative feedback on the use of GAI tools in academic writing was largely positive. One of the first activities required participants to adapt and apply the following prompt:

> *I want to write an article titled [provide title] for [provide journal name] on [describe your study – or insert your abstract]. Could you please suggest an outline for the article? (PowerPoint slides, Day 1).*

The participants "were completely blown away by what the GAI assistant could do" (F1). They found the article outline "helpful" (C1), "informative" (C2), "insightful" (C3), "wonderful" (C4) and "amazing!" (C5). C4 wrote:

> *From generating an outline to checking the references the AI tools were very useful. The AI tools were very inspiring and my engagement was higher than usual in such workshops.*

For English second language students, "the language checks and how AI helped them to incorporate terms and words they were unfamiliar with or did not clearly understand" was particularly appreciated (F2). Additional applications of the tool, such as for data analysis and feedback on an existing piece of writing were also found to be useful. P1 reflected: "I was worried about how to handle [data analysis] but … [GAI] has clarified this". P2 "got feedback" which was "very constructive". Participants were impressed with the detail of the feedback provided by GAI tools, as well as the constructive suggestions for improvement. There appeared to be consensus (amongst participants and facilitators) that the GAI tools were useful for checking "one's understanding" (C2). providing constructive feedback (P2), suggesting an outline (C4), and as "an assistant in quickly recalling information and concepts" (F3).

The summative feedback conducted by the postgraduate office shortly after the course used a Likert scale of 1 – 10. A generic format was used – in other words it was not specific to the use of GAI tools in the writing-for-publication short course. The summative feedback nevertheless indicated participants' high levels of satisfaction (Figure 3).

Figure 3: External summative feedback on the writing-for-publication short course

In both formative and summative feedback, participants were enthusiastic about the short course. However, in the reflective data, gathered six months after the intervention, participants were less enthusiastic and more concerned about the impact of GAI on their writing. While many continued to use AI tools, for example "for language and grammar checks, fixing references, and gaining critical feedback on my draft writings" (P1), a more cautionary note had entered the reflections, with students asking questions, such as:

> *How far should scholars go in terms of using AI. … Will there still be authentic researchers out there? (P2)*

Others appeared to be irritated that the tools were not able to do all the work, for example, regarding reference checking:

> *I asked the [GAI application] to please correct all the references in the right APA style. It did that well. But where there was a page number missing I had to find that myself. Also, the doi links I had to insert myself. (P4)*

A hope for AI, shared by several participants, and evident in the literature (e.g., Straume and Anson, 2022), was that:

> *researchers and doctoral students might find that AI tools can help them with the more boring or mundane tasks and free up their minds for creativity and critical thinking. How can we maximize the good and limit the bad? (P6)*

The facilitators, while acknowledging the potential of GAI, were similarly critical in their reflections. For example, F1 wrote:

> *I am quite shocked at [the GAI tool's] lack of discernment – it can say something is good, when in my opinion, it is very superficial and uncritical. I have also found that the LLMs … are not very good at generating academic text.*

So why was there a shift from enthusiasm to critique of GAI tools?

Discussion: A Contradiction Analysis of GAI for Academic Writing

A contradiction analysis was conducted to identify primary contradictions within the GAI tool itself, and then to identify secondary contradictions between the GAI tool and "object", and the GAI tool and "subject".

> ***Primary contradiction: GAI tools "do not adhere to the ethical norms of academic writing"***

GAI tools have a non-specialised generative capacity (Nazari *et al*., 2021), in other words, they are not specifically designed for academic writing, and do not adhere to the ethical norms of academic writing, as F2 reflected:

> *In the rush to train the tools there was no attention to copyright or even accurate referencing. If AI accessed data without the necessary permissions, and if you use the output of AI as it is, you become the author who has plagiarised the information from the original source.*

GAI tools violate academic norms of accuracy and transparency:

> [GAI tools] can mislead and make up information. The lovely word used is 'hallucinations' but these are the untruths that you can take on as if they are factual and the fault will be yours and not that of the AI tool.

Writers thus need to be aware of the dangers of appropriating the words of the tool into their own writing and should "resist the urge to use AI to do the work for us and avoid the traps of unethical practice" (F2). GAI technology, though remarkable, has deep flaws (Yeo, 2023), for example, it retains the biases of the material it was trained on, as well as from the sources from which it indiscriminately collects information (Shofiah, *et al*., 2023: 178). P6's reflection is a case in point:

> *In the workshop we learnt that AI tools are sometimes biased – racially or in terms of social class and/or gender. So, is there the potential for AI to introduce bias into my research process?*

The challenge that writing facilitators need to address is that GAI is "here to stay" and, unfortunately, "rules and regulations are not going to ensure ethical use by students" (F2). Moreover, GAI tools are constantly changing, which makes them difficult to regulate. P6 expressed the view that because of these challenges, it is important not to ignore GAI tools, but to engage in critical thinking and "deep discussion":

> *You are doing a good job by not ignoring these tools – we need to know more about them and think critically about them. There could maybe be more place in the next workshop for a deep discussion on the tools and what it means for us as researchers and growing to be experts in our field.*

Secondary contradiction 1: GAI tools "displaced the object"

A contradiction between the tool and object is common when a new tool is introduced into an activity system (Dolata *et al*., 2023). In this case participants shifted their energies away from the writing task (object) and focussed instead on mastering the new GAI tools. In activity theory, a tool/object reversal describes a situation where the intended function of the tool become the central focus, or object (Kaptelinin and Nardi, 2009). GAI was intended to be a tool to support academic writing, but instead it displaced the object. For example, no participants reported on their actual writing in their formative or reflective evaluations because the GAI tools were all consuming. P2 explained that she had become "addicted" to AI tools:

> *I use AI tools for research every day, for example Research Rabbit and Connected papers to get related papers for literature review. Yes, I think I am now addicted to AI tools. I use Gemini, ChatGPT and Claude to understand text from research articles or books. I use PoPAi and ChatPDF to summarise research articles, Quillbot for paraphrasing. I use Consensus for literature review or theoretical framework outlines. I use a lot of AI that is not listed in this space. Every day I get a new link on twitter from renowned researchers and I try it.*

Secondary contradiction 2: "Who's in control?"

As students became more familiar with the tools over time, they also became more aware of potential negative outcomes, as implied by P3's desire to "keep control" of her own writing and to use generative AI to enhance her writing, rather than "do" the actual writing.

> *I see [GAI] as a complementary tool that can enhance my research and my writing. Yes, I use AI for specific tasks, but I still keep control over the overall research and writing process. So, I use AI to improve the quality of my writing, but not to do my writing.*

Growing awareness of potential negative impacts led students to become more critical of GAI:

> *I was worried about data privacy. My thesis is my own original work. So, if I put my findings into ChatGPT and ask it to analyse it, how does it handle my data? I don't want people to know about my findings and my study before my thesis is complete and the article is published. Is ChatGPT compliant with data protection regulations? (P5).*

As well as raising justified concerns about data security, P5 highlighted the importance of "thinking critically" when using GAI, expressing a concern that people might "rely on the tools rather than use their own brains":

> *I don't want to rely on AI because it could negatively affect my expertise or critical thinking skills … I am also less impressed with AI-generated content because it lacks a certain depth. … I would worry about the validity of my research if I was using these tools or rely on these tools too much.*

There was the fear that because technology "has no moral compass our human moral compass may [shift] to accommodate poor practice" (F2). P4 reflected:

> *I am very glad that I did my thesis before I knew about [GAI]. I don't know if my thesis would have been better or worse than it is. But somehow, I feel that these AI tools … they make your studies more complicated.*

In the context of GAI in learning analytics, Yan *et al*. make the point that "the lines blur between learners and GAI tools"; they therefore argue that a "renewed understanding of learners is needed" (2024: 101). A similar argument could be made for rethinking the role of the writer in an age of GAI writing tools. A core premise of activity theory

is that "subjects act upon objects, and that tools mediate this process" (Karanasios *et al*., 2021: 242). However, the relationship between the postgraduate writer and the GAI tools used was more complex and dynamic than previously experienced. These tools might potentially replace the writing subject. Instead of GAI doing the mundane tasks and leaving the writer with more time to devote to complex and creative tasks, GAI could create a subject-tool reversal. Such a human-technology relationship "differs radically from that described by early activity theorists" (Karanasios *et al*., 2021: 242).

The contradiction analysis showed that, while GAI might have solved some writing problems, it created new challenges. For example, its limitations caused it to fail to meet academic writing standards. The difficulty in distinguishing between GAI-generated content and human-generated content raises concerns for publishing. These challenges imply the need for further development and specialisation of GAI tools for academic writing.

Concluding Reflections and Implications: How was Academic Writing Impacted?

So how did training postgraduate candidates in the responsible use of AI tools impact their academic writing? Addressing the research question proved to be complicated. Of particular concern for the facilitators was that in the months following the intervention several participants had submitted a research article in which the reliance on GAI tools was obvious:

> *What I found disappointing was that one of the participants submitted a paper that contained large chunks of text cut-and-paste straight from [the GAI tool]. And this after explaining the dangers, academic dishonesty, and possible consequences (I sent it straight back!) I have increasingly come across text in students' work that looks suspiciously as if it is AI generated (F1).*

Despite the warnings and caveats there was evidence of the misuse of GAI tools:

> *Unfortunately, though the responsible use of AI was stressed some students did not heed the advice and check all references and, in many instances, provided lengths of text with no references. The transparent acknowledgement of the use of AI was also not evident … (F2).*

The contradiction analysis showed that the use of sophisticated GAI tools is complex. The tools themselves were not designed for academic writing, which implies the need for potential academic authors to have a deep understanding of what it means to disseminate research findings through scholarly publication. Because the tools are remarkable, they tend to distract, or even separate, the writer from the object of scholarly writing. The impact of the tools on the writing subject is of particular concern. Is it possible, a participant reflected, that once having used GAI tools in an academic writing project to regain "control over the overall research and writing process?" (P3). Wresting back control of our own writing requires us to appreciate the scholarship demanded in academic writing. As several participants and facilitators pointed out, potential authors need prior competence in academic writing before using GAI tools as this will enable a more critical approach to the tools. P3 drew an analogy between writing with GAI tools before one understands the process of academic writing with using a calculator to learn arithmetic:

> *I think the danger is in using AI too much, being too dependent, before you build your own knowledge and writing skills – without AI. Otherwise you are passing on your learning to AI. AI should only be used once you know how to do research and to write yourself. It's like using a calculator, first learn to do arithmetic otherwise you can't do anything without a calculator. The same with [GAI tools].*

A limitation of the study is that workshop participants had different levels of writing ability and confidence. In retrospect, candidates for an intervention that uses GAI tools probably need some academic writing competence before participating in training on GAI tools. Such writers would be less inclined to use GIA blindly, assuming that everything GAI produces is fact and "as if we can trust the tool to do our writing for us without our human and insights interrogation of the answers to our questions" (F2). But at the same time GAI tools are useful for new writers, for example, they can edit writing, or act as an assistant that can provide facts and concepts. As F3 pointed out, these features "can certainly help to speed-up the processes of writing and improve the standard of writing that is needed in constructing a quality paper". The implications of the study are therefore that more training on academic writing (with and without GAI), more research on GAI for new writers, more sharing of practices with GAI writing tools, and more open discussions on their strengths and limitations is necessary.

> *I think that it's important to teach more about AI tools. These are the tools we will all be using in future. Probably by the next [Writing-for-Publication course] there will be better and more AI tools. It's a learning process and a steep learning curve (P6).*

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