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The Impact of Artificial Intelligence (AI) On Postgraduate Studies at A University of Technology (UoT)

Sehlabaka Johannes Motsie

Research Department, Vaal University of Technology, Andries Potgieter Blvd., Vanderbijlpark, South Africa.
Email: sehlabakam@vut.ac.za

Abstract

The use of Artificial Intelligence (AI) at higher education institutions (HEI) in South Africa has emerged as a transformative academic tool that is aimed at advancing teaching, learning and research. This research study was aimed at investigating the use of AI in academic writing for master's and doctoral students at a University of Technology (UoT) in Southern Gauteng South Africa, with specific focus on ethical application and AI impact on postgraduate studies. This qualitative study explored how postgraduate students at a South African University of Technology use generative AI particularly ChatGPT tool for academic writing and research projects. The researcher analysed open ended questionnaires and interviews with 59 students across two faculties using thematic analysis. Many students reported efficiency gains in idea generation, outlining, and language editing, including concerns about information accuracy, authorship, and dependence on the tool. The study found that unregulated application of AI may impact negatively on postgraduate student's academic writing skill, critical thinking and increases integrity risks where assessments rely on the use of AI tools alone. The researcher proposes a balanced approach combining clear AI use policies, early ethics education, and assessment redesign emphasizing process evidence (e.g., drafts, protocols, and oral defences). The findings inform practical governance for the institution seeking to harness AI while safeguarding quality and integrity in postgraduate studies. The study also acknowledges that, although AI tools facilitate idea generation and technical tasks, it may however undermine the value of academic writing, critical thinking, overreliance and quality on research outputs. To uphold ethical standards and preserve intellectual rigour, the study advocates for a more balanced application in the use of AI for master's and doctoral studies for the development of critical scholarly advancement.

Keywords: *Artificial Intelligence (AI), ChatGPT, University of Technology (UoT), Postgraduate Student, Academic Writing.*

1. INTRODUCTION

Artificial intelligence (AI) is a broad field within computer science that focuses on developing intelligent systems capable of performing tasks that traditionally require human application. Within the higher education sector, AI has emerged as a transformative technology with the potential to enhance postgraduate student engagement and support research development. However, its impact on academic writing and the broader research environment remains a topic of debate among scholars. This study explored the complexities surrounding the use of AI in academic writing for master's and doctoral studies at a University of Technology (UoT) in Gauteng. Although the adoption of AI in South African higher education institutions is still at an early stage, its influence on teaching, learning, and research is becoming increasingly evident and concerning.

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AI tools such as ChatGPT are reshaping how higher education institutions operate in an era characterised by rapid technological advancement. In postgraduate studies, the use of AI represents a meaningful shift towards blurring the boundaries between formal and informal learning, potentially supporting student success and fostering innovation **[1].** Despite these possibilities, the full potential of AI within postgraduate academic writing has yet to be fully realised.

In recent years, the notable rise in research outputs and student throughput rates across South African universities can be linked to the integration of digital technologies in teaching and learning. AI tools have transformed postgraduate research practices by streamlining academic writing and increasing the efficiency of research-related tasks. Tools such as ChatGPT have altered how postgraduate students and researchers gather information, construct arguments, and disseminate knowledge and information **[2]**.

Nevertheless, the use of AI in postgraduate studies also poses significant challenges. Concerns have been raised about academic integrity, the authenticity and originality of AI-assisted research writing, and the reliability of AI-generated information, particularly in data analysis **[3]**. The ability of AI systems to produce human-like text may blur the boundaries between genuine authorship and machine-generated content, potentially encouraging unethical academic practices and dependency on the tool **[4]**. Additionally, overreliance on AI tools may hinder the development of critical academic skills, including analytical reasoning, scientific writing, and independent research competence, particularly among postgraduate students and early-career researchers **[5]**.

2. PROBLEM STATEMENT

The adoption of AI in higher education provides immediate feedback and support for academic tasks, benefiting both staff and postgraduate students. Yet, alongside these advantages, AI can pose risks to human development if used uncritically. In South Africa, the integration of tools such as ChatGPT into postgraduate study has introduced challenges, including overreliance that may impede students' independent research, critical thinking, and problem-solving **[6]**. There is also concern about the dissemination of inaccurate information and the facilitation of academic dishonesty, as some students may use AI to complete research tasks without fully engaging in the learning process.

At the same time, AI's intuitive, human-like interactions make it attractive to both students and supervisors, and its capacity to incorporate feedback can enhance performance over time **[7].** To realise these benefits while safeguarding academic integrity and intellectual growth, institutions should promote responsible use that strengthens critical thinking and establish clear ethical standards for postgraduate research.

In India for example, postgraduate students use AI to strengthen reading, writing skills and complete research projects in a timely manner, though ethical concerns persist **[8]**. AI tools also enhance writing and support the language-editing process for both students and academics **[9]**. To improve academic writing, students in both postgraduate and undergraduate programmes increasingly rely on ChatGPT's digital writing assistance. **[10]** emphasise the importance of supporting postgraduate students to acquire new knowledge, develop research competencies, and gain access to resources. Moreover, ChatGPT facilitates exploratory enquiry and can help produce error-free academic prose **[6]**.

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Fatimah (2024) **[11]** highlights AI's role in fostering confidence and enthusiasm for research by providing scientific guidance, arguing that AI offers both academic and personal support throughout the research journey. Consistent with this view, ChatGPT enables rapid adaptation to students' developmental needs by providing ready access to research information and promoting a more resilient research experience **[12].**

3. THE IMPACT OF AI ON TEACHING, LEARNING AND RESEARCH

AI is reshaping postgraduate teaching and research by providing on-demand information, personalised support, and new modes of feedback and collaboration. ChatGPT offers valuable opportunities for research support, especially for postgraduate students. **[13]** emphasise that AI can transform how students generate ideas and produce text, thereby improving the efficiency of academic writing. **[14]** similarly highlight AI's potential to modernise traditional teaching, learning, and research by facilitating structured collaborative discussions, delivering timely feedback, and serving as a virtual tutor for independent study. In language education, postgraduate students can use ChatGPT to create adaptive and engaging learning environments **[15]**. In addition, AI can assist with the design of learning tasks and assessments, inform teaching strategies, and help optimise workload. ChatGPT also supports research processes—including medical writing—and can act as a clinical assistant for health professionals. **[16]** argue that ChatGPT is a versatile tool for improving academic and professional work, driving productivity and innovation across disciplines.

Despite these advantages, AI also presents significant challenges that warrant careful attention. A key risk concerns academic credibility and integrity. Academic misconduct may arise if postgraduate students fail to acknowledge sources appropriately when using AI-generated content **[17]**. **[18]** show that advanced tools such as ChatGPT can evade plagiarism-detection systems like Turnitin, potentially encouraging some students to submit AI-generated text as their own. Indeed, postgraduate students who use ChatGPT for research projects may be more likely to commit plagiarism than those who do not **[19]**. Researchers further caution that reliance on AI can hinder supervisors' ability to assess students' authentic academic writing and comprehension, complicating early intervention and support **[20]**.

Additional concerns include the potential generation of harmful content and the associated risk of unethical behaviour **[15]**. **[14]** emphasise the hazard of AI dependency, whereby heavy reliance may weaken intellectual growth, critical thinking, and academic writing. AI tools may also facilitate other forms of academic misconduct, including cheating and uncredited text generation. Plagiarism-detection software sometimes struggles to distinguish AI-generated content from human-written text **[21]**. Ethical issues such as user privacy, data security, and bias in training data remain pressing **[14]**. Researchers therefore call for clear guidelines to ensure ethical and responsible use of ChatGPT **[6]**. Empirical evidence reinforces these challenges, particularly in relation to plagiarism and deception **[22]**. **[19]** finds AI-generated text to be more common among ChatGPT users' submissions, and report that some students admit copying chatbot-generated text without proper citation, often out of convenience. Consequently, several studies emphasise the need for strict policies governing AI in higher education **[23]**. Ready access to AI-generated responses can displace students' own analysis and writing with direct implications for competency. Overreliance on ChatGPT may impede the development of essential research skills, creativity, critical thinking, and problem-solving **[24]**. Moreover, questions remain about the quality and reliability of ChatGPT's outputs, which sometimes rely on unverified data **[25].**

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4. METHODOLOGY

This qualitative, cross-sectional research study explored postgraduate students' experiences with ChatGPT in their research projects academic writing. Participants were 59 postgraduate students from two faculties at [institution], recruited via [convenience/stratified/purposive] sampling. Data collection used a questionnaire with open-ended items administered online in the second semester of 2025 academic year.

Data analysis followed a thematic analysis approach of Braun & Clarke's six steps, with independent coders using NVivo/Atlas.ti/Excel. Coding disagreements were resolved through discussion/consensus, and an audit trail was maintained. Trustworthiness was strengthened through peer debriefing, reflexive memos, and thick description. Ethics approval was obtained from Central Ethics Committee, and all participants gave informed consent.

The questionnaires for this study were developed by the researcher. Informed consent was received from all participants and the researcher emphasised that participation in the study is voluntarily, there were no coercion for participating in the study and when the researcher used modern technology, such as online teams' meeting recordings to collect data, all participants were informed, and consent was given. Vaal University of Technology, **CENTRAL RESEARCH ETHICS COMMITTEE (CREC) Dr SJ Motsie - VUT CREC Ref No 27-10-2025-8.7**

5. FINDINGS AND DISCUSSION

About 65% of the respondents were enrolled for master's qualifications, while 35% were registered for doctoral qualifications across two faculties in various departments at this University of Technology. Of the total respondents, 52% were male and 48% were female. Regarding age distribution, 20% of the participants were between 20 and 25 years old, 34% were between 25 and 30, 22% were between 30 and 40, and 13% were between 40 and 50 years old, while 11% selected the "other" category.

The findings indicate that ChatGPT can enhance postgraduate students' critical thinking and academic writing when used responsibly and ethically to support research projects. Students reported benefits for digital writing, brainstorming, learning new approaches, and information access and analysis, aligning with prior work showing widespread use of ChatGPT to strengthen writing processes.

However, overreliance on AI can hinder the development of independent academic writing and critical-thinking skills, raising concerns about research integrity and the verification of AI-generated content.

Participants and prior studies noted that ChatGPT may sometimes produce misleading or inaccurate information, and that its use can enable unethical behaviour, including plagiarism. The risks extend to data privacy, security, and bias in training data. These concerns underscore the importance of clear institutional guidance and responsible-use practices to protect academic standards.

Empirical evidence cited in the literature supports these results: AI-generated text can be difficult to detect, even with plagiarism-detection software, and some students admit copying chatbot text without proper citation, often for convenience. Overreliance may impede skills development (e.g., problem-solving, creativity, and critical thinking) and complicate supervisors' ability to assess authentic writing and comprehension. Consequently, recent

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studies call for robust policies to govern AI use in higher education, alongside skills-building initiatives that promote critical engagement with AI and verification of outputs.

Key Findings from the Study

- **AI as a support tool**
  - Used for brainstorming, grammar checks, literature review, and data analysis.
  - Helps postgraduate students streamline research tasks and overcome writing barriers.
- **Ethical concerns**
  - Risk of plagiarism and compromised academic integrity.
  - Difficulty in distinguishing between original student work and AI-generated content.
  - Questions about fairness and transparency in research outputs.
- **Impact on skills development**
  - Potential decline in critical thinking and independent academic writing.
  - Overreliance on AI may weaken the intellectual rigor expected at master's and doctoral levels.
- **Balanced approach advocated**
  - AI should complement—not replace—human scholarly effort.
  - Institutions must set clear guidelines to preserve integrity and ensure responsible use.

The real challenge isn't whether AI should be used—it's **how** it should be integrated. If students treat AI as a *thinking partner* rather than a *shortcut machine*, it can sharpen their research work. For example:

- Using AI to generate multiple perspectives on a topic, then critically evaluating them.
- Employing AI for technical tasks (grammar, formatting, coding) while reserving analysis and argumentation for the student.
- Treating AI outputs as raw material to refine, not final drafts to submit.

This way, AI becomes a **catalyst for deeper inquiry** rather than a crutch that undermines intellectual growth.

Key Risks in Applying AI in Postgraduate Studies

1) **Bias** — Models can reproduce or amplify biases present in training data, leading to unfair outcomes.
2) **Misinformation** — AI may generate inaccurate or fabricated content, undermining learning quality.
3) **Academic Misconduct** — Students may use AI to produce uncredited work, including plagiarism and contract cheating.
4) **Technological Dependence** — Overreliance can erode intellectual autonomy and reduce critical engagement.
5) **Weakened Problem-Solving** — Heavy use may displace opportunities to practise analysis, synthesis, and argumentation.

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6. CONCLUSION

AI particularly ChatGPTis already reshaping postgraduate education and will continue to do so **[26]**. Realising its benefits for academic writing, critical thinking, and student engagement depends on responsible and transparent use that keeps academic integrity and human judgement at the centre of teaching, learning, and research. Supervisors and researchers play a pivotal role in setting expectations, modelling appropriate practice, and guiding students to verify sources and critically evaluate AI-generated content **[26]**.

At the same time, the risks are material. Overreliance can erode independent reasoning and writing; misuse can facilitate plagiarism and other unethical practices; and unresolved issues around data privacy, security, and bias require sustained institutional attention. The concentration of AI development among large technology companies further complicates the landscape, as corporate incentives may not always align with the public good, underscoring the need for careful, critical scrutiny by higher education institutions.

Overall, there is broad consensus that supervisors, researchers, and university leaders must work together to ensure responsible integration of AI in postgraduate studies. With clear guidance and well-designed learning activities, students can use AI to enhance their academic writing, strengthen critical-thinking, and improve research productivity, while safeguarding academic integrity and scholarly values.

The notion of radical transformation on higher education institutions through AI is still far from reality. Higher education systems are more complex, and technology alone cannot address the diverse objectives and the limitation on human learning **[27]**. ChatGPT is transforming higher education by supporting language acquisition, academic writing, and research across disciplines. It provides language learners with opportunities to strengthen communication, and it assists students and academics with drafting, summarising, debugging, and rewriting. At the same time, meaningful risks remain. Concerns about academic misconduct, dependency, and the ethics of AI-generated content underscore the need for clear, enforceable policies that promote responsible, transparent use. While ChatGPT can enhance learning outcomes and engagement, its potential for misuse warrants careful regulation, supervisor guidance, and explicit disclosure and verification practices. The integration of ChatGPT in academic settings should continue to be refined as evidence accumulates. Future research ought to examine variation across disciplinary, institutional, and pedagogical contexts to determine where the technology adds the most value and where stronger safeguards are necessary. This paper contributes to that conversation by highlighting both the advantages and the constraints of ChatGPT in academia, and by identifying the need to strike a deliberate balance between utility and ethics.

7. STUDY LIMITATIONS

This research study relies primarily on current existing literature, which may not capture the earliest technological developments in AI or its evolving applications within higher education sector. Given the rapid pace of change, findings from earlier publications may be superseded as tools such as ChatGPT and their institutional uses develops. Several reviewed studies lack first-hand data in South African content from postgraduate students, limiting insight into lived experiences, challenges, and benefits. The quality and reliability of secondary sources also vary, introducing potential bias and incomplete representations of AI’s impact. Finally, regional variation may constrain transferability: contexts such as Southern Africa,

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where access to infrastructure, digital tools, and academic support can be unevenly distributed and may shape applicability and generalisation.

8. RECOMMENDATIONS

South African higher education institutions together with the Department of Higher Education, (DHET) should establish clear policies and procedures governing the responsible use of AI tools such as ChatGPT. Postgraduate students must be held to zero-tolerance standards for plagiarism and undisclosed AI-generated content, with expectations and consequences outlined in institutional policies. For research projects, programmes should deploy approved AI-detection and verification practices judiciously, recognising their limitations and requiring human review.

Ethics education on AI should begin early in the research lifecycle—at proposal and methods stages—and be delivered collaboratively by supervisors, researchers, ethics committees, and research administrators. Training should cover disclosure norms, verification of AI outputs, data privacy, and discipline-specific use cases to ensure responsible and equitable integration of AI in postgraduate studies.

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