

Integrating Artificial Intelligence in Postgraduate Supervision: Emergent Opportunities, Challenges, and Strategic Responses for Institutions

Obrain T. Murire¹ 

Bramwell K. Gavaza² 

AFFILIATIONS

¹Faculty of Engineering, Built Environment & Information Technology, Walter Sisulu University, East London, South Africa.

²Faculty of Management & Public Administration Sciences, Walter Sisulu University, Butterworth, South Africa.

CORRESPONDENCE

Email: omurire@wsu.ac.za

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Abstract: The integration of AI (artificial intelligence) into postgraduate supervision has transformative potential for improving efficiency, communication, and research outcomes. This study explores both the opportunities and challenges associated with AI-based tools in postgraduate supervision. Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, it systematically reviews peer-reviewed journal articles, conference papers, and reports to identify trends, benefits, and barriers to AI adoption. Thirty-seven studies were selected for final synthesis due to their direct relevance to the study's research questions. The findings indicate that AI offers significant opportunities, such as personalised learning paths, automated feedback cycles, enhanced research, increased visibility, and support for supervisor-student collaboration. Nonetheless, several major obstacles to widespread AI adoption remain. These include ethical implications, data privacy concerns, technical restrictions, and limitations in user digital literacy. Resistance from supervisors and students, driven by fears of AI supplanting human interaction, is also a notable barrier. The study proposes the development of

regional and national guidelines for the phased implementation of AI tools in postgraduate supervision, starting with non-intrusive applications such as administrative support and progress tracking. Concurrently, training programmes for supervisors and students should be introduced to enhance digital literacy and cultivate a favourable attitude towards AI tools. Additionally, institutions must develop policies to address ethical issues and create a framework for human-AI collaboration that complements traditional supervision practices. This study advances scholarly understanding of AI's evolving role in postgraduate student supervision and provides actionable insights for institutions seeking to utilise AI effectively.

Keywords: Artificial Intelligence; digital literacy; educational technology; higher education; postgraduate supervision; student engagement.

1. Introduction

Being an academic postgraduate research supervisor in a higher education institution is difficult and complicated (Wright, 2024). Efficient supervision in higher education, particularly at the doctoral level, is expected to meet high standards of quality, with strong quality assurance supporting all supervisory practices (Wright, 2024). However, the increasing importance of

research in higher education may intensify the demands on research supervision, further burdening the already stretched student supervisors (Cowling et al., 2023).

Artificial Intelligence (AI) has been deemed beneficial for facilitating students' involvement during their postgraduate journey. AI technologies are transforming research and education by automating repetitive tasks, assisting with data analysis, and introducing innovative learning and assessment procedures (Zhai, Wibowo & Li, 2024). Wright (2024) highlights that the fast-evolving AI tools are significantly influencing the evaluation of academic work, especially in postgraduate studies. Li and Xing (2021) also underscore that AI enhances student participation and teamwork, empowering students to ask questions and engage in discussions asynchronously.

However, AI is considered a potential risk in the academic landscape, particularly concerning complications associated with the writing, submission, and supervision of postgraduate dissertations or theses. AI reshapes the dynamics, responsibilities, and trust involved in writing a dissertation or thesis (Dai et al., 2023). There is a risk that AI could undermine the fundamental objective of higher education, which is to foster critical thinking and intellectual development in students, ultimately diminishing the value of degrees (Cotton, Cotton & Shipway, 2023). While AI presents both opportunities and challenges in postgraduate supervision (Xia et al., 2024), how it will transform and influence higher education supervision practices remains unclear.

1.1 Overview of artificial intelligence and postgraduate supervision transformation

The use of AI in higher education has significantly transformed various academic processes, encompassing teaching, learning, administration, and increasingly, postgraduate supervision (Ahsan, Akbar & Kam, 2022; Murire, 2024). In light of rising postgraduate enrolments, limited supervisory capacity, and heightened expectations for quality research outputs, AI emerges as a transformative tool that has the potential to enhance the efficiency, accessibility, and effectiveness of supervision (Aladsani, 2025). Murire and Cilliers (2019) observe that there has been a global surge in postgraduate enrolments, driven by the knowledge economy's demand for highly skilled researchers and professionals. This phenomenon, commonly referred to as the massification of higher education, has exerted considerable pressure on the traditional supervision model (Manathunga, 2014; Murire & Cilliers, 2019). Moreover, the diversifying profile of postgraduate students, which includes part-time, distance, and international students, has further complicated supervisory processes (Holmes & Miao, 2023; George, 2023). Supervisors are required to navigate varying expectations, cultural diversity, and differing levels of research readiness among students. In such circumstances, maintaining regular communication, delivering timely and high-quality feedback, and effectively monitoring student progress becomes an ongoing challenge (Gavaza, 2024). Supervisors are expected to oversee larger cohorts of students, often across diverse disciplines, while concurrently addressing institutional research output targets, administrative duties, and teaching responsibilities (Day, 2023). Murire (2024) asserts that AI offers a viable solution to these evolving challenges.

Furthermore, Hopp and Speil (2021) contend that AI in postgraduate supervision is not intended to supplant human interaction but to complement and enrich the supervisory process. Consequently, AI technologies can assist with a variety of supervisory tasks as demands on supervisors continue to escalate.

1.2 Opportunities of AI in postgraduate supervision

One of AI's most valuable contributions to postgraduate supervision is its support for academic writing and the provision of timely, customised feedback (Smith et al., 2024). AI can also foster a more inclusive and equitable supervision atmosphere (Mannuru et al., 2023; Rodrigues et al., 2023). For example, AI-powered chatbots and virtual assistants can offer 24/7 assistance by answering repeated questions, explaining academic principles, or directing students to appropriate information (Hansen et al., 2025; Okoth, 2025). This is especially helpful for students who may be studying in different time zones or remotely (Titchener & Greene, 2023). Moreover, Day (2023) claims that AI-powered systems can facilitate asynchronous communication between supervisors and students, ensuring continuity in supervision despite resource constraints or geographic dispersion. These systems can record interactions, track milestones, and send reminders, thereby enhancing the management of the supervision process (Luckin et al., 2016).

Ahsan, Akbar, and Kam (2022) posit that supervisors generally face the dual challenges of providing scholarly guidance and managing time-consuming administrative tasks, such as monitoring progress, scheduling meetings, and overseeing submission deadlines (Hanim, Aripin & Lin, 2020). George (2023) states that AI can automate such tasks through intelligent dashboards and AI-driven project management software that send notifications, maintain records of milestones, and offer reports on student progress. Chan and Hu (2023) found that the use of AI in postgraduate supervision improves time management and allows supervisors to identify potential delays or bottlenecks early. Moreover, AI technologies like predictive analytics can examine student activity, engagement, and submission history to recognise threats such as disengagement or the likelihood of attrition. Early detection allows for timely action by supervisors and institutions, thereby strengthening postgraduate programme completion and retention rates (Williamson & Eynon, 2020).

George (2023) underscores that conducting a comprehensive literature review is often regarded as one of the most challenging and time-consuming stages of postgraduate research. Similarly, Okoth (2025) mentions that the literature review process requires not only the identification of relevant scholarly works but also the evaluation, synthesis, and organisation of these into a coherent narrative that justifies and supports the research focus. Murire and Cilliers (2019) argue that traditionally, this phase demands significant manual effort, critical thinking, and the ability to navigate vast volumes of academic data. However, Chauke et al. (2024) assert that advancements in AI are beginning to revolutionise this fundamental aspect of scholarly inquiry.

AI-powered tools such as Iris.ai, Research Rabbit, and Connected Papers provide researchers with robust capabilities for discovering, filtering, and organising relevant literature. These tools leverage techniques such as semantic similarity analysis, citation network mapping, and automated keyword extraction to go beyond basic keyword searches (Zawacki-Richter et al., 2019). For instance, by analysing conceptual linkages and citation patterns, these platforms can surface not only the most cited works but also hidden or emerging studies that are semantically related to a research query (Michel-Villarreal et al., 2023). This significantly enhances the discovery process and ensures a more robust and comprehensive foundation for academic writing (Lucey et al., 2021).

In addition to identifying pertinent studies, Dai et al. (2023) stated that these AI systems can visually map the evolution and interconnections of research topics over time. They can highlight emerging themes, predict future research directions, and filter out irrelevant or redundant sources, providing researchers with a more transparent and strategic understanding of their research landscape (Michel-Villarreal et al., 2023). This ability to map and navigate the intellectual terrain of a discipline enables students to make more informed decisions when framing their research questions, identifying gaps in existing knowledge, and positioning their studies within the broader academic conversation (Halse & Malfroy, 2010).

Supervisors and academic mentors also stand to benefit from these tools (Awdry, 2023). With access to real-time updates and analytics on new publications within their area of expertise, supervisors can remain current with the latest research developments, which can enhance the relevance and timeliness of the feedback they provide to their students (Dergaa et al., 2023). This continuous awareness contributes to more effective and evidence-informed supervision practices. However, there is a risk that overreliance on AI could deskill postgraduates and erode their critical thinking skills. Institutions should consider establishing AI ethics committees within postgraduate schools to monitor and guide the evolving impact of AI on academic supervision.

1.3 Challenges of AI in Postgraduate Supervision

A significant concern regarding the incorporation of artificial intelligence (AI) in postgraduate supervision is the preservation of academic integrity. Chauke et al. (2024) argue that the introduction of ChatGPT in higher education raises significant apprehensions about academic dishonesty. Ozguven et al. (2024) further assert that the integration of AI tools into higher education has led to both deliberate and inadvertent instances of manipulation by students in their utilisation of such technologies. The utilisation of AI for academic tasks in dishonest ways varies considerably. Dehouche (2021) also suggests that some students employ ChatGPT to fulfil assignments and conduct research, which could potentially undermine the integrity of their academic responsibilities.

The risk of dishonesty and cheating associated with the utilisation of AI spans various academic fields. Supervisors face the challenge of addressing issues related to academic cheating and

dishonesty. Ahsan, Akbar, and Kam (2022) posit that there has been a notable increase in the number of scholarly articles addressing cheating in higher education in recent years, a trend that is partially driven by the growing accessibility of AI during assessments, as opposed to traditional in-person examinations, coupled with a rise in contract cheating. Beyond the concerns of academic integrity, some students have adopted AI-assisted writing as a substitute for their own work (Rodrigues et al., 2023). Hopp and Speil (2021) reported that approximately 22 per cent of students at an Austrian university confessed to engaging in plagiarism. Correspondingly, a study conducted by Chan and Hu (2023) involving students from six universities in Hong Kong highlighted issues related to accuracy and ethical considerations, particularly regarding plagiarism. AI can facilitate various forms of academic dishonesty, including data fabrication, plagiarism, examination cheating, improper collaboration, infringements of copyright, complicity in dishonest academic practices, and the alteration of bibliographic references, among other forms of academic misconduct (Rodrigues et al., 2023). The serious issue of plagiarism and the consequent disciplinary actions connected to AI continues to persist (Wright, 2024). The emergence of AI exacerbates the risks associated with academic cheating by potentially making academic services accessible to a broader cohort of students who may not perceive AI utilisation as dishonest or who previously could not afford essay mill services (Cotton et al., 2023). In such circumstances, Cotton et al. (2023) contend that university supervisors are compelled to meticulously consider the structure of their assessments and procedures to effectively communicate the issues of academic dishonesty and cheating to students while minimising their occurrence.

Even with the numerous advantages associated with certain AI tools, Day (2023) cautions that their utilisation in research may adversely affect students' academic achievements. The outputs generated by AI tools might include fabricated citations, references, and responses, which pose significant threats to the integrity of academic work. Holmes and Miao (2023) further affirm that AI-generated answers can be based on fictitious references, potentially undermining the technology's credibility as a reliable resource for research and education. George (2023) suggests that AI models can propagate misconceptions if deployed in academia without rigorous validation and effective supervision. Aladsani (2025) also posits that some students, having encountered erroneous references produced by AI, have come to realise the necessity of conducting thorough reference checks to avoid sanctions from their supervisors.

A major concern regarding the use of AI in the academic landscape, particularly regarding the supervision of postgraduate students, is the erosion of critical thinking, analysis, and writing skills. Ateeq et al. (2024) argue that AI tools designed to assist research and provide expedited solutions can easily be misused. Students may rely excessively on AI resources, which could impair their analytical and problem-solving abilities (Okoth, 2025). Dergaa et al. (2023) also emphasise that AI has the potential to diminish vital cognitive skills, such as critical and analytical thinking, as well as decision-making. An overreliance on AI tools for feedback and guidance

may disrupt direct communication between students and their supervisors, thereby hindering the development of a robust mentoring relationship and the sharing of implicit knowledge. Seo et al. (2021) contend that the interaction between students and supervisors constitutes the most critical form of academic interaction and that AI diminishes this engagement. Nonetheless, AI cannot wholly replace the guidance and emotional support that human supervisors provide to postgraduate students (Cowling et al., 2023). AI lacks the specialised knowledge that skilled supervisors and professors possess (Michel-Villarreal et al., 2023). Although AI platforms are typically effective in delivering comprehensive strategic responses and aggregating broad information, they struggle to provide in-depth insights regarding organisations, individuals, and locations that have received diminished global attention (Cowling et al., 2023).

The use of artificial intelligence (AI) may engender unfair assessments during postgraduate supervision. Cotton et al. (2023) articulate that the application of AI encompasses the generation of high-quality written research reports, implying that those who possess access to AI tools might hold an unfair advantage over their peers who do not. Holmes and Miao (2023) express apprehensions regarding the influence wielded by AI developers, which may lead to the potential for bias in information accessibility and the marginalisation of particular perspectives. The biases inherent in the data can inadvertently persist through the outcomes of AI, thereby affecting both accuracy and impartiality (Aladsani, 2025). Furthermore, Dai et al. (2023) highlight that the inherent bias within AI algorithms, along with concerns pertaining to fairness and the risk of misuse, constitutes fundamental issues that necessitate resolution by supervisors. Should the data employed for training be skewed, the AI may yield biased results or recommendations, which could adversely impact specific students or research domains. This scenario may culminate in inequities during the assessment processes of postgraduate supervision (Cotton et al., 2023).

Certain supervisors exhibit a lack of comprehensive understanding regarding AI tools, as there exist limited policies or established strategies governing their usage, whether to support, oppose, accept, or prohibit them (Wright, 2024). Guo and Wang (2023) assert that AI is prompting postgraduate supervisors to modify assessments to address the challenges associated with its utilisation. Ramberg and Modin (2019) further contend that academic dishonesty demonstrates an inverse relationship with the understanding and endorsement of academic integrity policies. George (2023) argues that AI may produce stereotypical, offensive, or prejudiced content in the absence of adequate supervision if employed in postgraduate education.

1.4 Problem statement

Postgraduate students increasingly operate within complex and specialised academic fields that necessitate extensive supervisory guidance, advanced research skills, and continuous academic support (Dai et al., 2023). However, many higher education institutions encounter persistent supervisory challenges, including limited supervisor availability, administrative burdens, and difficulties in providing timely, individualised, and discipline-specific feedback (Halse & Malfroy,

2010; Igumbor et al., 2022). These pressures are further exacerbated by rising postgraduate enrolments and shortages of qualified PhD-level supervisors in certain departments (Mahlangu, 2021). Although institutions have implemented technology-enhanced systems and hybrid supervision models to alleviate these challenges (Wisker et al., 2021), traditional supervision structures remain under strain. Emerging developments in Artificial Intelligence (AI) present promising opportunities to enhance supervisory efficiency, support scholarly writing, improve literature review processes, and provide personalised feedback (Chu et al., 2022). However, despite its potential, the integration of AI raises significant concerns regarding academic integrity, ethical use, student dependence, cognitive development, and algorithmic bias. What remains insufficiently understood is how AI can be responsibly leveraged to support postgraduate supervision while mitigating these risks. Accordingly, there is a need to investigate the opportunities that AI presents for strengthening supervision, the challenges and ethical issues it introduces, and the strategies required to ensure its responsible and effective adoption. This chapter addresses these gaps by examining the opportunities, challenges, and institutional enablers associated with the integration of AI into postgraduate supervision. Based on this, the following questions were raised:

- What are the opportunities associated with the integration of AI in postgraduate supervision?
- What are the challenges associated with the integration of AI in postgraduate supervision?
- Which strategies should institutions use to overcome the resistance to AI adoption in postgraduate supervision?

2. Methodology

This chapter adopts a qualitative research design to explore both the opportunities and challenges associated with AI-based tools in postgraduate supervision. A qualitative research approach is particularly suitable for this study because it enables a rich, detailed understanding of complex processes, such as supervision practice and technology integration, from the insiders' perspectives (Snyder, 2019).

Data collection was conducted using a systematic literature review (SLR). The SLR served as the conceptual framework and was designed to synthesise peer-reviewed journal articles, conference articles, and books published between 2015 and 2024. The literature search focused on relevant topics such as AI in higher education, writing aids in academia, research management tools, and ethical considerations of employing AI in supervision. These were searched through scholarly databases like Scopus, Web of Science, Google Scholar, and ERIC using keywords such as “Artificial Intelligence AND postgraduate supervision,” “AI tools in research,” and “AI in academic mentoring.” The selection criteria prioritised recency, relevance, and peer-reviewed literature. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

guidelines were adopted in the review process, highlighting transparency and methodological precision (Moher et al., 2009).

The selection and review of literature were guided by the PRISMA guidelines (Moher et al., 2009), which provided a structured and transparent review process. The initial database search yielded 151 records. After removing duplicates, 91 articles remained. Screening based on titles and abstracts, along with the application of predefined inclusion and exclusion criteria, resulted in 71 articles for full-text review. From this pool, 37 articles included in the reference list were selected for final synthesis due to their direct relevance to the study’s research questions.

Two authors collaboratively conducted the study, each bringing complementary strengths to the research process. Both authors led the systematic review process, including database searches, literature screening, and article selection. They were equally involved in conceptualising the research design, defining the scope, and developing the framework for analysis. The writing process was collaborative and iterative, with drafts shared via cloud-based platforms to enable joint editing, critical reflection, and refinement. Regular discussions were held to ensure alignment and maintain research integrity. Additionally, both authors independently applied the CASP checklist and engaged in peer debriefing to enhance the rigour and trustworthiness of the study.

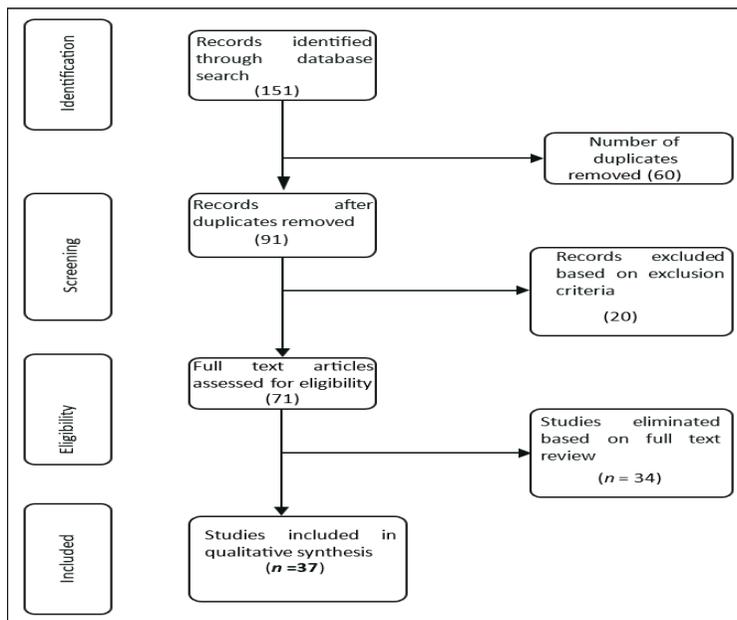


Figure 3: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

2.1 Data extraction and synthesis

While the PRISMA method offered rigour in identifying relevant literature, it constrained the study's capacity to explore emergent, practice-based themes that a grounded theory approach might have captured. Additionally, the absence of a longitudinal design similarly limits our ability

to detect the evolving impacts of AI over time. Given the rapid nature of advancements in AI technologies, some findings may become outdated quickly. Future studies should involve larger, more diverse samples and employ mixed methods to enhance generalisability and provide comparative findings. Longitudinal studies would facilitate tracking the continued impact of AI on postgraduate supervision, and discipline-specific studies might uncover the adoption and experience of AI across various academic fields. Further research into the ethical, psychological, and institutional dimensions of AI adoption is also required to enable responsible and context-sensitive use.

3. Findings and Discussion

This section presents the findings thematically, guided directly by the study's three research questions. The new structure enhances conceptual flow, reflects the logical progression of the study objectives, and intentionally foregrounds the authors' analytical voice. Rather than merely summarising previous studies, the discussion critically interprets what these findings mean for postgraduate supervision practice and policy in the evolving AI landscape.

3.1 Opportunities associated with integrating AI into postgraduate supervision

Across the reviewed literature, one of the strongest themes is the transformative potential of AI to enhance the quality, efficiency, and accessibility of postgraduate supervision. Our analysis shows that AI introduces significant improvements in three key supervisory domains: administrative efficiency, academic writing and research support, and student engagement.

Firstly, AI tools substantially reduce supervisors' routine administrative workload. Applications such as Grammarly, Turnitin, and AI-enabled dashboards automate substantial portions of text analysis, error detection, progress tracking, and time management (Awdry, 2023; Zawacki-Richter et al., 2019). As authors, we view this as a crucial step towards repositioning supervisors to focus on higher-order, conceptual guidance, which has long been identified as lacking in massified higher education environments (Murire & Cilliers, 2019). By alleviating supervisors of administrative burdens, AI creates opportunities for deeper intellectual engagement with postgraduate students. Secondly, AI significantly enhances students' academic writing and research capabilities. Tools such as Iris.ai, Connected Papers, and Research Rabbit provide sophisticated literature discovery, semantic search, and citation network mapping (Chu et al., 2022; Dergaa et al., 2023). In our interpretation, these tools not only accelerate the literature review process but also democratise access to advanced research support, particularly for students who may lack extensive disciplinary familiarity. While earlier research characterised the literature review as one of the most cognitively demanding stages of postgraduate research, our findings demonstrate that AI has begun to reshape this landscape by making scholarly inquiry more navigable, transparent, and efficient.

Thirdly, AI enhances student engagement, accessibility, and personalised learning. Chatbots, intelligent feedback systems, and translators offer 24/7 academic support, enabling remote, part-time, and international students to access timely guidance (Williamson & Eynon, 2020; Smutny & Schreiberova, 2020). Our analysis further indicates that adaptive learning systems foster autonomy, motivation, and confidence among postgraduate students—an essential ingredient for successful research trajectories (Holmes et al., 2021; Taylor, 2019). Collectively, these findings illustrate that AI is not merely a tool for efficiency; it represents a strategic enhancement to supervision ecosystems. When used responsibly, AI has the potential to equalise access, elevate academic writing skills, and reduce systemic supervisory bottlenecks that have historically undermined postgraduate success in resource-constrained institutions.

3.2 Challenges associated with integrating AI into postgraduate supervision

Despite the opportunities presented by artificial intelligence (AI), the literature highlights significant challenges that necessitate careful institutional oversight. Our thematic analysis identifies four primary concerns: academic integrity, data reliability, erosion of cognitive skills, and algorithmic bias and inequity.

The first and most prominent challenge pertains to academic integrity. Numerous studies have documented an increase in plagiarism, contract cheating, and the misuse of AI tools for generating assignments and research content (Cotton et al., 2023; Dehouche, 2021; Rodrigues et al., 2023). We interpret this trend as indicative of inadequate regulatory frameworks and inconsistent digital literacy among student populations. The growing sophistication of generative AI tools has blurred traditional boundaries of authorship, rendering academic misconduct both easier to perpetrate and more difficult to detect. Supervisors are faced with the dual burden of policing misconduct while also guiding the ethical use of AI. The second theme concerns the reliability and credibility of AI-generated outputs. Findings highlight the occurrence of fabricated citations, hallucinated references, and inaccurate responses produced by AI tools (Day, 2023; Holmes & Miao, 2023). These errors not only compromise students' research integrity but also shift additional verification responsibilities onto supervisors. From our perspective, this underscores the necessity for supervisors to remain epistemic gatekeepers—ensuring that AI complements rather than compromises academic standards. Thirdly, extensive use of AI may erode critical thinking and analytical reasoning skills. Studies suggest that an overreliance on AI-driven text generation and feedback diminishes students' cognitive engagement with content (Okoth, 2025; Dergaa et al., 2023). We contend that while AI can scaffold learning, excessive dependence risks producing graduates who lack independent scholarly judgment. This challenge underscores the importance of supervisory intervention in maintaining reflective, inquiry-driven learning.

Fourthly, AI introduces risks of algorithmic bias and unequal learning experiences. AI systems trained on skewed datasets may produce biased recommendations or marginalise certain

disciplinary or cultural perspectives (Aladsani, 2025; Dai et al., 2023). Furthermore, variations in digital literacy mean that students with greater technological familiarity disproportionately benefit. Our analysis suggests that, in the absence of institutional safeguards, the adoption of AI could inadvertently exacerbate inequities in postgraduate education rather than mitigate them. In summary, while AI provides powerful support mechanisms, its associated risks are substantial. Effective integration necessitates robust governance structures, enhanced academic integrity policies, and a shift in supervisory practices towards ethical, critical, and reflective engagement with AI tools.

3.3 Strategies to overcome resistance and maximise responsible AI adoption

The literature demonstrates that resistance to AI adoption is partly rooted in institutional uncertainty and partly in psychological and ethical discomfort among both supervisors and students. To address these barriers, our synthesis identifies three strategic imperatives: capacity building, policy development, and human-centred supervision models.

First, digital literacy training emerges as a critical enabler. Institutions must develop structured programmes that train supervisors and students in the ethical use of AI, the verification of AI outputs, and the critical appraisal of AI-generated information (Kelly, 2023; UNESCO, 2021). We contend that digital literacy should not be optional; it must become a core component of postgraduate training to ensure equitable access and responsible adoption. Second, clear and enforceable AI governance policies are needed. The literature emphasises gaps in institutional protocols addressing the use of generative AI, ethical boundaries, plagiarism, and data privacy (Wright, 2024; Holmes & Miao, 2023). We argue that institutions must move beyond generic regulatory statements and develop discipline-specific guidelines co-created with supervisors and postgraduate students. Such policies will provide clarity on permissible AI support and delineate academic misconduct more explicitly.

Third, AI integration must be grounded in human-centred supervision. Our analysis confirms that supervisors remain irreplaceable for emotional support, intellectual mentorship, and disciplinary expertise—elements that AI cannot replicate (Cowling et al., 2023). Therefore, responsible AI adoption should complement, rather than replace, the supervisory relationship. Supervisors should use AI strategically for feedback generation, progress monitoring, and administrative assistance while maintaining human-led guidance for conceptualisation, research logic, and doctoral identity formation. We conclude that responsible AI adoption hinges not on technological capability but on institutional readiness, pedagogical integrity, and sustained human involvement. AI can enhance postgraduate supervision only when supervisors and institutions engage with it critically, reflexively, and ethically.

4. Conclusions

While AI offers transformative potential for postgraduate supervision, its adoption must proceed with a critical, human-centred perspective. Technology alone cannot address the relational, ethical, and pedagogical complexities inherent in research supervision. Thus, the future of supervision lies not in replacing the human mentor but in reimagining supervisory practices wherein AI becomes an ethical, equitable, and transparent partner in fostering research excellence. The integration of AI into postgraduate supervision represents a fundamental paradigmatic shift in the manner in which universities support research, mentorship, and academic growth. As explored in the course of this chapter, AI presents exceptional opportunities to enhance the quality, productivity, and accessibility of supervision through tools that facilitate literature reviews, provide writing assistance, offer feedback mechanisms, and generate research metrics. These tools can minimise administrative burdens for supervisors, ensure timely feedback, and enable students to evolve into more autonomous and reflective researchers. Simultaneously, the study has illuminated a range of challenges that must be navigated with care. These include ethical concerns, data privacy risks, potential overreliance on AI tools, and disparities in digital literacy among students and supervisors.

Moreover, the findings underscore a clear need for human-centred frameworks that preserve the interpersonal, developmental, and dialogical aspects of postgraduate supervision while leveraging AI's capabilities to augment, rather than replace, these core academic relationships. To ensure that AI enhances rather than undermines the excellence of postgraduate education, institutions must actively formulate policies, build digital literacy through targeted training programmes, and cultivate a culture of critical engagement with AI technologies. A reflective, ethically driven approach to AI integration, based on collaboration, transparency, and academic integrity, will be key to shaping the future of postgraduate supervision in a manner that benefits both students and supervisors. Lastly, AI should not be perceived as a threat to the traditional supervisory framework but rather as a powerful adjunct that, if ethically leveraged, can transform the postgraduate research process into a more open, efficient, and creative endeavour. As the higher education landscape continues to evolve, embracing this transformation with both openness and caution will be crucial in preparing future scholars for success in a digitally enhanced world.

5. Recommendations

Several practical recommendations can be made to support the effective and ethical adoption of AI in postgraduate supervision practices.

In developing these recommendations, we consciously emphasise a balanced perspective. Drawing from our review and critical reflection, it is evident that without intentional, structured digital literacy training, there is a risk that AI could exacerbate inequalities in postgraduate supervision, privileging digitally fluent students and supervisors while marginalising others. We therefore advocate for institutional policies that are not merely compliance-based but are dialogic

and co-created with end-users to ensure sustainable, ethical AI integration in supervision contexts.

The incorporation of AI must foster critical thinking among postgraduate students. Universities that incorporate AI ethics into their programmes should explicitly address AI plagiarism to encourage students to develop original, critical, and creative thinking skills. Supervisors ought to evaluate AI system outputs, rectify inaccuracies, provide context, and cultivate strong reasoning abilities in students. Educational institutions should highlight the importance of supervisors and teaching personnel in guiding students, confirming the reliability of AI-generated information, and offering additional context when necessary. Supervisors should focus on structuring courses to ensure that AI promotes problem-solving, critical thinking, and creativity. They should also integrate AI technologies into academic courses, developing assessments or assignments that permit students to practise and enhance their writing abilities through the utilisation of AI.

AI is intended to assist in providing guidance for postgraduate students. Supervisors should design courses in a manner that accommodates the use of AI in an engaging style. There is a need for an integrated system that incorporates AI, which can be utilised to deliver mini-lectures, tests, and explanations tailored to each student, thereby enhancing outcomes in postgraduate courses. This process requires supervisors to supply instructional prompts and rubrics for educational objectives, scope, and format requirements. Additionally, academic institutions must offer materials and training to familiarise students with AI technologies and encourage the ethical utilisation of such tools in academic writing.

There is a necessity to restructure policies to ensure that appropriate regulations govern AI-supported postgraduate student supervision. Higher education institutions should reconsider their policies, curricula, and teaching procedures to better prepare students for a future in which AI technologies will be predominant. We recommend that postgraduate degree policies at the institutional level incorporate university protocols on the ethical usage of generative AI as one component of these guidelines and provide more detailed recommendations than those offered by external regulatory agencies. Academic institutions must develop and revise curricula and policies to address the changes brought about by AI; they must adapt to evolving educational requirements and ensure equitable access to AI.

Reflecting on the study, it became evident that the success of AI integration depends not solely on technological innovation but also on cultivating a culture of trust and openness between supervisors and students.

6.1 Social and practical implications of the study

The findings of this chapter carry significant social and practical implications for higher education institutions, supervisors, postgraduate students, and policymakers. From a social perspective, the integration of artificial intelligence (AI) into postgraduate supervision has the potential to mitigate

long-standing inequalities in access to academic support. Students who study part-time, remotely, or in under-resourced settings stand to benefit from AI-enabled tools that provide continuous feedback, translation support, accessibility features, and personalised academic guidance. This democratisation of support can bridge gaps between students with varying levels of research readiness, digital literacy, and access to supervision. Concurrently, the study highlights the need for institutions to address emerging risks such as academic dishonesty, unequal access to digital tools, and reliance on AI-generated content, which can exacerbate existing inequities if not carefully managed.

Practically, the study demonstrates that AI holds substantial potential to reduce supervisory workloads, streamline administrative processes, and enhance the efficiency of supervision. Supervisors may allocate more time to intellectual mentorship, an aspect of postgraduate education that AI cannot replace, while relying on AI to manage routine tasks such as organising literature, providing writing feedback, tracking progress, and detecting plagiarism. For institutions confronting high student-to-supervisor ratios and shortages of qualified supervisors, AI presents a viable solution for enhancing the overall quality of supervision. However, the practical implications also underscore the urgent need for comprehensive institutional policies governing the use of AI. Universities must establish clear guidelines on the ethical use of AI, academic integrity, and accountability, alongside structured training programmes to build digital literacy among supervisors and students.

Overall, the study suggests that successful AI adoption in postgraduate supervision requires a balanced, human-centred strategy that preserves the relational and developmental aspects of supervision while enhancing them through technological support. Institutions that invest in ethical frameworks, training initiatives, and equitable access to AI tools can leverage AI as a catalyst for improved research quality, enhanced student experience, and sustainable supervision models across diverse academic contexts.

7. Limitations of the study

Although the PRISMA method provided a rigorous and systematic approach to identifying relevant literature, it also imposed certain constraints. Its structured nature limited the study's capacity to capture emergent, practice-based themes that might have been uncovered through more interpretive methodologies, such as grounded theory. Furthermore, the study did not adopt a longitudinal design, which restricts insights into how the impacts of AI evolve over time. Given the rapid pace of technological advancement, some findings may quickly become outdated.

The scope of the reviewed studies was also constrained by the size and diversity of available samples, which affects the generalisability of the conclusions. Future research should consider larger and more heterogeneous participant groups, as well as mixed methods approaches, to provide richer and more comparative perspectives.

Longitudinal research is essential for tracking the ongoing influence of AI on postgraduate supervision, while discipline-specific investigations may reveal variations in AI adoption and experiences across academic fields. Furthermore, a deeper examination of the ethical, psychological, and institutional implications of AI use is necessary to facilitate the responsible and context-sensitive integration of these technologies in higher education.

8. Declarations

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Use of Artificial Intelligence: The current work was created without the assistance of artificial intelligence technologies.

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