

Transforming Research Supervision: Ethical and Literacy Imperatives in the Era of Generative AI

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Abstract: Higher education has undergone a rapid transformation in recent years, driven by the dual pressures of mitigating the long-term effects of COVID-19 and integrating generative artificial intelligence (GenAI) technologies. The pandemic exposed and exacerbated pre-existing inequalities and power imbalances within the sector, necessitating policy adaptations to address issues such as digital inequality, limited social interaction, barriers faced by student researchers in conducting face-to-face data collection, and the protection of mental health. Concurrently, GenAI has emerged as a disruptive technology that is reshaping pedagogical practices, research processes, and supervisory relationships. Although GenAI is widely promoted as a tool that can enhance teaching, research, administration, and student support, it raises critical concerns related to academic integrity, ethics, systemic bias, knowledge ownership, and uneven regulatory standards. Supervisors similarly hold divergent views regarding its usefulness and risks, a tension also reflected in inconsistent journal policies on GenAI use. Guided by the GenAI–Technological Pedagogical Content Knowledge framework (GenAI-TPACK), this study examined the ethical and literacy imperatives necessary for transforming research supervision in the era of GenAI. A systematic literature

review was conducted to identify emerging GenAI literacy indicators that facilitate ethical, transparent, responsible, and informed engagement with GenAI during the research process. The review revealed significant gaps in supervisor preparedness, uneven AI literacy among research candidates, and a lack of coherent institutional guidance. The study contributes practical insights for higher education institutions seeking to balance the opportunities and challenges posed by GenAI and offers direction for developing humanising, context-sensitive guidelines for responsible integration in research supervision.

Keywords: GenAI literacy, GenAI-TPACK, generative artificial intelligence, higher education, humanising pedagogy, research supervision.

1. Introduction

In 2022, the rapid emergence of generative artificial intelligence (GenAI) within the higher education sector, particularly following the release of tools such as ChatGPT, constituted a significant turning point in the transformation of postgraduate research (Capano et al., 2025). This phenomenon promptly generated considerable interest, as well as serious concerns regarding its potential implications. The opportunities presented by GenAI are posited as tools that can enhance higher education through personalised learning, efficient research, streamlined administration, and improved student support (Kutty et al., 2024; Noroozi et al., 2024).

The COVID-19 pandemic posed fewer opportunities and more challenges for online postgraduate supervision. The few identified opportunities included the necessity for supervisors to rethink and redesign more sustainable supervisory strategies capable of withstanding new disruptions to postgraduate research, such as those introduced by GenAI. Consequently, research candidates who pursued postgraduate studies during the pandemic experienced a heightened sense of care, guidance, and support from their supervisors. Although this support was rendered virtually, the increased level of engagement fostered favourable experiences for the candidates (Sosibo, 2024). The pandemic also provided research candidates with access to technology-based communication platforms, facilitating more frequent interactions with supervisors. Virtual communities of practice were established to enable one-on-one and group discussions. Additionally, the pandemic created an environment in which research candidates had more time to engage with research activities that would ordinarily have been consumed by work, family, and other life commitments (Chigona & Sosibo, 2024).

However, despite the opportunities introduced by GenAI and the COVID-19 pandemic, both phenomena have exposed and intensified pre-existing inequalities and power dynamics within higher education. Their impact has accelerated the necessity for policy adaptations to address digital inequality, diminished social interaction, barriers to face-to-face data collection for student researchers, and concerns related to mental health. The rethinking and redesigning of postgraduate supervision in the era of GenAI should be underpinned by humanising pedagogy. Supervisors must remain sensitive to the individual needs and backgrounds of their students to ensure that newly developed strategies are impactful and beneficial for all research candidates (Khene, 2014). This is particularly crucial in contexts where students may encounter cultural, social, and socio-economic barriers. This study aims to examine the ethical and literacy imperatives necessary for transforming research supervision in the era of GenAI within the principles of humanising pedagogy.

1.1 Ethical imperatives

In this era of GenAI, ethical considerations have become paramount as these technologies increasingly reshape norms and professional paradigms within the realm of postgraduate supervision. The emergence of GenAI introduces ethical dilemmas that necessitate a comprehensive understanding of its impact on ownership, creativity, bias, decision-making, and administration. Ethical imperatives must address issues of accountability, transparency, bias, and fairness as GenAI evolves and becomes more embedded in society (Dabis & Csáki, 2024).

Building on these foundational ethical concerns, ethical frameworks emphasise the importance of maintaining human oversight and accountability in the use of GenAI. This ensures that AI tools are employed responsibly and that individuals remain morally and legally accountable for AI-related outcomes. The ethical implications of utilising GenAI in social science research encompass concerns regarding misinformation, biases, privacy, and data rights (Dabis & Csáki,

2024; Saleem et al., 2024). Navigating the moral terrain of GenAI requires higher education institutions to implement policies that combine preventive measures with procedures that encourage or compel research candidates to voluntarily address the ethical concerns raised by the use of GenAI (Saleem et al., 2024).

In addition to accountability and oversight, transparency in the utilisation of GenAI is crucial. Clear communication about the role and extent of GenAI usage in research processes helps maintain trust and integrity (Dabis & Csáki, 2024; Saleem et al., 2024). Addressing algorithmic bias through the diversification of training data and ensuring fairness in GenAI applications remains an ongoing challenge. Ethical guidelines and robust protocols are also required to prevent discrimination, privacy breaches, and other forms of dehumanisation. According to Runcan et al. (2025) and Silva-Atencio (2025), GenAI raises ethical dilemmas related to governance, bias, transparency, and fairness, underscoring the need for responsible AI frameworks and proactive ethical guidance in research.

Beyond considerations of governance and transparency, GenAI has the potential to enhance data collection and analysis, offering alternative approaches to traditional research methodologies, which highlights the necessity for comprehensive digital and AI literacy training in research supervision (Farina & Stevenson, 2024). Globally, higher education institutions are developing comprehensive ethical guidelines to govern the use of GenAI. These guidelines are essential to align the integration of GenAI with academic integrity and social responsibility (Farina & Stevenson, 2024; Montezuma & Chong, 2024). Ethical reflection and continuous moral education are vital to assist research candidates and supervisors in navigating the complexities of GenAI usage in research (Montezuma & Chong, 2024; Saleem et al., 2024).

1.2 AI Literacy imperatives

The integration of GenAI into research processes presents distinctive opportunities and challenges for both research candidates and supervisors, thereby necessitating enhanced AI literacy among these groups. GenAI possesses the potential to exacerbate the digital divide and adversely affect access to research resources (Radojičić & Vukmirović, 2025). AI literacy can play a crucial role in mitigating this challenge by equipping research candidates and supervisors with the skills and knowledge required to engage with GenAI effectively, ethically, and responsibly (Ruiz et al., 2024).

To address these emerging literacy gaps, there exists a significant need for training programmes aimed at enhancing AI literacy among research candidates and supervisors. This encompasses understanding how to generate effective prompts and critically evaluate AI outputs (Takaffoli et al., 2024). Higher education institutions are encouraged to adapt their research processes and pedagogical approaches to better prepare future researchers for the AI era. Petrenko (2024) emphasises the importance of developing skills such as scenario-based thinking and uncertainty management.

Beyond individual training and skill development, fostering interdisciplinary interactions and diverse viewpoints is essential for the ethical and effective use of GenAI. Collaboration among technologists, educators, and social scientists can assist in addressing the multifaceted ethical issues posed by GenAI. The deployment of GenAI introduces the potential for biases and other ethical challenges that may impact the cognitive engagement of participants or researchers (Saleem et al., 2024). This highlights the necessity for careful ethical consideration and reinforces the value of essential human capabilities within the research process.

At an institutional level, establishments must evaluate their preparedness for GenAI adoption, taking into account factors such as data readiness, ethical safeguards, and leadership support. The successful integration of AI necessitates a balance between technological innovation and ethical considerations (Marcinkevage & Kumar, 2025). GenAI has the potential to transform postgraduate research and alleviate the workload of research candidates and supervisors, underscoring the need for future research to explore effective pedagogical approaches and the long-term impacts of GenAI integration (Farina & Stevenson, 2024). The use of GenAI systems in academia raises ethical queries concerning accountability, transparency, bias, and fairness as these systems advance in sophistication, highlighting both the advantages and challenges of maintaining moral principles in research supervision (Dabis & Csáki, 2024). GenAI also raises issues regarding privacy, consent, and responsible data management, necessitating further investigation into effective security measures and responsible data practices (Montezuma & Chong, 2024). The challenges associated with integrating GenAI into research supervision include inaccuracies, usability, privacy concerns, and the indispensable role of human review, underscoring the need for guidance and strategies for the appropriate and ethical integration of GenAI in literature reviews (Takaffoli et al., 2024).

Therefore, when considered collectively, transforming research supervision in the era of GenAI necessitates a dual focus on ethical imperatives and literacy imperatives. By promoting a culture of ethical responsibility and enhancing AI literacy, higher education institutions can harness the potential of GenAI while mitigating risks associated with human factors through humanising pedagogies. While existing studies provide valuable insights into the ethical and literacy imperatives for research supervision in the era of GenAI, they do not directly address the challenges of integrating GenAI into research supervision from an ethical, literacy, and humanising perspective.

1.3 Humanising pedagogy in postgraduate supervision in an era of GenAI

The primary objective of humanising pedagogy within a digital context is to cultivate learner dignity, establish meaningful interactions, and promote learner empowerment, all within a complex digital landscape (Mehta & Aguilera, 2020). The significance of digital pedagogy lies in its ability to effectively address the urban-rural digital literacy divide through comprehensive skills development initiatives. Humanising pedagogy in supervision requires supervisors to

remain sensitive to the individual needs and backgrounds of their students, particularly in contexts where students may face cultural and social barriers (Khene, 2014). While mentoring is an effective supervision strategy, it is essential to recognise the power dynamics involved. Effective supervision should not obscure the significant role of power but rather address it transparently (Manathunga, 2007). Technology plays a significant role in modern research, and the emergence of GenAI is reshaping traditional boundaries between supervisors and research candidates. GenAI can offer personalised learning experiences by generating tailored learning materials and providing immediate feedback, which can help address the unique needs of each postgraduate student (Kong & Yang, 2024; Rajak et al., 2024). GenAI can support the diverse learning styles of research candidates, as its technologies can create inclusive learning environments by offering personalised support and adaptive learning platforms, which are particularly beneficial for all learning styles (Velazquez-Solis et al., 2025).

The challenges and considerations of GenAI use in research processes include ethical use and academic integrity. The widespread availability of GenAI tools raises concerns about academic misconduct. Higher education institutions need to develop comprehensive policies that balance the benefits of GenAI with the need to uphold established academic standards (Kruger-Roux & Alberts, 2024; Strachan et al., 2024). Tensions in power dynamics in postgraduate supervision require a rethink, as GenAI may be perceived as a superior source of information and guidance. Supervisors must become increasingly conscious of the power dynamics in their relationships with research candidates (Manathunga, 2007).

Integrating GenAI into postgraduate supervision can enhance the learning experience by providing personalised and immediate support. However, literature has shown that it is crucial to maintain a humanising pedagogy that is sensitive to the individual needs of research candidates and aware of the power dynamics involved. By balancing the benefits of GenAI with ethical considerations and continuous professional development, supervisors can create a supportive and inclusive learning environment for their research candidates.

2. Conceptual Framework

This study adopts a conceptual framework grounded in the Technological Pedagogical Content Knowledge (TPACK) theory originally proposed by Mishra and Koehler (2006). TPACK extends pedagogical content knowledge by integrating technological knowledge to explain how educators meaningfully combine technology, pedagogy, and content in educational practice. While TPACK has been widely applied in teaching and teacher education contexts, recent studies demonstrate its adaptability for examining emerging digital technologies, including artificial intelligence, within higher education environments (Celik, 2023; Valtonen et al., 2017).

Building on this theoretical foundation, the present study advances an adapted GenAI-TPACK conceptual framework tailored to postgraduate research supervision. This framework does not claim to constitute a new theory; rather, it synthesises established theoretical constructs and

contemporary literature to explain how generative artificial intelligence influences supervisory practice under specific ethical, pedagogical, and institutional conditions.

The framework, illustrated in Figure 1, comprises three interrelated knowledge dimensions: GenAI literacy, humanising pedagogy, and postgraduate supervision, all situated within an outer contextual layer of ethical institutional governance.

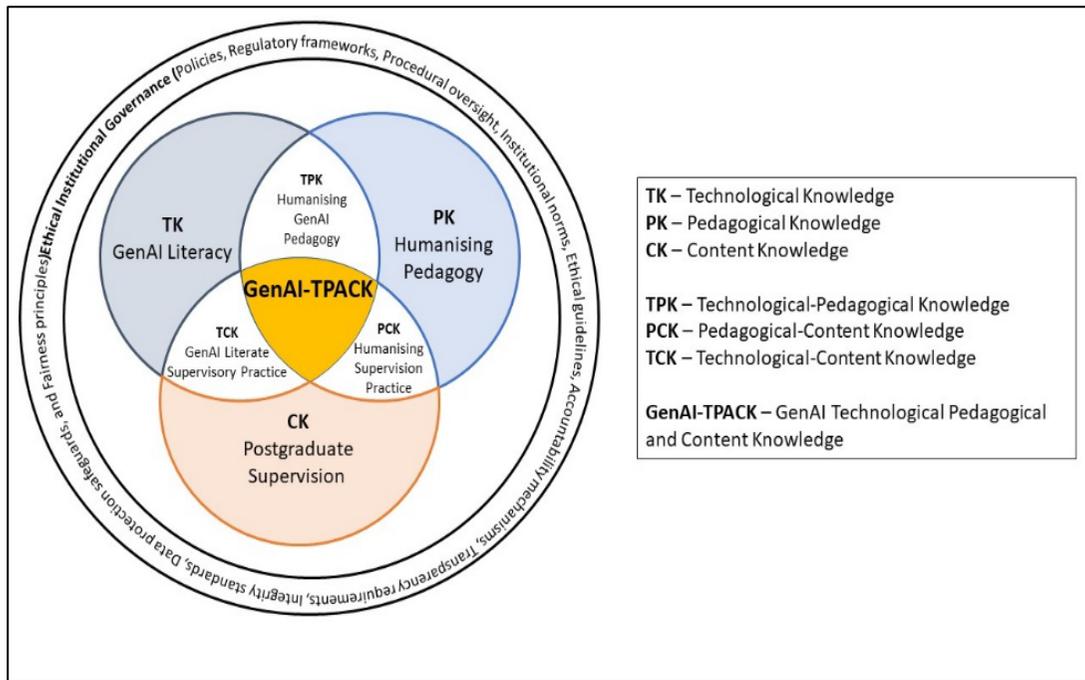


Figure 1: Conceptual Framework for Ethical and Human-Centred GenAI-Mediated Postgraduate Supervision

GenAI literacy encompasses the competencies required by supervisors and postgraduate candidates to engage critically and responsibly with GenAI tools. Prior research conceptualises AI literacy as extending beyond technical proficiency to include evaluative judgement, ethical awareness, transparency, and the ability to recognise bias and limitations in AI-generated outputs (Celik, 2023; Ng et al., 2021). In the context of postgraduate supervision, insufficient GenAI literacy may result in an inappropriate reliance on automated outputs, compromised academic integrity, and inconsistent supervisory practices.

Humanising pedagogy serves as the pedagogical foundation of the framework. Drawing on scholarship that emphasises relationality, care, dialogue, and learner agency in higher education (Freire, 2021; Kim et al., 2023), this dimension highlights the importance of preserving trust, dignity, and reflexive engagement within AI-mediated supervision. Recent studies caution that AI-supported educational practices must complement, rather than replace, the socio-cultural and dialogic elements that underpin effective supervision (Kukulka-Hulme et al., 2022).

Postgraduate supervision constitutes the content domain of the framework and encompasses the disciplinary, methodological, and developmental practices involved in guiding research

candidates through the research process. Literature on doctoral and postgraduate supervision highlights the centrality of feedback, scholarly socialisation, identity formation, and epistemic development, all of which may be reshaped by GenAI-enabled tools (Boyd & Harding, 2025; Lee, 2008; Wisker et al., 2010). This dimension interacts dynamically with GenAI literacy, as supervisors increasingly integrate digital tools into supervision while remaining accountable for academic standards and learning outcomes.

Surrounding these three dimensions is the outer layer of ethical institutional governance, which provides the structural and regulatory context for GenAI adoption. Existing research consistently identifies gaps in institutional policies, disclosure requirements, accountability mechanisms, and ethical guidance for AI use in higher education (Azevedo et al., 2025; Floridi et al., 2018; UNESCO et al., 2023). Ethical institutional governance encompasses policies, regulatory frameworks, procedural oversight, institutional norms, ethical guidelines, transparency requirements, and data protection safeguards. This layer ensures that the responsibility for ethical GenAI use does not rest solely with individual supervisors or students but is supported by coherent institutional structures.

As illustrated in Figure 1 above, these four dimensions operate as an integrated model:

- GenAI literacy enables critical and responsible engagement with AI tools;
- Humanising pedagogy ensures that supervision remains relational, ethical and student-centred;
- Postgraduate supervision provides disciplinary and developmental grounding; and
- Ethical institutional governance establishes the conditions for accountable and equitable GenAI integration.

Together, these elements form a holistic conceptual framework that explains how GenAI shapes postgraduate supervisory practice and identifies the institutional and ethical conditions required for its responsible adoption. The framework provides a structured foundation for analysing supervisory practices, institutional readiness, literacy disparities and the relational consequences of GenAI integration in postgraduate research supervision.

3. Problem Statement

Recent shifts in higher education have been influenced by rapid digital evolution, which has the potential to enhance access to learning, increase flexibility, and foster more personalised educational experiences that enrich both teaching and research practices (Zou et al., 2025). These developments, including heightened reliance on digital tools and remote learning environments, have generated new expectations regarding the conduct of research and research supervision. Existing studies indicate that digital transformation can facilitate improved learning environments that promote independent learning, adaptive engagement, and data-informed decision-making. However, the extent to which these advantages are realised depends on institutional readiness, professional competencies, and strategic vision within higher education

institutions (Ajani, 2024; Nazyrova et al., 2025). Within this evolving digital context, GenAI has emerged as a significant disruptor in higher education (Francis et al., 2025; García-López & Trujillo-Liñán, 2025; He, 2025; Jin et al., 2025). Its integration has further redefined research practices, with digital tools increasingly regarded not merely as complements to traditional approaches, but as integral components of research support and postgraduate supervision. While GenAI presents considerable potential for enhancing research efficiency and allowing researchers to concentrate on more complex facets of their work through personalised support and administrative automation, its rapid and uneven adoption has introduced a range of tensions that warrant critical examination. In particular, the pace of GenAI development, combined with predominantly small-scale and experimental utilisation within supervisor-research candidate relationships across both the global north and south (Petrenko, 2024), has resulted in fragmented regulatory responses, limited preparedness among supervisors and research candidates, and missed opportunities for research excellence. This situation highlights a pronounced gap in understanding the ethical and GenAI literacy requirements necessary to facilitate responsible and effective GenAI integration in postgraduate supervision. Accordingly, this study provides new insights into the ethical and GenAI literacy imperatives essential for supervisors and research candidates to navigate the evolving landscape of postgraduate supervision in the context of widespread GenAI adoption.

3.1 Research questions

This study is guided by the following three research questions, which integrate the ethical, literacy, governance, and pedagogical considerations emerging from the literature:

- Q1. What ethical challenges arise from the integration of GenAI into postgraduate research supervision, particularly regarding academic integrity and mentorship dynamics?
- Q2. What GenAI literacy competencies and institutional governance mechanisms are required to ensure responsible, ethical, and consistent use of GenAI by research supervisors and postgraduate students?
- Q3. What strategies can align the adoption of GenAI in postgraduate research supervision with humanising pedagogy while preserving the integrity of knowledge creation?

4. Materials and Methods

A systematic literature review (SLR) was conducted for this study, employing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology. The PRISMA 2020 statement was applied (Page et al., 2021). PRISMA facilitates the documentation of transparent accounts of the conducted review, with its utilisation widely endorsed and adopted within the academic community. The rigour, comprehensiveness, and reproducibility inherent in PRISMA render it particularly suitable for this type of investigation. The researchers

identified and classified the research as a systematic review report addressing the ethical and literacy imperatives in the current era of Generative AI and its impact on transforming postgraduate research supervision. To ensure a rigorous and transparent review process, clearly defined inclusion and exclusion criteria were established for the selection of literature pertinent to this study. These criteria guided the identification, screening, and refinement of sources, ensuring that only relevant, credible, and recent publications contributed to the analysis. Table 1 summarises the specific parameters utilised to determine the eligibility of studies for inclusion and the rationale for exclusion.

Table 1: Inclusion and exclusion criteria

Inclusion	Exclusion
1. Search keywords	1. Unrelatedness to search keywords
2. Articles written in English	2. Articles in other languages except English
3. Academically peer-reviewed articles, conferences, books, book chapters, reviews	3. Not peer-reviewed articles
4. Recency (2015-2025)	4. Recency (>10 years)
5. Duplicates	5. Duplicates
6. Article or title relatedness to the phenomenon under investigation	6. Discipline of focus
7. Relatedness to the problem statement, research question, and objective	7. Outside the domain of postgraduate supervision

The researchers conducted searches across Google Scholar, Scopus, the Education Resources Information Centre (ERIC), and the Web of Science databases. The rationale for selecting these databases was to ensure a comprehensive and rigorous search, utilising sources that grant access to a substantial body of relevant literature and are specifically designed to index academic research in education and related fields. Scopus and Web of Science are renowned for their extensive coverage of high-quality peer-reviewed publications and robust citation indexing capabilities (Martín-Martín et al., 2021). ERIC is widely acknowledged as a fundamental database for educational research due to its emphasis on scholarly and policy-related outputs (Fitzgerald et al., 2025). Google Scholar was included to expand the search, as it encompasses grey literature and additional academic outputs that may not be represented in conventional subscription databases (Halevi et al., 2017). Table 2 presents a list of the databases utilised, the search strings applied, and the resulting number of initial sources (112).

Table 2: Search strings

#	Database	Search term	Number of sources
1	Google Scholar	("Generative AI" OR "GenAI" OR "Artificial Intelligence") AND ("research supervision" OR "doctoral supervision" OR "graduate mentorship") AND ("ethics" OR "academic integrity" OR "responsible AI" OR "bias") AND ("AI literacy" OR "digital literacy" OR "supervisor training") AND ("humanizing pedagogy" OR "humanising pedagogy" OR "social justice" OR "humanising praxis" OR "humanizing praxis")	89
2	Scopus	("Generative AI" OR "GenAI" OR "Artificial Intelligence") AND ("research supervision" OR "doctoral supervision" OR "graduate mentorship")	11
3	ERIC	("Generative AI" OR "GenAI" OR "Artificial Intelligence") AND ("research supervision" OR "doctoral supervision" OR "graduate mentorship")	8
4	Web of Science	(ALL=("Generative AI" OR "GenAI" OR "Artificial Intelligence")) AND ALL=("research supervision" OR "doctoral supervision" OR "graduate mentorship")	4
Total:			112

Table 2 presents the results from each database search. The researchers subsequently identified articles published between 2015 and 2025, resulting in the exclusion of 18 articles. Further screening was conducted on the remaining 94 articles, leading to the exclusion of 6 duplicates. Additionally, 53 articles were excluded for failing to meet the specified criteria, as their abstracts or titles were not related to the phenomenon under investigation. A further 25 articles were excluded due to their lack of relevance to the problem statement and research questions. Ultimately, only 10 articles remained for final analysis based on the inclusion criteria, with none sourced from Web of Science. Although only ten studies fulfilled the inclusion criteria, this number is deemed appropriate given the emerging and conceptually specialised nature of research on GenAI in postgraduate research supervision. Systematic review methodologists emphasise that small evidence bases are common and methodologically acceptable in developing or narrowly defined research areas, particularly when rigorous eligibility criteria are employed to ensure conceptual relevance and analytical depth (Brunton et al., 2012, 2017; Petticrew & Roberts, 2006). Importantly, the objective of a systematic literature review (SLR) is not to maximise the number of included studies but to ensure transparency, coherence, and alignment between the research purpose and the selection process. This review does not aim to estimate prevalence, effectiveness, or generalisable outcomes; rather, it seeks to synthesise ethical, literacy, and pedagogical insights that enhance understanding of GenAI-mediated postgraduate supervision. In conceptually oriented reviews, the adequacy of the evidence base is assessed by conceptual saturation and analytical coherence rather than numerical thresholds alone (Snyder,

2019; Xiao & Watson, 2019). Consequently, the inclusion of ten studies reflects the point at which no substantively new conceptual insights emerged, indicating sufficient saturation to address the three research questions. The limited number of included studies is therefore not a methodological weakness but a notable finding in itself, highlighting both the novelty of the field and the necessity for further empirical research.

In this study, articles addressing artificial intelligence (AI) in education at a general level were deliberately excluded to preserve conceptual integrity and maintain close alignment with the research questions focused specifically on ethical and GenAI literacy imperatives in postgraduate supervision. In accordance with PRISMA 2020, the rigour of the review is demonstrated through methodological transparency, reproducibility, and the defensible application of inclusion and exclusion criteria, rather than the attainment of a predetermined sample size (Page et al., 2021). Adhering to these principles, the final sample of ten studies represents the most relevant, methodologically appropriate, and conceptually aligned evidence currently available for the phenomenon under investigation (Albright, 2011; Booth et al., 2016). Figure 2 below illustrates the flowchart representing the PRISMA process followed (Page et al., 2021).

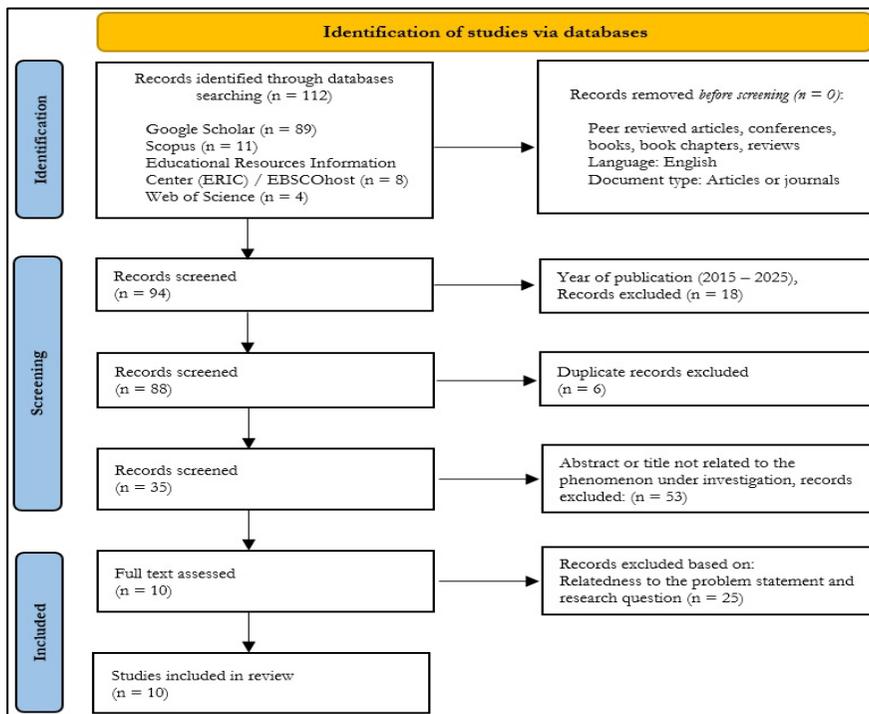


Figure 2: PRISMA flow diagram

5. Presentation of Results

This section presents the findings of the SLR based on the ten studies that met the inclusion criteria. As detailed in the Materials and Methods section, this modest evidence base reflects the emerging and highly specialised nature of scholarship on ethical and GenAI literacy imperatives

in postgraduate supervision. Methodological guidance confirms that, in conceptually narrow or developing fields, smaller study pools remain acceptable when derived through rigorous screening and clearly defined inclusion criteria (Brunton et al., 2012, 2017; Petticrew and Roberts, 2006; Snyder, 2019; Xiao & Watson, 2019).

The findings presented in this section derive from a SLR undertaken to examine the ethical and GenAI literacy imperatives shaping postgraduate research supervision in higher education, viewed through a humanising pedagogy lens. The review was guided by the overarching research question: What ethical and GenAI literacy imperatives are necessary for transforming research supervision in higher education through a humanising pedagogy in the era of GenAI?

Although the study employs three research questions, the thematic analysis identifies four themes. This is consistent with systematic review conventions in which themes arise inductively from the evidence base. In this case, the second research question, integrating GenAI literacy and governance, produced two distinct clusters: one centred on competency development and the other on institutional regulation. Because the literature treats these as conceptually distinct domains, they are presented separately to ensure analytic clarity. These four dimensions informed the subsequent thematic synthesis and continue to serve as the organising structure for presenting the results.

A total of ten validated sources were included in the analysis, summarised in Tables 3 and 4. Each source was examined against the four analytical dimensions that correspond directly to the study’s research questions, as indicated earlier. Table 2 illustrates the frequency with which each of the ten studies addressed these dimensions, showing that GenAI literacy (n = 8) and ethical challenges (n = 7) were the most prominent areas of focus, followed by humanising pedagogy (n = 6) and policy and governance (n = 4). This distribution informed the thematic organisation of the findings. The results are therefore structured around four themes, each reflecting one of the research questions and the corresponding analytical dimension. These themes synthesise patterns across the reviewed literature and highlight areas of convergence and divergence relevant to GenAI-mediated postgraduate supervision.

Table 3: Descriptive summary of sources

N0:	Author(s)	Title	Year	Publisher	Publisher Country	Type of Article
1	Bartoletti, I.	Chapter 3 – AI in education	2022	Routledge	UK	Book chapter
2	Smuha, N.A.	Chapter 5 – Pitfalls and pathways for Trustworthy AI	2022	Routledge	UK	Book chapter
3	Kizilcec, R. F. & Lee, H.	Chapter 7 – Algorithmic fairness in education	2022	Routledge	UK	Book chapter
4	du Boulay, B.	Chapter 9 – The overlapping ethical imperatives of human teachers and their Artificially Intelligent assistants	2022	Routledge	UK	Book chapter

5	Jassim, O.A., Mahmoud, M.A. & Sharifuddin, M.	A multi-agent framework for research supervision management	2015	Springer Verlag	Germany	Journal article
6	Waring, P.	Artificial intelligence and graduate employability: What should we teach Generation AI?	2024	Kaplan Higher Education	Singapore	Journal article
7	Tauginienė, L.	Ethics and Integrity in Research, Publishing, and Educational Leadership: Introduction	2024	Springer Nature	Germany	Journal article
8	Fu, Yao & Weng, Zhenjie	Navigating the ethical terrain of AI in education: A systematic review on framing responsible human-centred AI practices	2024	Elsevier	Netherlands	Journal article
9	Wright, A.	Postgraduate Supervision in a ChatGPT World: What's Next?	2024	Universidad Politecnica de Valencia	Spain	Conference paper
10	Cowling, M., Crawford, J., Allen, K. & Wehmeyer, M.	Using leadership to leverage ChatGPT and artificial intelligence for undergraduate and postgraduate research supervision.	2023	Australasian Journal of Educational Technology (AJET)	Australia	Journal article

Table 3 compiles 10 scholarly sources (2015–2025) that contribute to the discourse on Artificial Intelligence in education, algorithmic ethics, research supervision, and graduate employability. These sources are categorised by type, publisher details, and origin to support systematic literature synthesis. There is a balanced mix of empirical research, conceptual chapters, and emerging discourse contributions, comprising 5 journal articles, 4 book chapters, and 1 conference paper. The sources reflect a broad international representation, particularly from Europe. The topical focus of the sources ranges from Artificial Intelligence ethics and fairness in education, such as algorithmic bias and human-AI interaction, to postgraduate and graduate teaching supervision, with an emphasis on evolving practices in AI-enhanced academic contexts; digital pedagogy; research integrity and mentorship, with a focus on ethics, leadership, and professional development in graduate education. Most works are from 2022–2024, showing a very recent and relevant research base on Artificial Intelligence and postgraduate pedagogy in higher education. This collection of sources forms a solid foundation for a systematic review on the evolving role of Artificial Intelligence in higher education, especially regarding ethics, employability, and postgraduate supervision.

Table 4 further deepens the analysis by mapping each of the ten validated studies to the three research questions (Q1–Q3) using keyword alignment and conceptual relevance. This table illustrates how each article contributes differently across the ethical, literacy, policy, and humanising pedagogy dimensions. For example, studies by Bartoletti (2022), Smuha (2022), Kizilcec and Lee (2022), and du Boulay (2022) show strong alignment with Q1 and Q2, reflecting their emphasis on ethical concerns and GenAI literacy. Similarly, works by Cowling et al. (2023)

and Wright (2024) align with Q3 due to their emphasis on relational, supervisory, and pedagogical implications. This structured mapping provides the basis for identifying patterns across the literature and informs the thematic synthesis presented later in this section.

Table 4: Summary of Sources

N0:	Author(s)	Keywords Matched	Q 1	Q 2	Q 3	Summary
1	Bartoletti, I.	AI, ethics, education, policy	✓	✓	✓	Primary theme: AI in education Focus / contribution: Ethical implications of AI integration in education
2	Smuha, N.A.	trustworthy AI, ethics, integrity, fairness	✓	✓	✓	Primary theme: Trustworthy AI Focus / contribution: Critically evaluates the risks and challenges to building trustworthy AI in education
3	Kizilcec, R. F. & Lee, H.	algorithmic bias, equity, fairness, pedagogy	✓	✓	✓	Primary theme: Algorithmic fairness Focus / contribution: Explores fairness and bias in educational algorithms
4	du Boulay, B.	AI ethics, academic integrity, transparency	✓	✓		Primary theme: Ethics of Human-AI Roles Focus / contribution: Analyses the ethical imperatives of teachers vs AI assistants
5	Jassim, O.A., Mahmoud, M.A. & Sharifuddin, M.	AI supervision, agent systems, governance, doctoral training		✓	✓	Primary theme: AI in Supervision Focus / contribution: Proposes a multi-agent framework to support research supervision processes
6	Waring, P.	AI literacy, employability, higher education		✓		Primary theme: AI and employability Focus / contribution: Examines AI's influence on graduate employability and curriculum design
7	Tauginienė, L.	academic integrity, leadership, ethics	✓	✓		Primary theme: Research ethics and integrity Focus / contribution: Introduces ethical leadership in research and publishing
8	Fu, Y. & Weng, Z.	responsible AI, educational ethics, human-centred design	✓		✓	Primary theme: Responsible human-centred AI Focus / contribution: Presents a systematic review on frameworks for ethical, responsible AI in education
9	Wright, A.	GenAI, research supervision, integrity	✓	✓	✓	Primary theme: Postgraduate supervision in AI context Focus / contribution: Explores how AI (e.g., ChatGPT) is reshaping postgraduate supervision
10	Cowling, M., Crawford, J., Allen, K. &	ChatGPT, research supervision, humanising pedagogy		✓	✓	Primary theme: AI and leadership in supervision Focus / contribution: Analyses leadership strategies for integrating AI in undergraduate and postgraduate research supervision

Wehmeyer, M.				
Distribution of supporting articles:		7	8	7

The presentation of findings is structured by themes. The four themes outlined below synthesise patterns, tensions, and convergences across the included studies. Collectively, they illuminate the ethical, pedagogical, literacy, and governance imperatives necessary for embedding GenAI within postgraduate supervision in a manner consistent with a humanising pedagogy. The themes integrate both qualitative insights and keyword trend analyses to highlight patterns, gaps, and areas of transformative potential in research supervision. The discussion incorporates theoretical grounding from the GenAI-TPACK framework and situates the findings within the context of humanising pedagogy for postgraduate supervision in the era of GenAI.

5.1 Theme 1: Ethical challenges in GenAI-mediated postgraduate supervision

Seven studies illustrate the complex ethical implications of integrating GenAI into postgraduate supervision. Across this body of work, the central concern is the potential erosion of academic integrity and uncertainty surrounding authorship when GenAI-generated content becomes embedded in research processes. Bartoletti (2022) contends that undisclosed or poorly regulated use of GenAI risks compromising originality and diminishing the scholarly value of research outputs. This concern is reinforced by Smuha (2022), who notes that many institutional contexts still treat AI tools as neutral, thereby overlooking the socio-political dynamics and rights-based considerations crucial to trustworthy AI practices.

Bias and fairness also emerge as critical challenges. Kizilcec and Lee (2022) demonstrate that algorithmic systems can reproduce existing societal inequities, which has implications for supervisory evaluation, feedback, and decision-making processes. Their work aligns with du Boulay (2022), who critiques the implicit value systems encoded in educational AI tools and stresses the necessity for proactive ethical reflection rather than reactive compliance. These ethical risks, including algorithmic opacity and compromised integrity, highlight the need for clearer institutional support and transparent accountability structures.

Leadership and governance perspectives further reinforce this theme. Tauginienė (2024) emphasises that fragmented ethical cultures in universities leave supervisors without guidance, resulting in inconsistent decisions regarding authorship, disclosure, and fairness. Fu and Weng (2024) also reveal governance gaps, arguing that responsible AI use must be grounded in human-centred ethical principles rather than performative policy statements. Wright (2024) provides empirical evidence that supervisors already experience uncertainty and stress when navigating these ambiguities without institutional clarity. Collectively, these studies underscore that the ethical challenges of GenAI are multifaceted, affecting integrity, transparency, fairness, and relational trust throughout the supervision process.

5.2 Theme 2: GenAI literacy competencies for supervisors and postgraduate students

Eight studies emphasise the necessity for comprehensive GenAI literacy among supervisors and postgraduate students. The literature consistently indicates that GenAI literacy extends beyond basic operational familiarity, encompassing ethical reasoning, evaluative judgement, and critical engagement with AI-generated outputs. Bartoletti (2022) identifies a significant preparedness gap in higher education, noting that the adoption of AI is accelerating faster than institutions can provide adequate training. This observation aligns with Smuha (2022), who argues that trustworthy AI necessitates scenario-based ethical training rather than superficial compliance with guidelines.

Algorithmic bias and fairness remain central considerations within the discourse on literacy. Kizilcec and Lee (2022) demonstrate that, without the ability to detect and question biased AI outputs, supervisors risk perpetuating inequities in assessment and feedback. Their findings complement du Boulay's (2022) assertion that AI literacy and ethical literacy must be cultivated concurrently, as users must critically engage with GenAI rather than treating it as an infallible technological assistant. This dual competency is essential for maintaining rigorous academic standards.

Employability-driven perspectives also contribute to this theme. Waring (2024) warns that graduates lacking GenAI literacy may encounter difficulties in AI-driven labour markets, thereby underscoring the importance for universities to embed AI reasoning, prompt engineering, and critical digital skills into curricula. At the institutional level, Tauginienė (2024) observes that literacy gaps create unequal supervisory experiences, reinforcing the need for structured AI capacity-building initiatives. Wright (2024) adds that supervisors frequently feel unsupported when evaluating AI-influenced student work, further emphasising the lack of training frameworks. Cowling et al. (2023) illustrate the applied dimension of literacy by demonstrating that supervisors must understand prompt design, validation, and oversight to integrate GenAI responsibly. Collectively, these studies depict GenAI literacy as a multidimensional competency essential for ethical, consistent, and informed supervisory practices.

5.3 Theme 3: Institutional policies and governance frameworks for GenAI Use

Across four studies, institutional governance emerges as a critical yet underdeveloped component of the integration of GenAI in postgraduate supervision. These works collectively emphasise that the adoption of GenAI cannot be left to individual discretion and requires structured, institution-wide policies to ensure ethical and consistent practice. For instance, Jassim et al. (2015) highlight the necessity for systematised supervisory processes through their multi-agent model, while Fu and Weng (2024) demonstrate that higher education institutions often lack governance mechanisms capable of keeping pace with rapid advancements in GenAI. Similarly, Tauginienė (2024) and Brunton et al. (2012) stress the importance of institutional leadership, coherence, and ethical oversight to support supervisors navigating AI-mediated environments.

A recurring message across these studies is that governance gaps heighten risks related to bias, academic integrity, uneven supervision practices, and misalignment between institutional expectations and supervisory realities. Fu and Weng (2024) caution that without clear guidelines, the burden of ethical decision-making shifts to individual supervisors, creating inconsistencies that may compromise fairness and accountability. Complementing this, Tauginienė (2024) argues that robust integrity safeguards, transparent disclosure expectations, and institutional support structures are essential to prevent fragmented or reactive responses to the challenges posed by GenAI.

Overall, these studies indicate that institutional policy and governance are not peripheral considerations but foundational elements of the ethical implementation of GenAI in postgraduate supervision. In the absence of coherent frameworks, both students and supervisors are left to manage complex ethical questions independently, thereby increasing the likelihood of inconsistent practices and compromised academic standards (Fu & Weng, 2024; Jassim et al., 2015; Tauginienė, 2024).

5.4 Theme 4: Humanising pedagogy and relational dynamics in AI-supported supervision

Six studies explore how GenAI can be integrated into postgraduate supervision in ways that preserve dignity, relational trust, and student agency—core principles of a humanising pedagogy. The literature consistently highlights that GenAI offers potential benefits but also risks undermining the interpersonal aspects of supervision if not embedded within relationally grounded pedagogical practices. Bartoletti (2022) emphasises that AI tools must supplement rather than replace supervisor–student dialogue, cautioning that misuse may dehumanise learning processes. This view is complemented by Smuha (2022), who argues that ethical AI governance must foreground human rights, well-being, and socio-cultural sensitivity.

Fairness and inclusivity also shape this theme. Kizilcec and Lee (2022) demonstrate that algorithmic systems may marginalise certain groups if fairness and transparency are not intentionally prioritised. Their call for participatory design processes aligns with Fu and Weng (2024), who report that most current educational AI systems lack human-centred design principles, potentially reinforcing power imbalances within supervisory relationships. Both studies highlight the need for pedagogy that ensures AI enhances rather than suppresses student expression and epistemic agency.

Practice-oriented insights strengthen the pedagogical dimension of this theme. Wright (2024) illustrates that supervisors often feel pressure to adopt GenAI tools without adequate guidance, risking tensions between institutional expectations and humanising supervisory commitments. She proposes co-designed supervision agreements to maintain transparency and relational accountability. Similarly, Cowling et al. (2023) demonstrate that GenAI can support formative feedback and student development when integrated within leadership models that prioritise

psychological safety, collaboration, and relational care. Together, these studies underscore that humanising pedagogy remains essential for ensuring that GenAI enhances rather than diminishes the ethical, relational, and developmental foundations of postgraduate supervision.

6. Discussion of Findings

The systematic review demonstrates that the integration of GenAI into postgraduate research supervision presents both significant opportunities and complex ethical, pedagogical, and governance challenges. The ten validated articles collectively suggest that while GenAI can enhance personalisation, productivity, and formative feedback processes, its implementation occurs within institutional contexts that often lack clear policy direction, consistent literacy training, and ethically grounded supervisory practices. When interpreted through the broader literature and the conceptual arguments established in the Introduction, several cross-cutting insights emerge.

Interpreting the findings through the GenAI-TPACK lens highlights how responsible GenAI-mediated supervision depends on the interplay between technological proficiency, pedagogical sensitivity, and deep disciplinary knowledge. This framework is particularly relevant in a rapidly transforming academic environment where supervisors must reconsider traditional roles, expectations, and relational practices in light of GenAI's capabilities and constraints. Moreover, the findings align with humanising pedagogy, which foregrounds relational trust, inclusivity, socio-cultural awareness, and student voice; elements that remain central to postgraduate supervision even as technological mediation increases.

Ethical concerns emerge as a foundational theme. Articles by Bartoletti (2022), Smuha (2022), du Boulay (2022), and Tauginienè (2024) converge on the argument that issues of academic integrity, attribution, and algorithmic bias require urgent attention in supervisory contexts. Despite this, many institutions still lack ethical clarity regarding how GenAI outputs should be acknowledged, evaluated, or incorporated into thesis writing, data analysis, and feedback cycles. These findings echo Dabis and Csáki (2024) and Saleem et al. (2024), who emphasise the need for stronger institutional safeguards and more robust oversight mechanisms. The absence of clear guidance contributes to differing interpretations among supervisors and students, thereby influencing relational trust and expectations.

The importance of GenAI literacy among supervisors and postgraduate researchers is another dominant theme. Eight validated studies, including those by Kizilcec and Lee (2022), Waring (2024), and Cowling et al. (2023), highlight that literacy extends beyond technical skill to include ethical reasoning, critical prompt design, bias recognition, and reflective integration of AI-generated outputs. The findings align with calls from Farina and Stevenson (2024) and Petrenko (2024), who emphasise scenario-based training and institutional readiness. The contribution from Wright (2024) underscores the vulnerability supervisors experience when left to navigate the implications of AI without centralised support structures or institutional backing.

Despite the increasing adoption of GenAI in academic discourse, policy frameworks remain limited. Only four validated articles, specifically those by Jassim et al. (2015), Fu and Weng (2024), and Tauginienė (2024), provide a substantive discussion of governance structures. This observation is consistent with insights from Montezuma and Chong (2024), who note a persistent gap between policy intentions and regulatory enforcement. The absence of cohesive institutional policy not only inhibits responsible implementation but also raises equity concerns regarding differential access, uneven expectations, and inconsistent supervisory practices across departments and faculties.

A critical theme arising from both validated and referenced literature is the importance of aligning GenAI use with humanising pedagogical values. Six of the selected articles, particularly those by Wright (2024), Cowling et al. (2023), and Smuha (2022), argue that AI should not erode the relational, inclusive, and context-sensitive elements of postgraduate supervision. Rather than viewing AI as a replacement for supervisory engagement, a humanising framework perceives it as a collaborator in fostering student agency, dignity, and voice. This notion is reinforced by foundational works introduced by Mehta and Aguilera (2020) and Manathunga (2007), who assert that any shift in supervision models must remain grounded in care, mutual respect, and ethical transparency.

While excluded or contextually aligned studies were not analysed in depth, they provide a useful interpretative context. For instance, Velazquez-Solis et al. (2025) and Kruger-Roux and Alberts (2024) expand on how inclusive GenAI systems can support diverse learning needs, particularly for students from underrepresented or resource-constrained backgrounds. These findings align with Khene's (2014) advocacy for context-sensitive pedagogy that is culturally and socially responsive. Meanwhile, the literature from the COVID-19 era, as discussed by Sosibo (2024) and Chigona and Sosibo (2024), contextualises the shift towards virtual supervision models and examines how these frameworks have set the stage for contemporary AI-mediated supervision dynamics.

The discussion surrounding power dynamics introduced in the theoretical framing of GenAI and Technological Pedagogical Content Knowledge (TPACK) remains underexplored in most empirical studies. The potential for GenAI to exacerbate asymmetries between supervisors and research candidates—especially when only one party has access to or control over AI tools—raises ethical concerns that intersect with issues of consent, authorship, and student autonomy. In summary, the convergence between the systematic literature review (SLR) findings and the broader literature suggests that the integration of GenAI into postgraduate supervision is not merely a technical upgrade but rather represents a pedagogical and ethical shift. As institutions move towards scaling GenAI adoption, they must anchor these transitions in clearly articulated ethics, widespread literacy training, inclusive governance, and a recommitment to humanising pedagogy.

7. Conclusion

This systematic review examined the ethical and GenAI literacy imperatives shaping postgraduate research supervision in higher education, interpreted through a humanising pedagogy framework. The findings demonstrate that the integration of GenAI presents significant opportunities for enhancing feedback, productivity, and supervisory support while simultaneously introducing complex ethical, relational, and governance challenges that institutions have not yet adequately addressed.

Across the reviewed literature, four key patterns emerged. First, ethical concerns, including academic integrity, authorship, algorithmic bias, and transparency, remain insufficiently regulated, leaving supervisors and students without clear guidance on the responsible use of GenAI. Second, GenAI literacy has become an essential competency for both supervisors and postgraduate students. However, the development of this literacy currently depends on individual initiative rather than coordinated institutional support, resulting in uneven levels of understanding and inconsistent supervision practices. Third, the review reveals a persistent policy and governance vacuum. Despite the rapid adoption of GenAI tools, few institutions have developed coherent regulatory frameworks that outline expectations, responsibilities, or acceptable boundaries for AI-assisted academic work. Finally, the findings underscore the need to integrate GenAI use within a humanising pedagogical approach. Without intentional attention to relational trust, inclusivity, and student agency, GenAI risks reinforcing existing power hierarchies and diminishing the developmental, dialogic character of postgraduate supervision.

Overall, the evidence indicates that GenAI does not merely introduce new technological capabilities; it reshapes the ethical, pedagogical, and relational foundations of supervision. Transforming postgraduate supervision in the GenAI era, therefore, requires institutional readiness, supervisor support, and pedagogical sensitivity grounded in ethical responsibility and human-centred educational values.

7.1 Recommendations

The findings of this review highlight several ethical, pedagogical, and governance considerations that must be addressed to support the responsible and human-centred integration of GenAI into postgraduate research supervision. Drawing from the thematic analysis and the preceding conclusion, this section outlines key recommendations for higher education institutions, supervisors, and policymakers. These recommendations are intended to strengthen institutional preparedness, enhance GenAI literacy, safeguard ethical academic practice, and ensure that technological adoption aligns with the principles of humanising pedagogy.

Higher education institutions should develop coherent and comprehensive policies that clearly articulate expectations for the ethical use of GenAI in postgraduate supervision. These policies should address disclosure procedures, authorship attribution, acceptable uses of GenAI tools in

academic work, and mechanisms for fairness auditing. Establishing consistent guidelines across faculties will reduce reliance on individual interpretation and minimise the risk of unequal supervisory practices. Institutions should also implement governance structures that support ethical decision-making, provide clarity regarding roles and responsibilities, and ensure that supervisors and students engage with GenAI within a regulated and transparent framework.

There is a critical need for structured GenAI literacy programmes that equip supervisors and postgraduate students with the competencies required for responsible engagement with AI technologies. Such programmes should extend beyond basic technical skills to include ethical reasoning, critical evaluation of AI outputs, awareness of algorithmic bias, and proficiency in prompt design. Embedding GenAI literacy into postgraduate training and supervisor development initiatives will promote consistent and informed practice across academic departments. Ongoing professional development is essential, given the rapid evolution of GenAI tools and their growing influence on research practices.

Ethical engagement with GenAI in postgraduate supervision requires transparent communication between supervisors and students regarding expectations, boundaries, and acceptable forms of AI assistance. Institutions should encourage supervisors and students to co-create supervision agreements that explicitly address GenAI use and align with principles of academic integrity. Supervisors should adopt practices that integrate fairness, accountability, and human rights considerations into their decision-making processes, ensuring that GenAI enhances rather than undermines the ethical standards and relational foundations of postgraduate research.

The adoption of GenAI tools should be guided by the values of humanising pedagogy, which emphasises relational trust, student agency, socio-cultural sensitivity, and mutual respect. Supervisors should be supported to integrate GenAI in ways that augment, rather than replace, the interpersonal and developmental aspects of postgraduate supervision. This includes ensuring that students retain their voice and autonomy, and that AI tools are introduced in ways that recognise diverse learning needs and safeguard student wellbeing. Intentional alignment between GenAI use and human-centred pedagogical principles will help prevent the reinforcement of power imbalances or the erosion of meaningful supervisory relationships.

7.2 Future research directions

Further research is needed to deepen our understanding of how GenAI shapes postgraduate supervision across different institutional contexts. Empirical studies examining how supervisors and students negotiate authorship, trust, and accountability in AI-mediated academic work would provide valuable insights. Comparative research across diverse and resource-constrained settings could illuminate the equity-related implications of GenAI adoption. Longitudinal studies exploring how GenAI influences supervisory identity, power dynamics, and epistemic autonomy over time would also contribute significantly to the evolving discourse on AI in higher education.

7.3 Limitations of the study

This review has several limitations that should be acknowledged. First, although 112 records were initially identified, only ten studies met the inclusion criteria. This small number reflects both the emerging nature of research on GenAI ethics and literacy within postgraduate supervision and the narrow conceptual focus of the review. Second, the study restricted its scope to peer-reviewed literature published between 2015 and 2025, potentially excluding relevant earlier work or recent grey literature. Third, the search was limited to four major academic databases, which, although appropriate for the field, may have narrowed the breadth of the available evidence. Finally, the included studies varied in methodological design and disciplinary context, which limits the generalisability of the findings. These limitations indicate the need for further empirical and comparative research to deepen understanding of GenAI's role in postgraduate supervision.

8. Declarations

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Use of Artificial Intelligence: The current work was created with the assistance of artificial intelligence technologies, such as Grammarly, to assist with refining language for clarity, as confirmed by the author(s).

References

- Ajani, O. A. (2024). Exploring digital transformation and future trends in higher education development across African nations. *Journal of Pedagogical Sociology and Psychology*. <https://doi.org/10.33902/JPSP.202427374>
- Albright, D. L. (2011). Book review: Cooper, H. *Research synthesis and meta-analysis: A step-by-step approach* (4th ed.). Thousand Oaks, CA: SAGE. <https://doi.org/10.1177/1049731509348800>
- Azevedo, L., Robles, P., Best, E., & Mallinson, D. J. (2025). Institutional policies on artificial intelligence in higher education: Frameworks and best practices for faculty. *New Directions for Adult and Continuing Education*, 10(2), 1-23. <https://doi.org/10.1002/ace.70013>
- Bartoletti, I. (2022). AI in education. In W. Holmes & K. Porayska-Pomsta (Eds.), *The ethics of artificial intelligence in education* (1st ed.). Routledge.
- Booth, A., Sutton, A., & Papaioannou, D. (2016). Taking a systematic approach to your literature review. *Systematic Approaches to Successful Literature Review*, 9-35.
- Boyd, P., & Harding, D. (2025). Generative AI: Reconfiguring supervision and doctoral research. *Buildings & Cities*, 6(1), 1-12. <https://doi.org/10.5334/bc.560>
- Brunton, G., Stansfield, C., & Thomas, J. (2012). Chapter 6 - Finding relevant studies. In *An introduction to systematic reviews*.

- Capano, G., He, A. J., & McMinn, S. (2025). Riding the tide of generative artificial intelligence in higher education policy: An Asian perspective. *Journal of Asian Public Policy*, 1–15. <https://doi.org/10.1080/17516234.2025.2450571>
- Celik, I. (2023). Towards intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence (AI)-based tools into education. *Computers in Human Behavior*, 138, 107468. <https://doi.org/10.1016/j.chb.2022.107468>
- Chigona, A., & Sosibo, L. (2024). Research and postgraduate supervision during the Coronavirus-19 pandemic: Lessons learned. *South African Journal of Higher Education*, 38(1). <https://doi.org/10.20853/38-1-6281>
- Cowling, M., Crawford, J., Allen, K. A., & Wehmeyer, M. (2023). Using leadership to leverage ChatGPT and artificial intelligence for undergraduate and postgraduate research supervision. *Australasian Journal of Educational Technology*, 39(4). <https://doi.org/10.14742/ajet.8598>
- Dabis, A., & Csáki, C. (2024). AI and ethics: Investigating the first policy responses of higher education institutions to the challenge of generative AI. *Humanities and Social Sciences Communications*, 11(1), 1006. <https://doi.org/10.1057/s41599-024-03526-z>
- du Boulay, B. (2022). The overlapping ethical imperatives of human teachers and their artificially intelligent assistants. In W. Holmes & K. Porayska-Pomsta (Eds.), *The ethics of artificial intelligence in education* (1st ed.). Routledge.
- Farina, A., & Stevenson, C. N. (2024). *Ethical navigations* (pp. 63–87). <https://doi.org/10.4018/979-8-3693-1565-1.ch005>
- Fitzgerald, S. R., Weaver, K. D., & Droog, A. (2025). Selecting a specialised education database for literature reviews and evidence synthesis projects. *Research Synthesis Methods*, 16(1), 30–41. <https://doi.org/10.1017/rsm.2024.11>
- Floridi, L., Cows, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., Luetge, C., Madelin, R., Pagallo, U., Rossi, F., Schäfer, B., Valcke, P., & Vayena, E. (2018). AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Minds and Machines*, 28(4). <https://doi.org/10.1007/s11023-018-9482-5>
- Francis, N. J., Jones, S., & Smith, D. P. (2025). Generative AI in higher education: Balancing innovation and integrity. *British Journal of Biomedical Science*, 81. <https://doi.org/10.3389/bjbs.2024.14048>
- Freire, P. (2021). *Pedagogy of hope: Reliving pedagogy of the oppressed*. <https://doi.org/10.1080/00131911.2020.1766207>
- Fu, Y., & Weng, Z. (2024). Navigating the ethical terrain of AI in education: A systematic review on framing responsible human-centered AI practices. *Computers and Education: Artificial Intelligence*, 7, 100306. <https://doi.org/10.1016/j.caeai.2024.100306>

- García-López, I. M., & Trujillo-Liñán, L. (2025). *Ethical and regulatory challenges of generative AI in education: A systematic review*. *Frontiers in Education*, 10. <https://doi.org/10.3389/feduc.2025.1565938>
- Halevi, G., Moed, H., & Bar-Ilan, J. (2017). *Suitability of Google Scholar as a source of scientific information and as a source of data for scientific evaluation: Review of the literature*. *Journal of Informetrics*, 11(3), 823–834. <https://doi.org/10.1016/j.joi.2017.06.005>
- He, D. (2025). *The Impact of Generative Artificial Intelligence on Higher Education*. *Proceedings of the 2nd International Conference on Intelligent Education and Computer Technology*, 324–329. <https://doi.org/10.1145/3764206.3764256>
- Jassim, O. A., Mahmoud, M. A., & Sharifuddin, M. (2015). *A multi-agent framework for research supervision management*. *Advances in Intelligent Systems and Computing*, 373. https://doi.org/10.1007/978-3-319-19638-1_15
- Jin, Y., Yan, L., Echeverria, V., Gašević, D., & Martinez-Maldonado, R. (2025). *Generative AI in higher education: A global perspective of institutional adoption policies and guidelines*. *Computers and Education: Artificial Intelligence*, 8, 100348. <https://doi.org/10.1016/j.caeai.2024.100348>
- Khene, C. (2014). *Supporting a humanizing pedagogy in the supervision relationship and process: A reflection in a developing country*. *International Journal of Doctoral Studies*, 9, 073–083. <https://doi.org/10.28945/2027>
- Kim, H. J., Kong, Y., Hernandez, C., & Soban, M. (2023). *Student emotions and engagement: Enacting humanizing pedagogy in higher education*. *LAFOR Journal of Education*, 11(3), 185–206. <https://doi.org/10.22492/ije.11.3.09>
- Kizilcec, R. F., & Lee, H. (2022). *Algorithmic fairness in education*. In W. Holmes & K. Porayska-Pomsta (Eds.), *The ethics of artificial intelligence in education* (1st ed.). Routledge.
- Kong, S.-C., & Yang, Y. (2024). *A human-centered learning and teaching framework using generative artificial intelligence for self-regulated learning development through domain knowledge learning in K–12 settings*. *IEEE Transactions on Learning Technologies*, 17, 1562–1573. <https://doi.org/10.1109/TLT.2024.3392830>
- Kruger-Roux, H., & Alberts, R. (2024). *Generative artificial intelligence policy for academic literacy in South African higher education* (pp. 1–22). <https://doi.org/10.4018/979-8-3693-1054-0.ch001>
- Kukulska-Hulme, A., Bossu, C., Charitonos, K., Tim, C., Rebecca, F., Elizabeth, F., Mark, G., Guitert, M., Christothea, H., Maina, M., Prietp-Blázquez, J., Bart, R., Sangrà, A., Sargent, J., Scanlon, E., & Denise, W. (2022). *Innovating pedagogy 2022*. In *The Open University* (Issue July).
- Kutty, S., Chugh, R., Perera, P., Neupane, A., Jha, M., Li, L., Gunathilake, W., & Perera, N. (2024). *Generative AI in higher education: Perspectives of students, educators and administrators*. *Journal of Applied Learning & Teaching*, 7(2). <https://doi.org/10.37074/jalt.2024.7.2.27>

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- Lee, A. (2008). How are doctoral students supervised? Concepts of doctoral research supervision. *Studies in Higher Education, 33*(3).
<https://doi.org/10.1080/03075070802049202>
- Manathunga, C. (2007). Supervision as mentoring: The role of power and boundary crossing. *Studies in Continuing Education, 29*(2), 207–221.
<https://doi.org/10.1080/01580370701424650>
- Marcinkevage, C., & Kumar, A. (2025). Generative AI in higher education constituent relationship management (CRM): Opportunities, challenges, and implementation strategies. *Computers, 14*(3), 101. <https://doi.org/10.3390/computers14030101>
- Martín-Martín, A., Thelwall, M., Orduna-Malea, E., & Delgado López-Cózar, E. (2021). Google Scholar, Microsoft Academic, Scopus, Dimensions, Web of Science, and OpenCitations' COCI: A multidisciplinary comparison of coverage via citations. *Scientometrics, 126*(1), 871–906. <https://doi.org/10.1007/s11192-020-03690-4>
- Mehta, R., & Aguilera, E. (2020). A critical approach to humanising pedagogies in online teaching and learning. *The International Journal of Information and Learning Technology, 37*(3), 109–120. <https://doi.org/10.1108/IJILT-10-2019-0099>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record: The Voice of Scholarship in Education, 108*(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Montezuma, J. R. M., & Chong, M. (2024). Generative artificial intelligence impact on education and industry: An ethical dimension. *2024 IEEE World Engineering Education Conference (EDUNINE)*, 1–3. <https://doi.org/10.1109/EDUNINE60625.2024.10500608>
- Nazyrova, A., Milosz, M., Bekmanova, G., Omarbekova, A., Aimicheva, G., & Kadyr, Y. (2025). The Digital Transformation of Higher Education in the Context of an AI-Driven Future. *Sustainability, 17*(22), 9927. <https://doi.org/10.3390/su17229927>
- Ng, D. T. K., Leung, J. K. L., Chu, K. W. S., & Qiao, M. S. (2021). AI literacy: Definition, teaching, evaluation and ethical issues. *Proceedings of the Association for Information Science and Technology, 58*(1), 504–509. <https://doi.org/10.1002/prai.487>
- Noroozi, O., Soleimani, S., Farrokhnia, M., & Banhashem, S. K. (2024). Generative AI in education: Pedagogical, theoretical, and methodological perspectives. *International Journal of Technology in Education, 7*(3), 373–385. <https://doi.org/10.46328/ijte.845>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, n71*. <https://doi.org/10.1136/bmj.n71>

- Petrenko, A. (2024). The role of generative artificial intelligence (GAI) in scientific research. *System Research and Information Technologies*, 3, 133–147.
<https://doi.org/10.20535/SRIT.2308-8893.2024.3.08>
- Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences: A practical guide*. Oxford: Blackwell.
- Radojičić, S., & Vukmirović, D. (2025). Exploring the impact of generative AI on digital inclusion: A case study of the e-government divide. *AI*, 6(12), 303.
<https://doi.org/10.3390/ai6120303>
- Rajak, L., Chauhan, S., & Bara, S. (2024). Transforming English pedagogy with artificial intelligence: En route to enhanced language learning. In *Artificial intelligence: A multidisciplinary approach towards teaching and learning* (pp. 216–241). Bentham Science Publishers. <https://doi.org/10.2174/9789815305180124010013>
- Ruiz, P., Mills, K., Lee, K., Coenraad, M., Fusco, J., Roschelle, J., & Weisgrau, J. (2024). *AI literacy: A framework to understand, evaluate, and use emerging technology*.
<https://doi.org/10.51388/20.500.12265/218>
- Runcan, R., Hațegan, V., Toderici, O., Croitoru, G., Gavrița-Ardelean, M., Cuc, L. D., Rad, D., Costin, A., & Dughi, T. (2025). Ethical AI in social sciences research: Are we gatekeepers or revolutionaries? *Societies*, 15(3), 62. <https://doi.org/10.3390/soc15030062>
- Saleem, M., Chawla, C., & Ather, D. (2024). *Ethical considerations in the deployment of generative AI systems in academia* (pp. 245–256). https://doi.org/10.1007/978-981-97-8460-8_12
- Silva-Atencio, G. (2025). The challenges and opportunities for ethics in generative artificial intelligence in the digital age. *DYNA*, 92(236), 26–35.
<https://doi.org/10.15446/dyna.v92n236.117144>
- Smuha, N. A. (2022). Pitfalls and pathways for trustworthy AI. In W. Holmes & K. Porayska-Pomsta (Eds.), *The ethics of artificial intelligence in education* (1st ed.). Routledge.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Sosibo, L. (2024). Key factors contributing to postgraduate students' success: Making a case for coronavirus-19 and beyond. *South African Journal of Higher Education*, 38(1).
<https://doi.org/10.20853/38-1-6263>
- Strachan, R., Oguna, C., & Oruche, U. (2024). The postgraduate student perspective on academic misconduct in the era of essay mills and generative AI: A case study from Northeast England. *2024 IEEE Global Engineering Education Conference (EDUCON)*, 1–7.
<https://doi.org/10.1109/EDUCON60312.2024.10578821>
- Takaffoli, M., Li, S., & Mäkelä, V. (2024). Generative AI in user experience design and research: How do UX practitioners, teams, and companies use GenAI in industry? *Designing Interactive Systems Conference*, 1579–1593.
<https://doi.org/10.1145/3643834.3660720>

- Tauginienė, L. (2024). Ethics and integrity in research, publishing, and educational leadership: Introduction. In *Springer International Handbooks of Education: Vol. Part F2304*.
https://doi.org/10.1007/978-3-031-54144-5_138
- UNESCO, Miao, F., & Holmes, W. (2023). Guidance for generative AI in education and research. In *Guidance for generative AI in education and research*.
<https://doi.org/10.54675/ewzm9535>
- Valtonen, T., Sointu, E., Kukkonen, J., Kontkanen, S., Lambert, M. C., & Mäkitalo-Siegl, K. (2017). TPACK updated to measure pre-service teachers' twenty-first century skills. *Australasian Journal of Educational Technology*, 33(3). <https://doi.org/10.14742/ajet.3518>
- Velazquez-Solis, P. E., González Correa, M. E., Martínez, M. A., Arroyo, J. G., & Marquez, M. Y. (2025). Designing teaching strategies using artificial intelligence for neurodivergent students in higher education. In *Exploring psychology, social innovation and advanced applications of machine learning* (pp. 191–208). IGI Global. <https://doi.org/10.4018/979-8-3693-6910-4.ch010>
- Waring, P. (2024). Artificial intelligence and graduate employability: What should we teach Generation AI? *Journal of Applied Learning & Teaching*, 7(1), 22–25.
<https://doi.org/10.37074/jalt.2024.7.1.42>
- Wisker, G., Morris, C., Cheng, M., Masika, R., Warnes, M., Trafford, V., Robinson, G., & Lilly, J. (2010). *Doctoral learning journeys final report*.
- Wright, A. (2024). Postgraduate supervision in a ChatGPT world: What's next? *10th International Conference on Higher Education Advances (HEAd'24)*, 1–8.
<https://doi.org/10.4995/HEAd24.2024.17244>
- Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, 39(1), 93–112.
<https://doi.org/10.1177/0739456X17723971>
- Zou, Y., Kuek, F., Feng, W., & Cheng, X. (2025). Digital learning in the 21st century: Trends, challenges, and innovations in technology integration. *Frontiers in Education*, 10.
<https://doi.org/10.3389/educ.2025.1562391>

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