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EDITED BY
Joy de los Reyes,
Ramapo College, United States

REVIEWED BY
Tonia De Giuseppe,
Giustino Fortunato University, Italy
Rashmi Kodikal,
Graphic Era University, India

*CORRESPONDENCE
Freda van der Walt
fvdwalt@cut.ac.za

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A systematic review on AI-enhanced pedagogies in higher education in the Global South

Nomfundo Gladys Khoza[1] and Freda van der Walt[2]*

[1]Department of Business Support Studies, Central University of Technology, Free State, Bloemfontein, South Africa, [2]Department of Business Management, Central University of Technology, Free State, Welkom, South Africa

Artificial intelligence is gaining traction in higher education for its ability to simulate human intelligence and support learning processes. This systematic review investigates how artificial intelligence-enhanced teaching approaches are being applied in higher education institutions across the Global South. The study draws on peer-reviewed literature identified through a structured search of JSTOR and Web of Science databases, using clearly defined inclusion and exclusion criteria. The findings reveal that most applications focus on improving technical efficiency and administrative functions, while pedagogical integration remains limited. Key barriers include inadequate infrastructure, unequal access to digital tools, limited faculty preparedness, and ethical considerations. However, the review also highlights opportunities for locally adapted solutions and collaborative innovation. The study concludes with recommendations to guide policy and practice and outlines a future research agenda aimed at promoting equitable and context-sensitive use of artificial intelligence in higher education within the Global South.

KEYWORDS

artificial intelligence (AI), AI-enhanced learning, pedagogical innovation, higher education, Global South

1 Introduction

Artificial Intelligence (AI) is increasingly recognized for its transformative power across various industries, particularly in education. McKinsey and Company (2024) define AI as "a machine's ability to perform the cognitive functions usually associated with human minds, such as perceiving, reasoning, learning, interacting with an environment, problem solving, and even exercising creativity." In higher education, AI technologies have become central to innovative teaching and learning practices, offering personalized learning experiences, intelligent tutoring systems, adaptive learning platforms, automated grading, and advanced data analytics (Al-Zahrani and Alasmari, 2024). Furthermore, AI technologies are beneficial to higher education, since AI-powered platforms significantly enhance learning quality, increase retention rates, and improve the overall educational experience (Divyshikha et al., 2024).

Despite these advancements, there remains a substantial lack of research on the pedagogical strategies underpinning the integration of AI into educational processes, particularly within AI-supported learning systems (Vorobyeva et al., 2025). Recent studies from leading Higher Education Institutions (HEIs) in the Global North highlight that digital transformation presents complex challenges and requires proactive adaptation to

emerging technologies (Gering et al., 2025). While the urgency of AI adoption in teaching and learning is well documented in the Global North, a significant research gap persists concerning its use in the Global South.

This gap is particularly salient given the unique challenges faced by HEIs in the Global South, including resource constraints, digital divides, socioeconomic disparities, and underdeveloped infrastructure (Henadirage and Gunarathne, 2025). The digital divide, in particular, deepens educational inequalities, as students in underserved communities often lack access to AI technologies (Divyshikha et al., 2024). Understanding how AI can transform teaching and learning in the Global South is critical—not only due to these challenges but also because of the potential for leapfrogging, wherein HEIs can bypass traditional development stages by adopting cutting-edge technologies to bridge gaps between industrialized and developing countries (Steinmueller, 2001).

Accordingly, this systematic review synthesizes the existing literature on AI-enhanced pedagogies in higher education within the Global South—an area that remains underexplored. This study is guided by the following research questions:

(1) How is AI currently being used to support teaching and learning in the Global South?
(2) What are the key challenges and opportunities identified in this context?
(3) What gaps exist in the current evidence base?

The remainder of this article is structured as follows: the next section outlines the methodology, followed by the presentation of results. The final sections discuss practical recommendations, outline areas for future research, and provide concluding remarks.

2 Methodology

2.1 Research design

This study employs a Systematic Literature Review (SLR) methodology, integrated with bibliometric analysis, to examine the scholarly landscape of AI-enhanced pedagogies in higher education across the Global South. The systematic review approach ensures a transparent, replicable, and structured process for identifying, selecting, and evaluating relevant literature, thereby enhancing the rigor and credibility of the findings (Moher et al., 2009; Petticrew and Roberts, 2006). Given the emerging and interdisciplinary nature of this research area, bibliometric analysis was employed to complement the review by quantitatively mapping the field (Donthu et al., 2021). This analytical method facilitates the identification of influential publications, authors, institutions, and thematic trends, offering insights into the intellectual structure and research evolution within the domain (Aria and Cuccurullo, 2017). By combining qualitative synthesis with bibliometric techniques, the study provides a comprehensive overview of the current state of knowledge, highlights areas of scholarly concentration, and uncovers gaps that warrant further investigation (Snyder, 2019).

2.2 Data sources and search strategy

Data for this SLR were obtained from two widely recognized and reputable academic databases: JSTOR and Web of Science (WoS). These databases were selected for their broad disciplinary coverage, high indexing quality, and extensive repository of peer-reviewed journal articles. Their inclusion ensures a robust and credible foundation for both the systematic review and bibliometric analysis, as they provide access to comprehensive metadata, including author affiliations, keywords, citations, and publication trends. Using both databases also mitigates the risk of publication bias associated with relying on a single source and enhances the overall reliability of the dataset.

A carefully constructed search strategy was employed to retrieve relevant literature on the use of AI in pedagogical practices within higher education across the Global South. The search incorporated a combination of Boolean operators and thematic keywords to ensure both precision and breadth. Boolean operators are logical connectors used to combine search terms in bibliographic databases. The three principal operators are AND, OR and NOT: AND narrows results to records containing all specified terms OR broadens results by retrieving records that contain any of the terms, and NOT excludes records containing the term that follows it. Use of Boolean operators enables precise control over sensitivity and specificity during database searching (Higgins et al., 2024). Core keywords included: “artificial intelligence”, “AI-enhanced learning”, “pedagogy”, “higher education”, and “Global South”. These terms were combined using the Boolean operator AND to narrow the search to studies situated at the intersection of these domains, while the operator OR was used to capture variations in terminology. For example, searches included phrases such as “artificial intelligence” AND “pedagogy”, “AI-enhanced learning” OR “AI in education”, and “higher education” AND “Global South”. Truncation and phrase searching were also applied where appropriate to maximize the retrieval of relevant studies while excluding unrelated material.

The search was limited to studies published between 2019 and 2025 to reflect the contemporary state of research and capture recent developments in both AI technologies and their pedagogical applications in the Global South. This time frame was selected to align with the rapid evolution of AI and its increasing integration into educational contexts during this period. To ensure linguistic consistency and interpretive clarity, only publications written in English were included. Furthermore, to maintain academic rigor, only peer-reviewed journal articles and review papers were considered. Editorials, conference abstracts, book reviews, and gray literature were excluded. Gray literature refers to material that is not controlled by commercial publishers and therefore is not indexed consistently in major bibliographic databases, for example theses, dissertations, technical reports, government documents, policy papers and conference reports. The inclusion of grayliterature reduces publication bias and can capture practitioner knowledge and locally produced evidence that would otherwise be missed (Paez, 2017).

All search results were exported in BibTeX format, which allowed for seamless integration with Biblioshiny (the web-based interface of Bibliometrix) and VOSviewer. These tools were subsequently used to conduct a descriptive bibliometric analysis and generate network visualizations, such as co-authorship maps, keyword co-occurrence networks, and citation analyses. This approach ensured that the dataset was both methodologically sound and analytically robust, forming a solid basis for the subsequent phases of the review.

2.3 Inclusion and exclusion criteria

A rigorous set of inclusion and exclusion criteria was applied to ensure that the final body of literature selected for this review was methodologically sound, thematically relevant, and aligned with the study's objectives. These criteria were established prior to the screening process and applied consistently to enhance the transparency, reliability, and replicability.

To be included in the final dataset, studies were required to meet several core conditions. Only peer-reviewed journal articles were considered, ensuring scholarly quality. All studies had to be written in English to maintain linguistic consistency and reduce the risk of misinterpretation. Publications were limited to those published between 2019 and 2025 to reflect the recent and rapidly evolving nature of AI applications in education, particularly in higher education. Critically, articles were only included if they explicitly focused on the use of AI in higher education and demonstrated clear relevance to the Global South. This relevance was established through either empirical studies conducted in Global South regions or comparative analyses offering insights transferable to these contexts.

Studies were excluded if they failed to meet any of the above criteria. This included non-peer-reviewed documents such as conference papers, editorials, opinion pieces, book reviews, and technical reports, which were omitted due to concerns over quality and methodological transparency. Articles that did not specifically address higher education—such as those focused on primary or secondary education, administrative processes, or unrelated technological domains—were also excluded. Additionally, studies lacking a conceptual or geographical focus on the Global South were removed, as were those that mentioned AI only superficially without engaging substantively with its pedagogical applications. Lastly, papers with insufficient methodological rigor, conceptual clarity, or empirical depth were excluded from the final dataset.

2.4 Screening and selection process

The initial search yielded 947 records. After removing 117 duplicates, 830 unique records remained for screening. During the title and abstract screening phase, 304 articles were excluded due to a lack of thematic relevance—typically because they addressed non-educational applications of AI or were situated in unrelated regional contexts. This left 526 articles for full-text review. Of these, 31 articles were excluded for not sufficiently addressing higher education, 17 for lacking relevance to the Global South, 9 for offering limited conceptual or methodological contributions, and 6 for not being peer-reviewed. Following all screening phases, a total of 463 articles met the inclusion criteria and were retained for bibliometric and content analysis.

This systematic and stepwise approach to inclusion and exclusion ensured that the final corpus of literature was both academically rigorous and directly relevant to the study's focus on AI-enhanced pedagogies in higher education within the Global South. The article section process is summarized in Figure 1 using the PRISMA flow diagram.

2.5 Data analysis tools

The bibliometric data were analyzed using two established tools: Biblioshiny, the web-based interface of the Bibliometrix R package, and VOSviewer. Biblioshiny was used to conduct descriptive analyses, including the examination of publication trends over time, source impact, author productivity, keyword frequency, and the geographical distribution of research output. This facilitated a broad understanding of the structure and evolution of the research field.

In parallel, VOSviewer was employed to generate visual representations of scholarly networks. Specifically, it supported the mapping of co-authorship networks, co-citation relationships, and keyword co-occurrence clusters, offering insights into the intellectual, collaborative, and thematic structure of the literature. Together, these tools enabled both quantitative and visual exploration of the dataset, enhancing the interpretability of key patterns and interconnections in the field.

2.6 Output: tables and figures

The analysis was supported by a series of tables and figures that present both descriptive statistics and network visualizations derived from the bibliometric dataset. Key tables include a summary of publication output by year, the most productive and most cited authors, leading journals, frequently occurring keywords, and the geographical distribution of contributions.

Complementary visual outputs include:

- A PRISMA flow diagram depicting the article selection process,
- A bar chart showing annual scientific production,
- A word cloud of author keywords, and
- Thematic and conceptual maps illustrating keyword clusters.

Network visualizations generated using VOSviewer include co-authorship networks, co-citation maps, and keyword co-occurrence diagrams. Collectively, these outputs offer both quantitative and interpretive insights into the development, structure, and thematic focus of the literature on AI-enhanced pedagogies in higher education within the Global South.

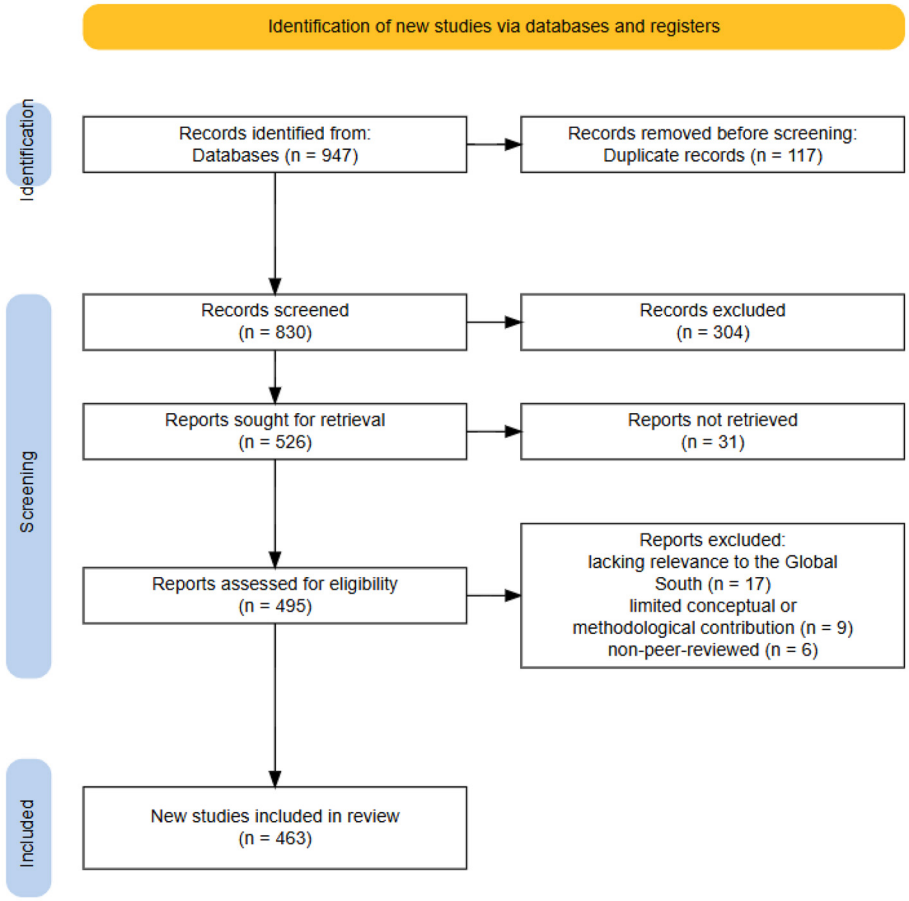

FIGURE 1
PRISMA flow diagram illustrating the article selection process (adapted from Page et al., 2021).

2.7 Key tables

2.7.1 Descriptive summary of publications

The bibliometric dataset for this systematic review comprises a total of 463 peer-reviewed documents published between 2019 and 2025, as summarized in Table 1. These publications are drawn from 228 distinct sources, including academic journals, books, and other scholarly outlets, indicating broad dissemination of research across disciplinary and regional boundaries. The literature has experienced a notable annual growth rate of 56.23%, reflecting rapidly increasing scholarly interest in the intersection of AI and higher education. The average age of the documents is 1.32 years, suggesting that the majority of the literature is recent and captures contemporary developments in AI technologies and pedagogical practices. On average, each document received 6.58 citations, highlighting active engagement with this emerging body of work. The dataset collectively cites 19,984 references, providing a robust foundation for situating AI-enhanced pedagogy within the broader academic discourse.

In terms of content, the dataset exhibits considerable thematic diversity, with 1,502 distinct author keywords and 437 Keywords Plus (ID) terms capturing the conceptual scope of the field. The author base includes 1,413 individual contributors, with 106 authors producing single-authored documents, reflecting a collaborative scholarly culture. An average of 3.25 authors co-authored each document, and 17.71% of publications involved international co-authorship, indicating cross-border academic collaboration. Regarding document types, the majority of records are standard articles (304), followed by article/early access (60), proceedings papers (58), reviews (27), article/book chapters (6), book reviews (3), editorial material (2), and review/early access (2). This distribution illustrates the predominance of research articles while also capturing the diversity of publication formats within the field.

2.7.2 Affiliations

An analysis of institutional contributions reveals a strong research presence within South Africa. As shown in Table 2, the University of Cape Town leads with 61 publications, followed closely by the University of the Witwatersrand (60) and the University of Johannesburg (52). Other notable contributors include Nelson Mandela University (41), University of the Western Cape (37), University of the Free State (35), Northwest University (34), University of KwaZulu-Natal (34), Stellenbosch University (32), and the Open University of Cyprus (28). These

TABLE 1 Main information summary.

Description	Results
Main information about data	
Timespan	2019:2025
Sources (Journals, Books, etc)	228
Documents	463
Annual growth rate %	56.23
Document average age	1.32
Average citations per doc	6,577
References	19,984
Document contents	
Keywords plus (ID)	437
Author's keywords (DE)	1,502
Authors	
Authors	1,413
Authors of single-authored docs	106
Authors collaboration	
Single-authored docs	108
Co-authors per doc	3.25
International co-authorships %	17.71
Document types	
Article	304
Article; book chapter	6
Article; early access	60
Article; proceedings paper	1
Book review	3
Editorial material	2
Proceedings paper	58
Review	27
Review; early access	2

affiliations demonstrate that a small group of institutions is driving scholarly output in AI-enhanced pedagogical research, reflecting concentrated leadership both regionally and internationally.

2.7.3 Countries

Citation analysis highlights key national contributions to research on AI-enhanced pedagogies in higher education. As shown in Table 3, South Africa leads in total citations with 2,021, averaging 6.30 citations per article. Cyprus (442; 15.20) and the United Kingdom (426; 22.40) also demonstrate substantial scholarly impact, while Botswana (173; 43.20) shows a notably high average citation rate relative to its publication volume. Other contributors include the USA (83; 5.20), Australia (81; 13.50), Finland (40; 20.00), Uganda (28; 14.00), Tanzania (25; 3.10), and the Netherlands (22; 11.00). These data indicate a diverse

TABLE 2 Most relevant affiliations.

Affiliation	Articles
University Of Cape Town	61
University of Witwatersrand	60
University of Johannesburg	52
Nelson Mandela University	41
University of The Western Cape	37
University of The Free State	35
North West University-South Africa	34
University of Kwazulu Natal	34
Stellenbosch University	32
Open University of Cyprus	28

TABLE 3 Most cited countries.

Country	TC	Average article citations
South Africa	2,021	6.30
Cyprus	442	15.20
United Kingdom	426	22.40
Botswana	173	43.20
USA	83	5.20
Australia	81	13.50
Finland	40	20.00
Uganda	28	14.00
Tanzania	25	3.10
Netherlands	22	11.00

geography of influence, where countries from both the Global South and Global North contribute meaningfully to the field. While South Africa demonstrates strong overall output, smaller countries such as Botswana and Finland exhibit high citation impact, suggesting that influential scholarship is emerging from a range of national contexts.

2.7.4 Documents

Table 4 presents the ten most cited documents within the dataset, highlighting total citations, citations per year (TC per Year), and normalized citation scores. These metrics provide insight into each publication's visibility, academic influence, and sustained relevance in the field. The top-cited work in this selection is Fowler (2015, British Journal of Educational Technology) with 252 total citations, averaging 22.91 citations per year and a normalized citation score of 15.15. This study is widely referenced for its methodological rigor and contributions to technology-enhanced learning. Tabulawa (2003, Comparative Education) follows with 171 citations (7.43 per year; normalized TC 1.74), highlighting its continued relevance in comparative pedagogical studies.

TABLE 4 Most globally cited documents.

Paper	DOI	Total citations	TC per year	Normalized TC
Fowler, 2015, Brit. J. E. Technol.	10.1111/bjet.12135	252	22.91	15.15
Tabulawa, 2003, Comp. Educ.	10.1080/03050060302559	171	7.43	1.74
Rambe and Bere, 2013, Brit. J. Educ. Technol.	10.1111/bjet.12057	149	11.46	6.45
Van Schalkwyk et al., 2019, Med. Edu.C	10.1111/medu.13804	127	18.14	11.22
Hoadley, 2007, J Curriculum S.	10.1080/00220270701261169	71	3.74	2.29
Zembylas et al., 2014, Gender Educ.	10.1080/09540253.2014.901718	67	5.58	5.34
Zembylas, 2021, Crit. Stud. Educ.	10.1080/17508487.2019.1617180	60	12.00	10.42
Stein, 2000, Tesol Quart	10.2307/3587958	56	2.15	1.00
Zembylas, 2018, S. Afr. J. Edu.	10.15700/saje.v38n4a1699	55	6.88	11.68
Leibowitz et al., 2010, Race Ethnic Educ.UK	10.1080/13613320903364523	53	3.31	2.37

Rambe and Bere (2013, British Journal of Educational Technology) received 149 citations (11.46 per year; normalized 6.45), demonstrating sustained influence in educational technology research. Van Schalkwyk et al. (2019, Medical Education) accumulated 127 citations (18.14 per year; normalized 11.22), reflecting its impact on pedagogical innovations in professional education contexts. Hoadley (2007, Journal of Curriculum Studies) and Zembylas et al. (2014, Gender and Education) have 71 (3.74 per year; normalized 2.29) and 67 citations (5.58 per year; normalized 5.34), respectively, underscoring the continued relevance of critical and curriculum-focused scholarship.

Additional influential publications include Zembylas (2021, Critical Studies in Education, 60 citations; 12.00 per year; normalized 10.42), Stein (2000, TESOL Quarterly, 56 citations; 2.15 per year; normalized 1.00), Zembylas (2018, South African Journal of Education, 55 citations; 6.88 per year; normalized 11.68), and Leibowitz et al. (2010, Race, Ethnicity and Education, 53 citations; 3.31 per year; normalized 2.37). Collectively, these studies illustrate the interdisciplinary and international nature of research informing AI-enhanced pedagogies, combining insights from technology, curriculum studies, and critical education scholarship.

Overall, Table 4 highlights the foundational literature that has shaped discourse in educational technology and AI-enhanced teaching. While not all publications explicitly focus on AI pedagogy, their methodological rigor and high citation impact demonstrate their relevance for informing contemporary educational innovations, particularly in higher education contexts across the Global South.

2.8 Key figures

2.8.1 Three-field plot

A three-field plot is a Sankey-style diagram that displays the relationships among three bibliographic fields (for example, authors, author keywords, and source journals), showing how items in each field connect and the relative weight of those connections. The plot is generated by the three Fields Plot function in the Bibliometrix/Biblioshiny environment and is useful for visualizing cross-field linkages in bibliometric datasets (Aria and Cuccurullo, 2017). Figure 2 presents a Sankey diagram illustrating the distribution of research on AI-enhanced pedagogies across key themes, countries, and institutions. The visualization highlights South Africa as a central contributor, with major universities, including the University of Cape Town, the University of the Witwatersrand, the University of Johannesburg, Nelson Mandela University, and the University of the Western Cape, emerging as prominent nodes. These institutions are strongly associated with themes such as "pedagogy," "critical pedagogy," "higher education," and "social justice," reflecting a robust engagement with both technological and educational dimensions of AI in the region.

The figure also indicates international collaboration, with connections to countries such as the United Kingdom, Cyprus, Australia, and the USA, demonstrating that South African research is embedded within broader global networks. Keywords like "artificial intelligence," "learning," and "curriculum" appear recurrently, suggesting a growing but still developing focus on the pedagogical implications of AI technologies.

Smaller but emerging contributions from countries such as Botswana, Zimbabwe, Ghana, and Nigeria indicate the expanding geographic reach of AI-enhanced educational research within the Global South. Overall, Figure 2 underscores a field in evolution: technologically sophisticated, increasingly collaborative across borders, yet still maturing in its integration of AI within teaching and learning practices.

2.8.2 Word cloud

The word cloud was produced using Biblioshiny (Bibliometrix) and exported as Figure 3. It should be noted that the word cloud provides a frequency-based representation only, while keyword co-occurrence analysis is reported separately (Aria and Cuccurullo, 2017). A word cloud is a frequency-based visualization in which the font size of each word is proportional to its frequency in the selected text field. In bibliometric studies, a word cloud of author keywords provides a quick visual summary of dominant topics, but should be interpreted with caution because it does not show co-occurrence structure or relationships among terms (Donthu et al., 2021). Figure 3 illustrates a word cloud generated from the author-supplied keywords of the academic literature

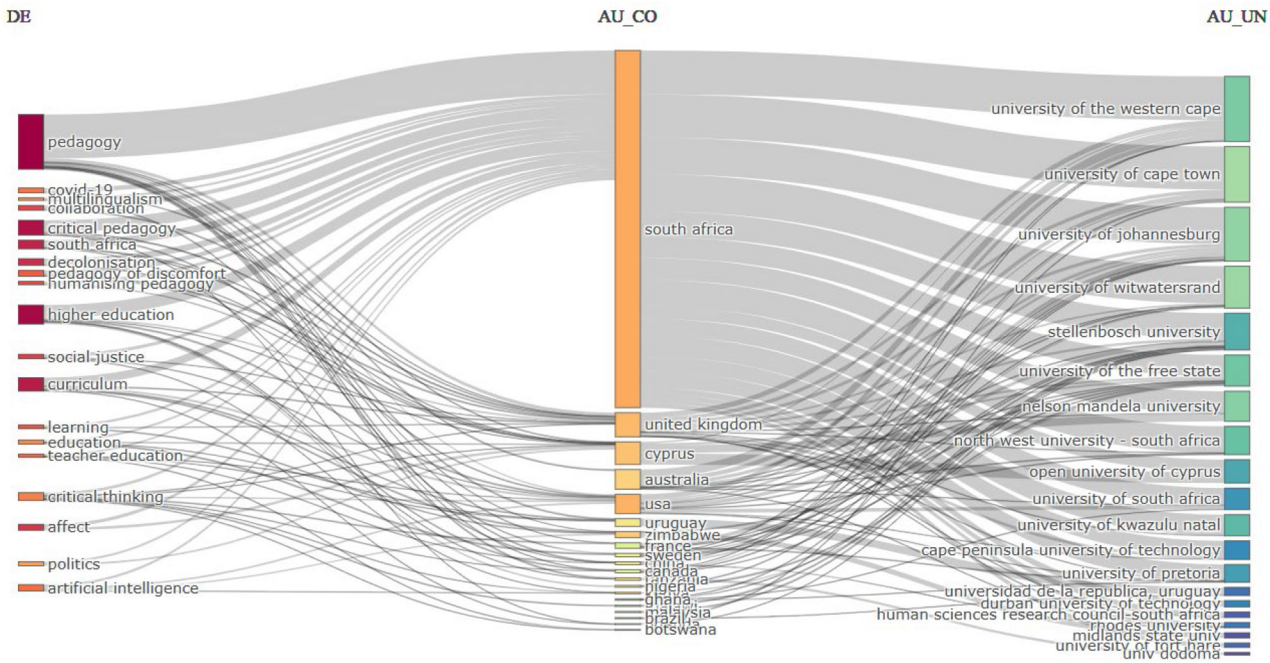

FIGURE 2
Three-field plot.

FIGURE 3
Word cloud of author keywords.

included in this systematic review. The relative size of each term reflects its frequency of occurrence, providing a visual overview of the dominant themes and areas of focus in the field. The most prominent terms include "South African university" and "South African universities," signaling a strong emphasis on the higher education context within South Africa. Closely linked are terms such as "South African education," "South African schools," and "South African classrooms," which collectively underscore the central role of local educational settings in the reviewed studies.

Other key themes with considerable weight include "artificial intelligence (AI)," "emergency remote teaching," and "teacher professional development," indicating that much of the scholarship addresses both technological and pedagogical dimensions. Terms such as "critical thinking pedagogy," "social justice education," and "pedagogical content knowledge" highlight the focus on teaching approaches and equity-driven education. Additionally, the inclusion of concepts like "learners' metacognitive skills," "pre-service teacher education," and "online learning platforms" points to the interplay between technology, pedagogy, and teacher preparation.

Overall, Figure 3 provides a concise visual representation of the research landscape, revealing how South African educational contexts, digital transformation, and critical pedagogical practices intersect to shape current scholarly inquiry.

2.8.3 Authors' production over time

Figure 4 presents a visualization of authors' publication trajectories within the dataset, highlighting their scholarly engagement in education research over time. Each horizontal line corresponds to an individual author, while circular markers indicate the years in which they published. The size of each marker is proportional to the number of publications for that year, providing insight into the intensity of research output.

The figure reveals that certain authors, such as Zembylas M and Bozalek V, demonstrate sustained contributions across multiple years, with notable peaks in productivity. Hoadley U also shows consistent engagement, with a significant cluster of publications around 2019. Others, such as Vandeyar S, Geduld D, and Mendelowitz B, contribute at more specific intervals, reflecting a more concentrated focus in certain periods.

Meanwhile, emerging contributions can be observed from authors like Nkealah N and Andrews G, whose publications have become more visible in recent years, signaling a growing engagement in the field. The varying sizes of markers also highlight fluctuations in productivity, suggesting cycles of research activity that may align with shifts in scholarly focus or collaborative projects.

Overall, Figure 4 not only maps publication timelines but also illustrates the diversity of authorial engagement, ranging from long-term sustained contributions to more recent and concentrated entries. This temporal distribution underscores the evolving nature of educational research in South Africa, shaped by both established voices and new perspectives entering the discourse.

2.8.4 Keyword co-occurrence map

Figure 5 displays a keyword co-occurrence map generated using VOSviewer, which illustrates the intellectual structure and thematic clusters within the literature reviewed. The size of nodes corresponds to keyword frequency, while the thickness of connecting lines reflects the strength of co-occurrence between terms. Distinct color groupings indicate thematic clusters, offering insight into dominant and emerging areas of research.

At the center of the map, "pedagogy" emerges as the most influential node, forming strong connections with related concepts such as "critical pedagogy," "higher education," "curriculum," and "teacher education." This central positioning highlights pedagogy as the anchoring theme around which much of the research discourse is organized. Closely linked terms such as "social justice," "decolonization," and "inclusive education" underscore the field's strong engagement with equity, transformation, and contextually responsive approaches to teaching and learning.

Another prominent cluster centers on "curriculum" and "technology," connected to terms like "assessment," "ICT," and "online learning." This indicates a significant focus on integrating digital tools and technological innovation into teaching practices, with implications for learner-centered approaches and educational transformation. Similarly, the cluster around "critical pedagogy" is linked to concepts such as "social class," "racism," and "resistance," reflecting ongoing debates about power, inequality, and justice in education.

Peripheral clusters extend the thematic breadth of the field. For example, connections with "multilingualism," "translanguaging," and "language policy" demonstrate the salience of linguistic diversity in South African and Global South educational contexts. Terms such as "student learning," "innovation," and "educational technology" further highlight the interplay between pedagogy, technology, and student outcomes.

Overall, Figure 5 reveals a multidimensional research landscape where pedagogy functions as a central hub, intersecting with themes of critical inquiry, technological integration, curriculum development, and social justice. This mapping demonstrates how scholarship in this area is not only concerned with teaching methods but also deeply invested in broader questions of equity, transformation, and contextual responsiveness within higher education.

3 Results

This section presents the five key themes that emerged from the systematic review.

3.1 Theme 1: technocentric dominance in AI-enhanced pedagogical research

A critical thematic pattern identified in the review is the technocentric orientation that dominates current research on AI-enhanced pedagogies in higher education across the Global South. The literature reflects a prevailing emphasis on technological functionality, primarily "machine learning," "deep learning," and "algorithmic modeling," as foundational tools for improving educational delivery, often at the expense of meaningful pedagogical theorization or instructional reflection.

3.1.1 Subtheme 1.1: technical systems and functional efficiency

Most studies in the review frame AI as a mechanism for optimizing efficiency, automating processes, and enhancing system-level functionality (e.g., learning analytics dashboards, intelligent tutoring systems). While such tools offer value for educational infrastructure, they frequently prioritize

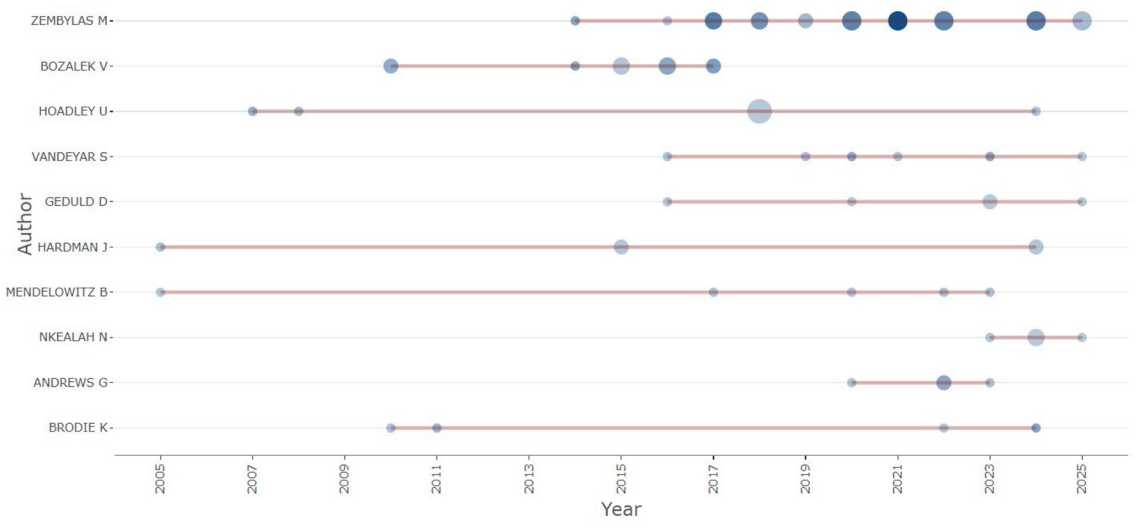

FIGURE 4
Authors' production over time.

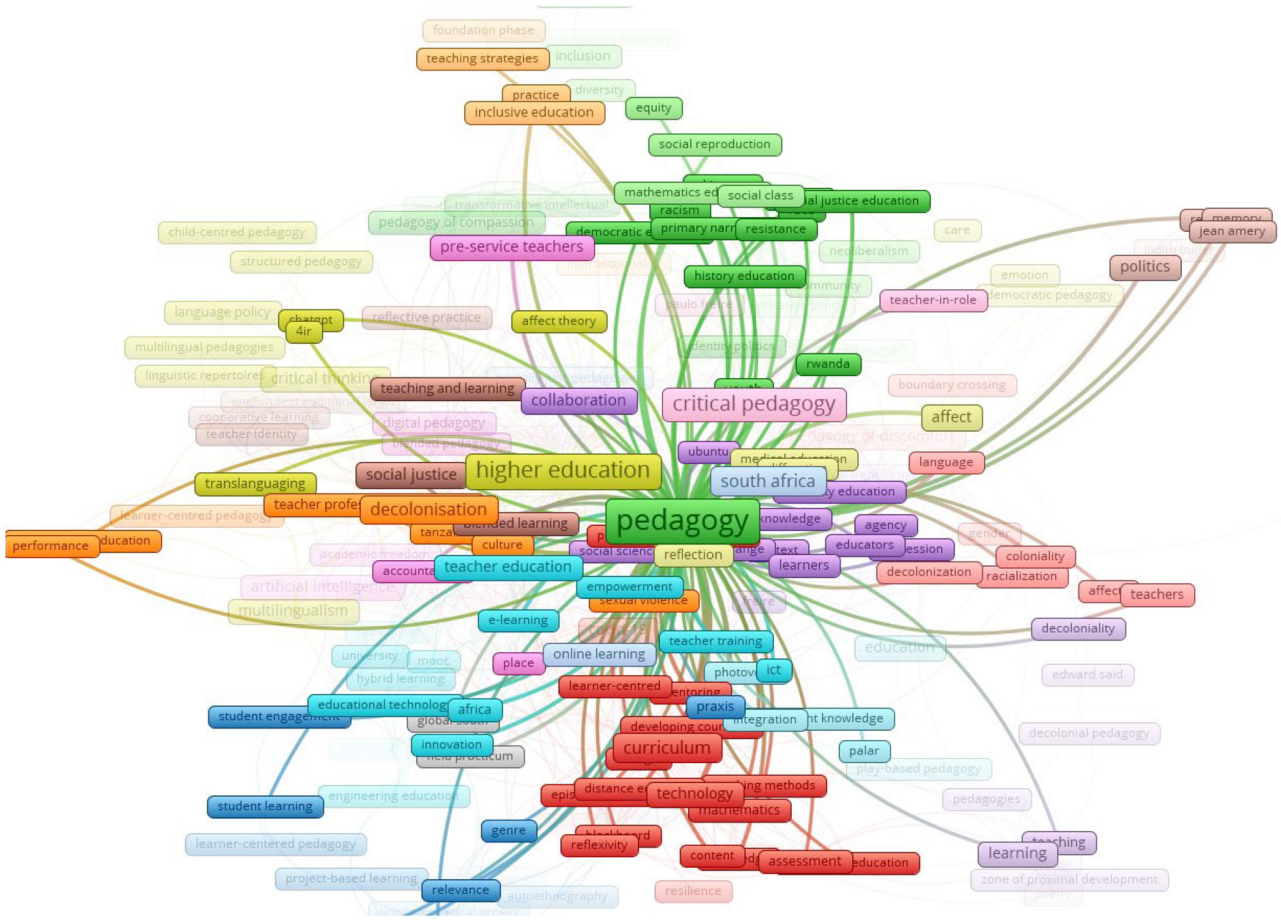

FIGURE 5
Keyword co-occurrence map (generated using VOSviewer).

predictive accuracy and automation over pedagogical relevance or transformative learning design. For instance, Gawe and Gudyanga (2025) focus extensively on system performance, applying AI to refine data analysis, content recommendation, and user adaptation models. These studies, although technically sophisticated, demonstrate minimal engagement with student-centered learning

principles or differentiated instructional strategies, thereby positioning pedagogy as a secondary concern. Moreover, AI is often integrated into curricula and teaching practices without explicit consideration of how learners interact with these technologies, or how such systems affect the cognitive, emotional, or social dimensions of learning. The literature reveals a trend in which AI-enhanced tools are treated as ends in themselves rather than as enablers of purposeful pedagogical innovation. As a result, critical questions related to learner agency, digital pedagogy, and contextual appropriateness remain largely unaddressed (Roe and Perkins, 2024; Qian, 2025).

3.1.2 Subtheme 1.2: absence of theoretical pedagogical grounding

The lack of robust pedagogical frameworks is a persistent gap across the reviewed studies. Only a small subset of publications explicitly references established learning theories, such as "constructivism", "socio-cultural learning", or "transformative learning theory". Instead, there is a widespread reliance on an implicit instructional logic in which technology is assumed to inherently enhance learning outcomes, without demonstrating how or why this improvement occurs (Gawe and Gudyanga, 2025; Kucirkova et al., 2023). This absence of theoretical coherence limits the explanatory power of many studies. Although numerous papers report improvements in student performance metrics following the implementation of AI systems, few articulate these gains in terms of learning processes, engagement patterns, or epistemological alignment with course content (Bauer et al., 2025). Consequently, pedagogy is often reduced to a "black box" function that is under-theorized and overshadowed by technical metrics and performance indicators.

3.1.3 Subtheme 1.3: unquestioned assumptions about technological benefit

Across multiple studies, a common trend in literature is that the mere integration of AI technologies into educational settings improves pedagogy (Zhai et al., 2024). In many cases, authors cite the promise of AI to improve quality, scalability, and personalization but fail to provide critical evaluation or contextual evidence to support such claims (Xiang and Meadows, 2025). This optimistic framing reflects a broader trend in which AI is romanticized as a catch-all solution to educational deficits in the Global South, without adequately addressing the institutional, cultural, or infrastructural realities that affect how these tools are deployed in classrooms. For example, studies focusing on sub-Saharan Africa or South Asia often highlight the potential of AI but neglect to account for variability in teacher readiness, student digital literacy, or resource constraints, all of which significantly mediate the technology's effectiveness (Bolu et al., 2024). The reviewed literature reveals a strong emphasis on AI applications, particularly "machine learning", "deep learning", and "algorithmic modeling", over pedagogical frameworks or instructional theory (Xiang and Meadows, 2025). Therefore, much of the prevailing discourse centers on AI primarily as a tool for efficiency, automation, and data-driven prediction, with limited engagement in student-centered teaching models or cognitive learning outcomes.

3.1.4 Subtheme 2.1: scattered thematic and disciplinary foci

Keyword co-occurrence analyses and bibliometric mapping reveal a research landscape characterized by multiple but weakly connected clusters (Ntunka et al., 2024). At its center, technological themes such as "computer vision," "machine learning," and "digital entrepreneurship" dominate, yet their links to pedagogy and instructional theory remain tenuous (Zembylas, 2018). This indicates that while the field draws on diverse disciplinary perspectives, it often lacks integration around questions of teaching and learning.

One prominent strand highlights technological innovation in domains such as logistics and sustainable infrastructure, but education is frequently referenced only at the margins, with little analysis of how these advancements reshape course design, classroom practice, or student engagement (Ntunka et al., 2024). Similarly, clusters that could bridge education and technology, such as those centered on e-commerce or digital transformation, tend to emphasize technical solutions rather than pedagogical outcomes (Zembylas, 2018).

Peripheral nodes broaden the thematic spread, yet they rarely converge into a coherent pedagogical conversation. As a result, the field presents itself as interdisciplinary but fragmented, with education often positioned as a secondary concern rather than the primary focus of inquiry (Ntunka et al., 2024). This dispersion raises important questions about whether the label "AI-enhanced pedagogy" reflects a consistent research agenda or whether it is used opportunistically within broader multidisciplinary debates (Zembylas, 2018).

3.1.5 Subtheme 2.2: absence of theoretical frameworks

A critical weakness across the reviewed literature is the near-complete absence of pedagogical theory, with few studies grounding AI-enhanced learning in established or emerging educational paradigms (Msonde, 2023). Instead, pedagogical value is often implied through technical descriptors such as efficiency, personalization, and automation, without articulating the mechanisms of learning or the rationale for adopting AI (Mendelowitz, 2017). This lack of theoretical anchoring results in shallow interpretations of educational impact and limits the field's ability to demonstrate how AI can meaningfully shape teaching and learning practices (Vandeyar, 2021).

For instance, adaptive learning platforms are often praised for their responsiveness, yet little attention is given to the epistemological assumptions behind such responsiveness, or to how it aligns with learners' cognitive, cultural, and social contexts (Msonde, 2023). Similarly, studies that emphasize the promise of innovation tend to describe AI in terms of functionalities rather than intentionally theorized, learner-centered approaches (Mendelowitz, 2017). As a result, AI-enhanced pedagogy is frequently framed as a set of tools and

outcomes rather than a coherent educational practice informed by critical or transformative theoretical traditions (Vandeyar, 2021).

3.1.6 Subtheme 2.3: conceptual gaps between innovation and instruction

The disconnect between AI innovation and pedagogical utility is further evidenced by the fact that many empirical studies, particularly those conducted in technical faculties, emphasize system architecture and algorithm performance over instructional strategies (Zembylas, 2025). While studies often demonstrate technical capabilities to forecast performance and identify at-risk students (Almalawi et al., 2024), many studies do not sufficiently explore how such systems actually support meaningful learning experiences in the classroom. For example, robotic learning assistants have been introduced in several studies across Southeast Asian and African institutions; however, there is limited discussion about how students interact with these technologies or whether such interactions foster deeper learning, critical thinking, or inclusive participation (Mbirimi-Hungwe, 2021).

Without such pedagogical insight, the field risks promoting technological determinism, wherein educational value is assumed rather than evidenced (Yafele, 2020). Moreover, very few studies contextualize AI within the specific institutional cultures, curricular structures, or socioeconomic conditions of Global South universities (Zembylas, 2025). As a result, innovations are often imported rather than indigenously developed, exacerbating the disconnect between AI capabilities and educational realities on the ground (Mbirimi-Hungwe, 2021). This conceptual misalignment raises critical concerns about the sustainability and relevance of AI-driven interventions in under-resourced or structurally diverse academic settings (Yafele, 2020).

3.2 Theme 3: regional leadership and uneven scholarly representation

The systematic review reveals a clear pattern of geographic concentration in the scholarly production on AI-enhanced pedagogies, with a few countries, most notably South Africa and Cyprus, emerging as consistent leaders in terms of publication volume and citation impact. Yet, this regional leadership does not reflect the Global South as a whole, where many regions remain significantly underrepresented, particularly in Central Africa, Latin America, and parts of Asia. Furthermore, the structure of scholarly collaboration highlights imbalances in research partnerships, with North–South collaborations often taking precedence over more equitable South–South exchanges.

3.2.1 Subtheme 3.1: South African and Cypriot leadership in research output

South Africa stands out as the most prolific contributor to AI-enhanced pedagogical research in the Global South, with institutions such as the University of Cape Town, the University of the Witwatersrand, and the University of Johannesburg playing central roles in the field's development. This leadership is supported by a concentration of research capacity within a small number of well-resourced universities, alongside national commitments to digital transformation in higher education (Jameson, 2022). South African researchers often frame AI in relation to equity of access, blended learning, and strategies to address infrastructural constraints in under-resourced contexts (Mokoena and Seeletse, 2025; Saal et al., 2025; Sanders and Mukhari, 2024).

Similarly, Cypriot universities, most notably the Open University of Cyprus, demonstrate strong engagement with AI-enhanced learning, with a relatively high average citation impact despite a smaller publication volume (Zembylas, 2025). Much of the Cypriot scholarship positions AI as a driver of pedagogical innovation, linking it to European digital education strategies and broader shifts in higher education modernization (EOC, 2025).

Although the review identifies national hotspots such as South Africa, Cyprus, the United Kingdom and Botswana, substantial gaps remain across large regional blocs, notably Central Africa and much of Latin America. In Latin America, for example, Uruguay exemplifies a long tradition of scholarship on school materialities and pedagogy, yet it is largely absent from contemporary empirical work on AI in higher education, which highlights a disjunction between historical regional scholarship and current AI-focused debates (Iglesias, 2025). Many countries across Central Africa are scarcely visible in the indexed literature, a pattern that reflects structural constraints such as limited research funding, restricted access to indexed journals and language barriers in non-English speaking scholarly communities (Davis and Ensor, 2018). Similarly, parts of Southeast Asia exhibit uneven representation, with a small number of national leaders present in the dataset, while other countries contribute minimally, thereby reducing the field's capacity to capture region-specific pedagogical challenges and opportunities. This uneven geographic profile risks producing monolithic frameworks for enhanced AI pedagogy; to improve inclusivity, future work should support multilingual publication pathways, broaden sampling to underrepresented regions and foster equitable collaboration among Global South countries (Davis and Ensor, 2018).

3.3 Theme 4: sustainability as a crosscutting concern

An increasingly prominent dimension of AI-enhanced pedagogy in the Global South is its intersection with sustainability discourses, particularly those aligned with the United Nations Sustainable Development Goals (SDGs). A growing segment of the literature views AI not merely as a tool for instructional automation or efficiency but as a strategic enabler of sustainable education. These studies position AI within a broader vision of social and environmental responsibility, framing pedagogy as a means of preparing students for the complex demands of green economies, climate adaptation, and sustainable industry development.

3.3.1 Subtheme 4.1: alignment with SDG-oriented curriculum development

Several studies highlight the role of AI in shaping curricula that directly respond to sustainability imperatives, particularly in higher

education contexts undergoing rapid digital and environmental transformation. For instance, Leal Filho et al. (2025) explore how AI applications can support interactive and personalized approaches to sustainable teaching, while Gohr et al. (2025) emphasize the potential of AI to enhance SDG research and education. These studies demonstrate that AI-enabled platforms can align course content with current developments, thereby enhancing the relevance of curricula.

Mienye et al. (2024) explored the potential of AI to advance sustainable development in Africa, emphasizing its role in driving progress across various sectors, including education, agriculture, healthcare, environmental protection, and infrastructure. Introducing AI to these contexts could also promote critical thinking around sustainability challenges within local contexts. These examples illustrate that viewing sustainability as an abstract concept, rather than treating it as a pedagogically embedded principle, requires data-rich, context-aware AI technologies.

3.3.2 Subtheme 4.2: framing pedagogical innovation around future skills and green economies

Beyond curricular integration, several studies frame AI-enhanced learning as a means of cultivating future-ready competencies, particularly those needed in emerging green and digital labor markets. Mwagiru et al. (2025) assert that in aligning skills development pathways with the demands of green, digital, and AI transformative shifts, SADC member states can benefit from implementing skills foresight and a skills governance approach.

In South and Southeast Asia, researchers highlight the importance of AI in promoting systems thinking, interdisciplinary learning, and problem-solving under uncertainty, skills considered essential for navigating the socio-environmental complexities of the twenty-first century (Arfanuzzaman, 2021; UNESCO, 2023). These skills can be cultivated through project-based and AI-supported learning formats that expose students to realistic sustainability problems, often drawn from their own communities. Such pedagogical models reframe the university not exclusively as a site of knowledge transmission but as a laboratory for local innovation grounded in sustainable practices.

3.3.3 Subtheme 4.3: tensions and gaps in sustainability integration

Despite the potential of AI to support sustainability-oriented education, several studies caution against overstating its impact without attending to contextual barriers. Leal Filho et al. (2025) and Mienye et al. (2024) note that while AI tools are increasingly used to support teaching and research, the actual implementation of sustainability-focused curricula remains uneven. In many institutions, sustainability is treated as an add-on rather than an organizing principle, and AI tools are deployed without a clear pedagogical framework linking them to social or environmental outcomes.

Moreover, infrastructural and policy gaps in many Global South contexts pose significant obstacles. For example, lack of access to reliable environmental datasets, limited faculty training in both AI and sustainability, and the absence of cross-disciplinary collaboration often hinder the integration of meaningful sustainability content into AI-enhanced teaching. These challenges suggest that while the rhetoric of "AI for sustainability" is gaining ground, its realization requires sustained investment in institutional capacity, curricular reform, and localized knowledge production.

3.4 Theme 5: challenges to effective integration of AI in pedagogy

While enthusiasm around AI's potential in higher education continues to grow, the literature reviewed reveals that its integration into pedagogical practice in the Global South remains uneven, complex, and fraught with structural challenges. These challenges are not merely technical but are deeply rooted in broader institutional, infrastructural, and pedagogical ecosystems that shape how technologies are accessed, adopted, and sustained within universities.

3.4.1 Subtheme 5.1: infrastructural constraints and digital inequality

One of the most frequently cited barriers to AI integration is the persistent digital infrastructure gap in many Global South contexts. Numerous institutions lack the foundational technologies required to support AI-driven systems, including stable internet access, high-performance computing, and digital resource repositories. For example, Davis and Ensor (2018) note that while AI discourse often assumes ubiquitous access to advanced technologies, this assumption overlooks the asymmetrical technological realities of low- and middle-income countries. These infrastructure disparities are exacerbated by broader digital inequalities between urban and rural institutions, where bandwidth limitations, hardware shortages, and unreliable electricity access undermine efforts to implement AI-enhanced teaching tools (Ahiaku et al., 2025; Mwansa et al., 2025). In this context, even simple AI-based learning analytics platforms may remain inaccessible to many universities.

3.4.2 Subtheme 5.2: limited educator readiness and institutional resistance

Another recurrent challenge is the low level of AI-related pedagogical competence among academic staff. Computer Science educators express significantly more confidence in their technical understanding of generative AI tools than other educators (Ghimire et al., 2024). As such, there is uncertainty about how AI can meaningfully enhance teaching, particularly in disciplines outside of computer science or engineering. The gap is not only technical but also conceptual, as educators often lack opportunities to explore how AI aligns with their teaching philosophy, curriculum goals, or assessment models. Moreover, institutional cultures can be resistant to pedagogical experimentation, especially when changes require shifts in professional identity, restructured workloads, or new evaluation metrics. Ntunka et al. (2024) assert that without strong leadership, incentives, and long-term professional development, the implementation of AI remains

surface-level, driven by policy rhetoric rather than embedded in meaningful teaching practice.

3.4.3 Subtheme 5.3: ethical concerns and local context neglect

Ethical concerns also cast a shadow over AI adoption in educational settings. Issues such as data privacy, algorithmic bias, and surveillance culture are particularly acute in the Global South, where regulatory frameworks are often underdeveloped. UNESCO (2021) highlights the risk of exacerbating existing inequalities if AI systems are deployed without careful consideration of cultural, social, and economic contexts. In many cases, AI tools used in universities in the Global South are imported from the Global North and are poorly adapted to local languages, pedagogical norms, and student needs (Msonde, 2023). This results in a mismatch between the promise of AI and its actual performance in context. Despite frequent calls in the literature for context-sensitive implementation strategies, empirical studies documenting locally developed or culturally adapted AI tools remain scarce, indicating a gap between policy aspiration and practical research.

4 Discussion

The review reveals that research on AI-enhanced pedagogies in the Global South is primarily driven by a technocentric agenda that prioritizes system performance and algorithmic optimization over pedagogical depth, with comparatively little work that examines instructional aims and classroom practices. This pattern reflects broader tendencies in educational technology research, where AI is often presented as a readymade solution while instructional theory receives limited attention (Davis and Ensor, 2018). The review emphasizes that AI tools cannot be used in isolation from pedagogy, contextual learning environments, and student experiences. As such (Zhai et al., 2024).

The conceptual landscape revealed by the review is fragmented, with multiple disciplinary strands pursuing related but often disconnected questions about AI in education, and with few efforts to produce shared definitional or theoretical frameworks (Davis and Ensor, 2018). This fragmentation undermines cumulative knowledge building and makes it difficult to compare findings across studies. The review, therefore, calls for theoretical consolidation, urging future research to anchor AI innovations in established educational paradigms while adapting those paradigms to local institutional and socio-cultural realities (Yafele, 2020).

Geographic concentration is a prominent feature of the corpus. As Table 3 shows, a small set of countries accounts for the bulk of citations and influence, while other regions remain scarcely represented. Institutional concentration is equally evident, as Table 2 shows that a relatively small group of universities, notably several South African institutions and the Open University of Cyprus, drive much of the published output. This uneven distribution risks narrowing the evidence base and privileging perspectives that may not generalize to less visible contexts. The absence of sustained empirical work from large regional blocs, including parts of Central Africa and Latin America, is particularly striking and points to a persistent geography of scholarly visibility that requires remedial attention.

Sustainability emerged in the review as a cross-cutting theme with potential to recast AI not only as an instructional tool but as a catalyst for education systems that advance climate resilience and social justice, in line with global development agendas (UNESCO, 2021). Nevertheless, the analysis indicates that sustainability is frequently treated as a peripheral concern rather than a guiding principle for design and implementation, and that few studies integrate sustainability goals into the core logic of AI-enhanced pedagogical interventions. The review, therefore, argues for a more explicit alignment between AI research in education and longer-term development priorities.

Finally, the review highlights persistent structural barriers that constrain meaningful AI adoption in many settings in the Global South, including infrastructural limitations, publication and indexing barriers, and gaps in faculty preparedness and pedagogical training. These constraints are compounded by epistemic and linguistic marginalization that reduces the visibility of locally generated knowledge (Davis and Ensor, 2018). Addressing these barriers requires investment in capacity building, support for multilingual and open publication pathways, and funding models that prioritize South-South collaboration and locally led research agendas.

In sum, the review advances a clear research agenda: center pedagogical questions in AI design and evaluation, pursue theoretical consolidation that is sensitive to local contexts, expand the geographic and institutional base of inquiry, and align AI research with sustainability and equity goals. Only through such reorientation can the field move from technology-driven promises to context-sensitive, pedagogically robust, and ethically grounded practice.

5 Recommendation

5.1 Practical recommendations

This SLR underscores the need for HEIs in the Global South to move beyond a technocentric approach and explicitly prioritize the integration of AI into teaching and learning through robust pedagogical frameworks such as transformational learning and constructivism. Achieving this shift requires the design and implementation of comprehensive training programs that build both technical and pedagogical AI competence among educators.

Secondly, stronger interdisciplinary collaboration must be cultivated between academic faculties and support units (e.g., ICT departments) to ensure a holistic and integrated approach to AI adoption. In addition, intra-regional partnerships should be actively promoted—alongside broader South-South collaborations – to facilitate the sharing of knowledge, best practices, and the joint development of contextually appropriate solutions.

Third, institutional capacity building should be emphasized. This includes increased investment in digital infrastructure, with a particular focus on creating context-sensitive AI solutions that are culturally relevant, linguistically accessible, and locally developed or adapted for the Global South.

Fourth, holistic skills development should be promoted through a balanced approach that leverages AI not only for efficiency and automation but also for cultivating critical thinking and other essential competencies. These include skills necessary to address persistent social challenges such as poverty, unemployment, and environmental degradation.

Finally, continued attention must be given to ethical guidelines for AI adoption, including privacy, data protection, algorithmic transparency, and inclusivity, to ensure the responsible and equitable use of AI in higher education. Aligning these practical recommendations with broader sustainability and SDG-related objectives can further strengthen the role of HEIs as agents of transformative change within their communities.

5.2 Recommendations for future research

This review highlights several areas where further scholarly inquiry is both necessary and urgent. First, research must address regional gaps. A significant lack of empirical studies remains on AI-enhanced pedagogy in regions such as Central Africa, Latin America, and parts of Southeast Asia. Studies conducted in these underrepresented contexts are critical to understanding the localized challenges and opportunities of AI in education.

Second, future research should move beyond examining AI tools developed in the Global North. Greater emphasis must be placed on the design, implementation, and evaluation of locally developed AI solutions that are sensitive to the cultural, linguistic, and pedagogical realities of the Global South.

Third, the development and empirical testing of pedagogical frameworks for AI use in higher education must be further explored. Comparative studies across different countries and institutions can illuminate how cultural, institutional, and policy factors shape AI adoption, leading to the identification of best practices for context-sensitive integration.

Fourth, the ethical, equitable, and sustainable use of AI continues to be a global concern. Future research should critically explore these dimensions, with a specific focus on data privacy, algorithmic bias, surveillance risks, and questions of justice and equity within AI-enhanced learning environments.

Finally, further investigation is needed into the lived experiences of faculty and students. Qualitative and mixed-method studies that explore perceptions, experiences, and the exercise of agency by both educators and learners can deepen our understanding of how AI is experienced and enacted in real-world teaching and learning settings.

Advancing research in these directions will provide a stronger foundation for inclusive, theoretically grounded, and contextually relevant AI integration in higher education across the Global South.

6 Limitations of the study

While this systematic review provides a comprehensive synthesis of the literature on AI-enhanced pedagogies in higher education within the Global South, several limitations should be acknowledged. First, the review was limited to English-language publications indexed in selected international databases. As a result, relevant research published in other languages or in local, non-indexed journals may have been excluded. Second, the exclusion of non-peer-reviewed sources may have introduced publication bias, especially given the rapid pace at which AI-related innovations are emerging in practice. Finally, due to the dynamic and fast-evolving nature of AI technologies, the review may not fully reflect the most recent technological or pedagogical developments in the field. Future research should seek to address these limitations by incorporating a broader range of sources, languages, and methodological approaches, including gray literature and practitioner-driven case studies.

7 Conclusion

This study found that, within the context of higher education in the Global South, AI is primarily employed to improve efficiency and automate administrative and instructional processes. The adoption of AI tools—many of which are developed in the Global North—has been driven by technocentric imperatives, with comparatively little attention paid to pedagogical design or the use of theoretical frameworks. Consequently, AI tools are not yet fully leveraged to support deep, student-centered learning experiences.

HEIs in the Global South continue to face substantial structural challenges that hinder meaningful AI integration. These include persistent digital divides, infrastructure deficits (such as limited access to reliable technology and internet connectivity), and inadequate institutional support for large-scale AI adoption. Additionally, many educators lack the training and confidence to use AI in pedagogically sound ways. Ethical concerns—including those related to data privacy, algorithmic bias, and the cultural relevance of imported AI tools—further complicate the landscape.

Despite these challenges, this study also identifies several opportunities. In particular, the potential for "leapfrogging" barriers through strategic adoption of innovative AI tools holds promise. Moreover, regional and cross-national collaboration—especially South-South partnerships —could facilitate knowledge exchange and the co-creation of contextually appropriate AI solutions.

Overall, the findings contribute to a research-informed agenda for advancing AI-enhanced pedagogies in the Global South. The study underscores the pressing need for more pedagogically grounded, context-sensitive, and ethically responsible approaches to integrating AI in higher education. By moving beyond purely technological framings and investing in inclusive, locally relevant practices, HEIs in the Global South can harness AI not only as a tool for efficiency but as a catalyst for transformative, equitable, and sustainable educational innovation.

Author contributions

GK: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. FW: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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