



Overcoming Inertia: A systematic review of the stagnant integration of Artificial Intelligence in Online Learning at Universities of Technology in South Africa

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ABSTRACT

The emergence of Artificial Intelligence (AI), especially generative AI, has the capacity to fundamentally reshape the higher education sector. University of Technologies (UoTs), institutions expected to lead technological adoption, integrating AI into teaching and learning frameworks, present a significant opportunity to enhance educational quality and student experiences. However, a pervasive apprehension that AI could undermine academic integrity, coupled with practical and ethical challenges, has led to notable stagnation in its widespread and meaningful adoption. This systematic review clarifies the diverse factors contributing to this inertia surrounding AI integration within UoT online learning environments. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, this review synthesised evidence from academic literature, policy documents, and institutional case studies. The analysis identified several major barriers, including deficits in digital literacy among educators and students, inadequate technology infrastructure, a lack of AI-focused pedagogical training, insufficient institutional support, and ambiguous policy frameworks. Furthermore, ethical concerns regarding algorithmic bias and data privacy emerged as critical hurdles. Despite these challenges, the review affirms significant opportunities for AI to deliver personalized learning pathways, enhance administrative efficiency, and foster deeper student engagement. To move from stagnation to strategic implementation, this review recommends the urgent development of clear institutional policies and robust training programs for all stakeholders. Such measures are critical to ethically and effectively harness the power of AI and uphold academic principles in the digital age.

Keywords: Artificial Intelligence, Generative AI, Online learning, Higher Education, Stagnation, Educational Technology

INTRODUCTION

South Africa's progress in the use of Artificial Intelligence (AI) has been hindered by significant barriers in recent years, resulting in stagnation that has impeded development of technological advancements. Despite being one of the most developed nations in the Southern African Development Community (SADC) region, it has faced a variety of internal and external factors that have hindered

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the effective adoption of AI.¹ A primary cause of stagnation is the pervasive societal challenges linked to AI, encompassing expensive infrastructure, ethical dilemmas, a shortage of skilled professionals, disparities among students, and various other factors. The interval from 2020 to 2022, commonly referred to as the "COVID-19" era, witnessed the compelled adoption of technologies for instruction and learning in Higher Educational Institutions (HEIs). The use of MS Teams, Moodle, Zoom, and various other platforms has profoundly transformed conventional pedagogies for teaching, learning, and evaluation in HEIs, resulting in numerous ethical issues among students. This has also led HEIs being skeptical about using these technologies. The emergence of Generative Artificial Intelligence (GenAI) exacerbated the prevailing challenges and contributed to stagnation. Farahani and Ghasemi state that the ability to generate assignments poses a significant risk to assessment ethics, negatively influencing AI integration across higher education.² While HEIs globally are strategizing to optimize these potentials, evidence suggests that developed countries are better equipped to capitalize on AI's advantages.³ Consequently, for countries in Africa, and specifically for South Africa's Universities of Technology (UoTs), which are expected to be pioneers in technological application, it is critical to address these governance challenges and build the foundational capacity for AI advancement. This study, therefore, investigates the key factors contributing to the stagnant integration of AI within the online teaching and learning spaces of these UoTs.

LITERATURE REVIEW

Comprehensive examination of Artificial Intelligence principles and applications at HEIs

Artificial intelligence has introduced novel opportunities and stimulating problems in higher education. AI, as a comprehensive technical phrase, is a system capable of performing tasks often associated with human reasoning and interaction with the environment. These tasks include adaptation, learning, synthesis, correction, and utilisation of diverse data necessary to execute complicated tasks. In this context, an AI-enhanced device might acquire data from its surroundings, autonomously assess it, and produce tailored, context-specific outputs. This encompasses a range of analytical techniques and subdisciplines. Machine learning, natural language processing, and deep learning are prevalent among these subfields. The HEIs promote skills for creativity, hence facilitating work-based learning. Their perspectives on the use of AI technologies affect its application in educational activities and the degree of integration between these technologies and traditional face-to-face teaching methods. These methods also facilitate an expedited form of learning that does not necessitate students' presence on campus for educational activities. Additionally, offering a platform for understanding the current trends in using technology globally enables opportunities for growth and recognition. Nevertheless, scientists have identified a gap in understanding the collaborative affordances offered by AI.⁴ Twenty-first-century competencies must be included in higher education to equip students for intricate professional problems. AI-driven solutions can improve skill development in students. Hence, this paper argues that HEIs must capitalise on AI technologies for teaching and learning.

The function and significance of Artificial Intelligence in contemporary contexts at HEIs

The future of higher education is fundamentally connected to advancements in new technologies and the computing capabilities of intelligent machines. The ultimate promise of technology in higher education lies in its appropriate application in enhancing human skills and expanding opportunities for teaching, learning, and research. Integration in AI, therefore, presents new opportunities and difficulties for teaching and learning in higher education, potentially transforming governance and the internal structure of higher education organisations. However, integration has been stagnant, especially in the South African context. Kuleto et al. argue that AI integration allows HEIs to leverage research advancements, the development of skills amongst students, innovation, and enhanced learning

¹ Fahd Azaroual, "Artificial Intelligence in Africa: Challenges and Opportunities," *Policy Brief. PB*, 2024, 23–24.

² Milad Farahani and Ghazal Ghasemi, "Artificial Intelligence and Inequality: Challenges and Opportunities," *Int. J. Innov. Educ* 9 (2024): 78–99.

³ Tshilidzi Marwala, *Closing the Gap: The Fourth Industrial Revolution in Africa* (Pan Macmillan South Africa, 2022).

⁴ Helen Crompton and Diane Burke, "Artificial Intelligence in Higher Education: The State of the Field," *International Journal of Educational Technology in Higher Education* 20, no. 1 (April 24, 2023): 22, <https://doi.org/10.1186/s41239-023-00392-8>.

experiences.⁵ Additionally, the institutions are able to address inequalities and be competitive in the global community. The response of HEIs to AI is contingent not only on the nature of AI itself but also on the prevailing interpretations of its significance.⁶ The representation of AI in higher education literature influences research, policy, practice, and the conversation around technology is significant. Such discourses can legitimise specific concepts of labour and productivity, including the endorsement of flexible working and the merging of work and home environments.

The contribution of Artificial Intelligence in enhancing teaching and learning

Education, over its several phases, typically incorporates contemporary technology and methodologies to improve the overall educational experience. Artificial intelligence is a pivotal new technology that profoundly influences the education system, offering substantial potential for societal benefit and the realisation of Sustainable Development Goals. The applications of artificial intelligence may significantly influence the future of modern education due to their considerable advantages.⁷ It has gone beyond mere science or algorithms; it now signifies an industrial revolution. Thus, the rising implementation of artificial intelligence in education corresponds with the expanding cooperation among governments and the surging investments addressing modern needs. It further contributes to technologies capable of bringing the world closer together. The HEIs in South Africa are just over a decade old, and they are a result of mergers of various institutions. They are still building, and such changes can be overwhelming, which leads to stagnation in the integration. Ajani, Akintolu and Afolabi suggests that, although HEIs are expected to be technologically savvy, they face economic challenges that hinder them from fully advancing.⁸ Due to this, they are unable to maximise the opportunities and benefits of using AI. Thus, contributing to stagnation.

Contribution of AI in enhancing online teaching processes

Since 2000, technology has evolved swiftly, prompting several HEIs to see the advantages of integrating different methods of instruction and learning with traditional instructional approaches. Hence, it is important to take into consideration that personalised learning enhances education by customising the learning experience to address the specific requirements and interests of students.⁹ AI-driven adaptive assessment systems in education facilitate individualised learning experiences for students. Additionally, HEIs are concerned that several task sets fundamental to instructional practices in higher education will be supplanted by AI software utilising intricate algorithms built by programmers, which may convey their inherent biases or agendas within operating systems. Thus, compromising the educational practices of these institutions. A continuous critique and investigation of offered solutions is essential to ensure that HEIs continue to function as institutions capable of preserving civilisation and fostering the advancement of knowledge and wisdom. This transformation facilitates informed administrative choices, optimises the allocation of courses and classes to educators based on their competencies and preferences, and identifies and supports both talented students and those experiencing learning challenges. This is accomplished by implementing specialised programs, assessing each student's learning progress, and facilitating direct connection with them.

Contribution to learning processes

Digital technologies, including video capsules and intelligent tutoring systems, can improve educational and instructional practices. For instance, by granting access to a greater number of students, enabling self-directed online learning, and enhancing personalised learning trajectories, the blended

⁵ Valentin Kuleto et al., "Exploring Opportunities and Challenges of Artificial Intelligence and Machine Learning in Higher Education Institutions," *Sustainability* 13, no. 18 (2021): 10424.

⁶ Rocsana Bucea-Manea-Țoniș et al., "Artificial Intelligence Potential in Higher Education Institutions Enhanced Learning Environment in Romania and Serbia," *Sustainability* 14, no. 10 (2022): 5842.

⁷ Mildred Nuong Deri et al., "Leveraging Artificial Intelligence in Higher Educational Institutions: A Comprehensive Overview," *Revista de Educación y Derecho*, no. 30 (2024).

⁸ Oluwatoyin Ayodele Ajani, Morakinyo Akintolu, and Sunday Oluwafemi Afolabi, "The Emergence of Artificial Intelligence in the Higher Education: Prospects and Challenges of AI.," *International Journal of Research in Business & Social Science* 13, no. 8 (2024).

⁹ Francesc Pedro et al., "Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development," 2019.

teaching and learning model can augment extracurricular activities and feedback mechanisms. Moreover, the functionalities of educational technologies offer cohesive insights on the optimal methods for matching learning objectives with technology-driven approaches.¹⁰ Consequently, the implementation of educational technology in managing and supporting remote education can significantly enhance students' results in online learning.¹¹ Consequently, it is unsurprising that as e-learning systems have evolved, higher education institutions globally have progressively adopted these technologies as an integral component of student instruction. The catalysts for this advancement are anticipations of enhanced professionalism in education by pupils and companies, alongside the need to optimize online learning.

Curriculum design and pedagogical considerations.

The rapid expansion of AI is progressively altering modes of living, learning, and working. To motivate additional students to engage with AI in their academic and professional pursuits, it is essential to create a pertinent and appealing curriculum. Hence, this paper argues that designing a curriculum aligned with AI technologies is pertinent for HEIs. By doing so, there is proper integration, further promising developments in AI-driven education encompass breakthroughs in personalised learning technologies, the integration of AI into curriculum design and delivery, the creation of AI-powered tutoring systems, and the improvement of adaptive learning platforms.¹² In addition, personalised learning algorithms are the core element of this system, enabling the shift to individualised education by tailoring materials and pedagogies to meet each student's distinct needs and preferences. These AI tools incorporate comprehensive data analysis to understand each learner's strengths, shortcomings, and learning pace, facilitating the development of highly tailored and effective educational experiences.¹³ With its promising potential, curriculum design in the context of South African HEIs is still complicated and has led to stagnation.

Policy formulation and implementation for artificial intelligence at HEI's

As artificial intelligence (AI) models proliferate, South African educational institutions require policies that provide equitable access while maintaining academic standards. Since the inception of multi-party democracy in 1994, South Africa has faced difficulties in effectively implementing policy initiatives. Additionally, the evolving global landscape, instigated by the Fourth Industrial Revolution, has engendered technology advancements that provide the potential for enhanced public policy formulation and execution via artificial intelligence.¹⁴ Notwithstanding these breakthroughs, the progression of AI in South African HE remains constrained in comparison to global trends. Challenges like insufficient knowledge, the imperceptible nature of AI-related wrongdoing, deficiencies in institutional policies, and ambiguities in conceptualisation remain. Hence, necessitating proper evaluation of the existence and the implementation.

Opportunities, benefits and risks

The integration of artificial intelligence (AI) in higher education (HE) presents a range of opportunities, benefits, and challenges. As a relatively recent technological advancement in this sector, AI provides various applications, including tutoring, information retrieval, referencing, paraphrasing, and personalized learning experiences. Tools such as Quillbot and Grammarly are examples of resources that facilitate these applications. However, the use of these AI tools often requires higher education

¹⁰ Joana Heil et al., "Students' Perceived Impact of GenAI Tools on Learning and Assessment in Higher Education: The Role of Individual AI Competence," *Smart Learning Environments* 12, no. 1 (2025): 37.

¹¹ Haady Abdilnabi Altememy et al., "The Influence of the Artificial Intelligence Capabilities of Higher Education Institutions in Iraq on Students' Academic Performance: The Role of AI-Based Technology Application as a Mediator," *Eurasian Journal of Educational Research* 104, no. 104 (2023): 267–82.

¹² Rachid Ejjami, "The Future of Learning: AI-Based Curriculum Development," *International Journal for Multidisciplinary Research* 6, no. 4 (2024): 1–31.

¹³ Karina Kasztelnik, "Artificial Intelligence-Assisted Curriculum Development: Innovations in Designing Educational Content for the 21st Century Learner," *Journal of Higher Education Theory and Practice* 24, no. 11 (2024): 51–59.

¹⁴ Miray Doğan, Arda Celik, and Hasan Arslan, "AI in Higher Education: Risks and Opportunities from the Academician Perspective," *European Journal of Education* 60, no. 1 (2025): e12863.

institutions (HEIs) to invest financially, which can be a significant expense. On the positive side, incorporating AI-related curricula can enhance competencies of HEIs, contributing to improved global rankings. Nonetheless, the introduction of generative AI has raised risks and challenges over recent months, particularly regarding its impact on human intelligence and the educational landscape. AI is known for its sophisticated LLM. To exemplarise this, Chan indicates that approximately one-third of surveyed students in HE in the US (sample size: 1000) have employed AI chatbots, such as ChatGPT, to complete written homework projects, with 60% utilising the software for over half of their tasks.¹⁵ ChatGPT, a form of generative AI tool, may replicate human writing, leading some students to utilise it for academic dishonesty. The survey revealed that 75% of students consider using the application to cheat as unethical, yet continue to engage in the practice while roughly 30% feel their professors are oblivious to their use of the tool. Notwithstanding the widespread adoption of this technology, there exists a paucity of scholarly research about ChatGPT and comparable generative AI technologies. South Africa is one of the few countries on the continent that has expanded its focus to use AI in educational initiatives. Nevertheless, there are little or no efforts to comprehend the influence of GenAI, such as ChatGPT, on teaching, learning and assessments.¹⁶ To address this gap, HEIs must adopt and integrate AI technologies to comprehend their functionalities, hence influencing results and teaching students on their successful usage. This paper argues that these AI technologies pose a threat to South African students and, if unaddressed, the nation risks producing graduates with no creative thinking, problem-solving skills, and knowledge retention.

THEORETICAL FRAMEWORK

Rogers' Diffusion of Innovations

The challenge of integrating new technologies into established institutions is well-documented. To provide a structured lens for analysing the stagnant adoption of AI in South African higher education, this study is premised on Everett Rogers' (1983) seminal theory, the Diffusion of Innovations. This framework is highly pertinent as it moves beyond simply describing a technology to explaining the complex social processes that govern its spread, or lack thereof, within a social system, such as the national Higher Education Institution (HEI) environment. Rogers defines an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption." In this study, AI, specifically its latest iteration, Generative AI, is the innovation. Diffusion, then, is the process by which this innovation is communicated through certain channels over time among the members of a social system. The current stagnation of AI integration signifies a critical disruption or bottleneck in this diffusion process within South African HEIs, hindering their ability to compete and innovate in a global market.

To diagnose the causes of this stagnation, this study will use the five key attributes of innovation that, according to Rogers, influence the rate of adoption:

1. **Relative Advantage:** Is AI perceived as being significantly better than the traditional methods it seeks to replace? The introduction's mention of scepticism and ethical dilemmas suggests that for many academics and institutions, the perceived advantages of AI are currently overshadowed by the risks, particularly concerning assessment integrity.
2. **Compatibility:** How consistent is AI with the existing values, past experiences, and needs of potential adopters? The clash between AI capabilities and long-standing pedagogical principles (e.g., individual authorship) points to a low degree of compatibility, creating resistance.
3. **Complexity:** How difficult is AI to understand and use? The identified shortage of skilled professionals and the need for extensive training indicate that AI is perceived as highly complex, acting as a major barrier to widespread adoption.

¹⁵ Cecilia Ka Yuk Chan, "A Comprehensive AI Policy Education Framework for University Teaching and Learning," *International Journal of Educational Technology in Higher Education* 20, no. 1 (2023): 38.

¹⁶ Kuleto et al., "Exploring Opportunities and Challenges of Artificial Intelligence and Machine Learning in Higher Education Institutions."

4. **Trialability:** To what extent can AI be experimented with on a limited basis? If HEIs lack the policies, infrastructure, or technical support for educators to safely "pilot" AI tools in their teaching, the opportunity for trialability is low, discouraging adoption.
5. **Observability:** How visible are the results and successes of AI adoption to others? If the most visible outcomes of AI use are negative (e.g., students cheating), while positive applications remain isolated or undocumented, the motivation for others to adopt it will be severely diminished.

Furthermore, Rogers categorizes adopters into a spectrum from "Innovators" to "Laggards." The current situation suggests that while a few individuals may be innovators, South African HEIs as a collective system are struggling to move beyond the "Early Adopter" stage and may even be positioned in the "Late Majority" or "Laggard" categories globally. This is particularly critical for Universities of Technology (UoTs), which are mandated to be leaders, not followers, in technological innovation. Therefore, the Diffusion of Innovations theory provides the ideal framework for this paper. It allows the research to move beyond a simple description of stagnation and provides a diagnostic tool to systematically evaluate the factors hindering AI integration. By applying this lens, the study can effectively analyse *why* the diffusion of AI is stalled and identify which of the innovation's attributes or social system factors are the primary contributors to this challenge within the South African HE environment.

METHODOLOGY

The paper focused on crucial information on the stagnant integration of AI in HEIs. Tahiru indicates that systematic reviews serve several essential purposes, including providing thorough summaries of existing knowledge on a certain topic and aiding in the development of future research goals.¹⁷ Moreover, it emphasises the acquisition of a thorough and representative database of pertinent literature. This information is subsequently assessed according to defined eligibility and selection criteria to ascertain its appropriateness for inclusion in the analysis. The primary objective is to deliver more extensive and exhaustive research.

The technique involves several acts, including searching, identifying, reading, summarising, gathering, analysing, interpreting, writing (with citations based on a predetermined research subject), and referencing. Furthermore, it is intended to be scientific in its objective, methodology, framework, and results, irrespective of the approach employed to execute it. Scientificity is attained by the use of a systematic framework of reasoning. It possesses the capacity to address enquiries inadequately resolved by singular studies and to pinpoint deficiencies in primary research that require rectification in subsequent investigations. Moreover, the capacity to formulate or assess concepts about the mechanics or rationale underlying observable phenomena. This study conducted a thorough analysis of current literature using a systematic review to address the specified research objectives. A methodology known as Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was established to fulfil the aims of the systematic review. This protocol seeks to do a comprehensive investigation by identifying pertinent literature on the challenges encountered in the stagnant integration of AI at HEIs. The diagram displays a flowchart that delineates the process of recognising, filtering, incorporating, and excluding objects.

¹⁷ Fati Tahiru, "AI in Education: A Systematic Literature Review," *Journal of Cases on Information Technology (JCIT)* 23, no. 1 (2021): 1–20.

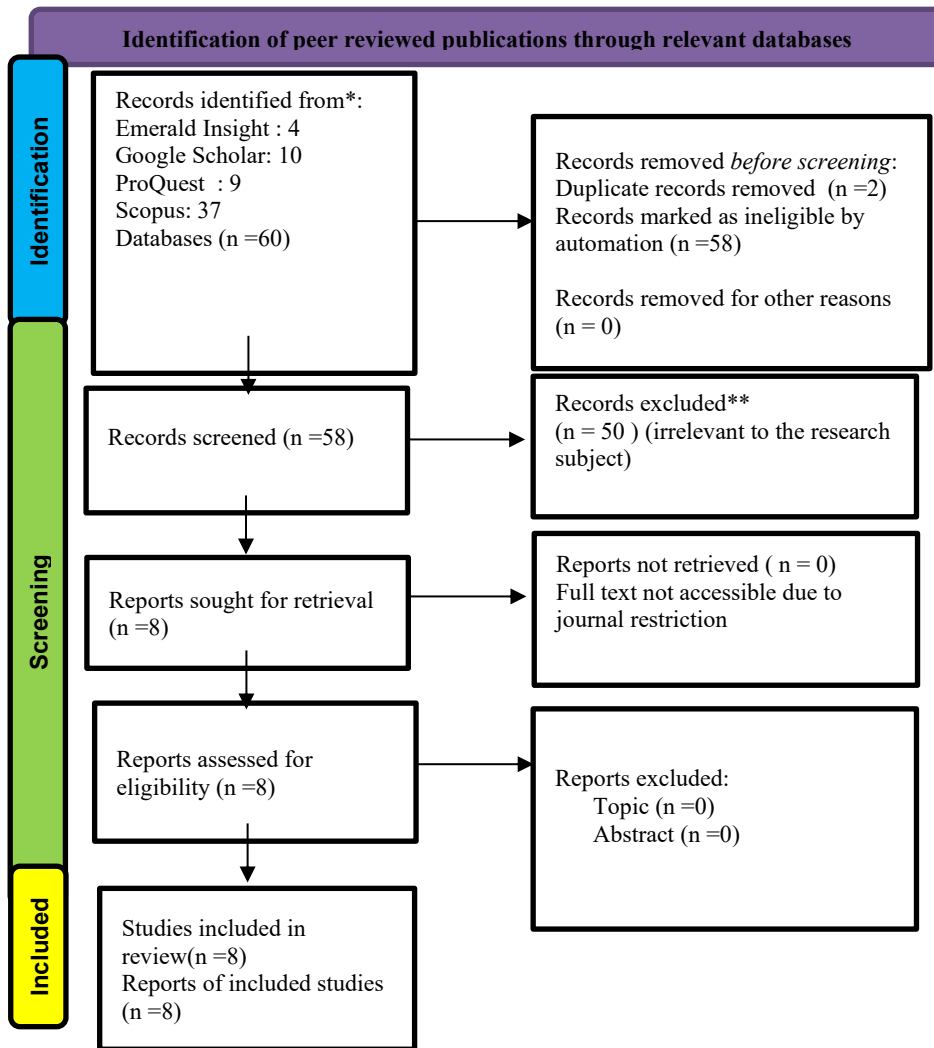


Figure 1: PRISMA flowchart

A systematic literature review delineates research deficiencies and reveals domains that prior studies have inadequately explored. It is guided by explicit research questions, delineates and analyses investigations, and eventually assesses the quality of the studies based on established criteria. The systematic review enabled the study to systematically analyse and integrate the existing evidence and information from different publications. Therefore, the publications utilised in this paper were obtained by an extensive search of previous studies conducted via online databases, including Emerald Insight, Google Scholar, Scopus and ProQuest. While other methods for literature search and retrieval, including physical searches and reference checks, are available, electronic databases have become the predominant method owing to their enhanced ease and efficiency. This paper employed several keywords to identify appropriate information.

Table 1: Keywords

Database	Keywords
Emerald Insight	Stagnant Integration of "Artificial Intelligence" into "Online" "Teaching and Learning" within South African Universities of Technology
Google Scholar	"Stagnant" "Integration" of "Artificial Intelligence" into "Online" "Teaching and Learning" within "South African" "Universities of Technology"

ProQuest	Stagnant Integration of "Artificial Intelligence" into "Online" "Teaching and Learning" within South African Universities of Technology
Scopus	Stagnant Integration of "Artificial Intelligence" into "Online" "Teaching and Learning" within South African Universities of Technology

Inclusion and exclusion

Inclusion criteria denote the particular prerequisites that a study must fulfil to be deemed eligible for inclusion. On the other hand, exclusion criteria denote the particular conditions that would exclude research from eligibility. The systematic review is defined by the inclusion and exclusion criteria. Research criteria are typically defined following the formulation of the study subject; however, prior scoping searches may be required to identify appropriate criteria. A diverse array of factors may function as criteria for the inclusion or exclusion of an item. The use of exclusion and inclusion criteria sharpened the study focus and bolsters the legitimacy of the research subject. This article included the following aspects to evaluate the specific requirements for the inclusion and exclusion criteria.

Table 2: Inclusion and exclusion criteria

Inclusion and Exclusion criteria	
Inclusion	Exclusion
Studies that include Integration of Artificial intelligence	Studies that do not present Integration of Artificial intelligence
Studies written in English	Studies that are not written in English
Studies published between 2020 and 2025	Studies that were not published between 2020 and 2025

(Source: Authors)

Quality Assessment

Evaluating the credibility of the evidence presented in a systematic review, it is crucial to analyse the data it contains. Biases stemming from the research process might distort the results of a poorly done study, thereby necessitating cautious interpretation. The quality assessment of the included papers was conducted using EndNote. The five criteria used to assess the quality included (i) presentation of inclusion/exclusion criteria, (ii) adequacy of the search, (iii) assessment of the quality of included research, (iv) presence of sufficient details regarding individual included studies, and (v) synthesis of the included studies. The categorization of "included," "undecided," and "excluded" was achieved using EndNote for interpretation. The endnote tool has been utilised in several systematic review studies. The table below illustrates the quality assessment of articles:

Table 3: Quality assessment of articles

Data extraction items	Description
Title	Title of paper
Authors	List of all the authors involved in the study
Publication date	The publication date of the research paper (ranging from 2020 to 2025)
Type	The type of publication (journal articles)

(Source: Authors)

Data coding and analysis

Qualitative data coding and analysis entails observing and understanding the statements, writings, or actions of participants. Data analysis in this paper involved examining developing categories and deducing emergent themes and trends. Coding is the fundamental component in qualitative data processing, and coding enables qualitative researchers not only to change but also to surpass the data. Furthermore, it plays a crucial role in bridging the gap between data collection and interpreting the significance of the data. Coding tools are specifically tailored for a particular study synthesis and encompass the interventions, outcome variables, and other data usually found in the relevant literature.

In order to create a coding system that can effectively capture all essential information, researchers possessed a comprehensive understanding of the literature they planned to synthesise. Typically, coded data may be classified into four fundamental categories: The four key components of the study include: (a) the methodology and content of the investigation, (b) the level of quality of the study, (c) the details of the intervention being studied, and (d) the measurements used to assess the outcomes of the study. Key factors recognised in the literature as crucial variables to include in all research syntheses are methodological and substantive features. These include the source of the study, year of publication, type of research design, and characteristics of the authors/investigators, such as their discipline and educational credentials. The selection of intervention categories and relevant outcome measures is highly dependent on the individual study and is guided by well-defined research objectives. Additionally, these choices are influenced by pertinent stagnation in the integration of artificial intelligence in online teaching and learning concerns in the context of South African HEIs.

Ethical consideration

A key component of the study's ethical considerations is the scrupulous and thoughtful utilisation of previously published sources and data. To uphold academic integrity and reduce the risk of plagiarism, the research diligently acknowledges and attributes all external sources of material. There are fewer ethical concerns about data collection and research engagement in this study as the data used is publicly accessible and does not require the participation of individuals.

PRESENTATION OF RESULTS /FINDINGS

Upon completing a thorough analysis of the literature, it was determined that all three databases produced a combined total of 8 academic papers related to the subject of the integration of AI in HE for online teaching and learning. The table below presents data about articles, including the author's name, article title, publication year, and country of origin. The table illustrates a significant surge in the number of publications in 2022, with a significant number of articles published globally.

Table 4: Publications included

Author/s	Year of publication	Title	Key Findings	Features, success factors, Barriers, Challenges.	Country of origin
Dakakni, D. and Safa, N.	2023	Artificial intelligence in the L2 classroom: Implications and challenges on ethics and equity in higher education: A 21st-century Pandora's box	There is an urgent need for the enactment of punitive legislative measures regarding privacy violations and equity concerns, particularly due to the displacements resulting from inadequate digital competencies, which may exacerbate existing socio-economic disparities affecting administrators, students and teachers.	Artificial intelligence is increasingly infiltrating individuals' personal and professional lives, resulting in a growing dependence on this advanced technology.	Lebanon
Jose, J. and B. Jose, J.	2024	Educators' Academic Insights on Artificial Intelligence: Challenges and Opportunities	While there are many obstacles, there are also possibilities that the academic community can leverage. This facilitates the advancement and evolution of Higher Education Institutions via the application of artificial intelligence.	AI is not primarily employed in teaching and learning because of the limited real usage among educators and students. Policies are another significant aspect, and if this is the case, it is strongly advised that institutions employ AI appropriately.	Oman
N. Liu, W. Deng and A. F. M. Ayub	2025	Exploring the adoption of AI-enabled English learning applications among university students using the extended UTAUT2 model	The use of AI in teaching languages amongst university students has been one of the milestones in the use of AI and has increased the desires of adopting AI in learning methods.	Three distinct mediators of AI were emphasized: performance expectancy, personnel innovativeness, and reported satisfaction, which serve as indicators of institutional adoption and utilization of AI.	Malaysia
T. Marshik, T. McCracken, C. Kopp, B and O'Marrah, M.	2025	Student and Instructor Perceptions and Uses of Artificial Intelligence in Higher Education	Students and instructors reported that their usage of artificial intelligence in the educational context is low, which is based on potential risks of plagiarism as well as potential detriments, including academic integrity concerns, misuse, or over-reliance.	There are low levels of actual AI use but shared similar views on its potential benefits, including learning supports and efficiency and also highlighted risks of academic integrity concerns and over. SuccessFactors include clear institutional policies, transparency, AI literacy training and open dialogues	United States of America

				about appropriate use, finally barriers involved limited exposure and clear guidelines and sensual integration of AI into pedagogy and responsibility and ensuring ethical use that aligns with academic goals.	
McGrath, C. Cerratto Pargman, T., Juth, N. and Palmgren, P.J.	2023	University teachers' perceptions of responsibility and artificial intelligence in higher education - An experimental philosophical study	Several stakeholders were more inclined to support universities' responsibilities to apply AI technologies and situations involving first-generation students and those with learning difficulties. However, there were fundamental disparities and varied perspectives on this. Responses revealed statistically significant relationships with demographic characteristics such as gender, age, faculty affiliation, and academic status.	University teachers review AI in higher education with both openness and caution. They were more supportive of AI when prompted on equity, particularly for first-generation learning-disabled students. While they also recognized AI's potential, they highlighted barriers such as limited knowledge, local institutional support and concerns about fairness and misuse. This study also indicated that successful integration requires clear institutional responsibility, training, and equity this strategy is.	Sweden
Niu, W., Zhang, W., Zhang, C., and Chen, X.	2024	The Role of Artificial Intelligence Autonomy in Higher Education: A Uses and Gratification Perspective	Different forms of autonomy, including sensing, thoughts, and action, significantly shaped students' willingness to use AI educators in higher education. Each type of autonomy influences adoption through specific gratifications: sensing autonomy, fear of social interaction and entertainment economy via information seeking and social interaction and action autonomy via information seeking and entertainment	Students are more likely to adopt AI educators, and their education systems exhibit sensing, thoughts, and action autonomy. These forms of autonomy increased usage intentions by fulfilling students' need for information, social interaction, and entertainment. Adoption is most successful when AI tools are personalized, responsive, and aligned with students' motivations, but challenges remain, including interest, ethical use, technological limitations and curriculum integration.	China
Sanabria-Navarro, J R. Silveira-	2023	Incidences of artificial intelligence in	AI is increasingly transforming contemporary education by impacting	AI is transforming education by enabling personalized learning,	Colombia

Pérez, Y. Pérez-Bravo, D D. and de-Jesús-Cortina-Núñez M.		contemporary education	students, lecturers, and institutions. Students benefit from personalized learning, while teachers must adapt their methodologies to leverage AI effectively.	supporting lectures, and influencing institutional practices. Success depends on institutional support, adaptation, and accessible technologies while adoption is hindered by knowledge gaps, resistance to change, and key equity issues.	
Xu, L and Yu, W.	2024	Design and Implementation of Artificial Intelligence Online Learning Platform Based on Resource Scheduling Technology	Implementation of an AI platform that was developed led to better student performance in technical subjects and demonstrated the potential of AI to transform online education through automated resource management and tailored learning experiences	The platform improved student performance and learning efficiency, but its success relied on technical expertise, infrastructure, and scalability. However there were challenges that included integration with existing systems and maintaining the accuracy and relevance of AI models over time.	China

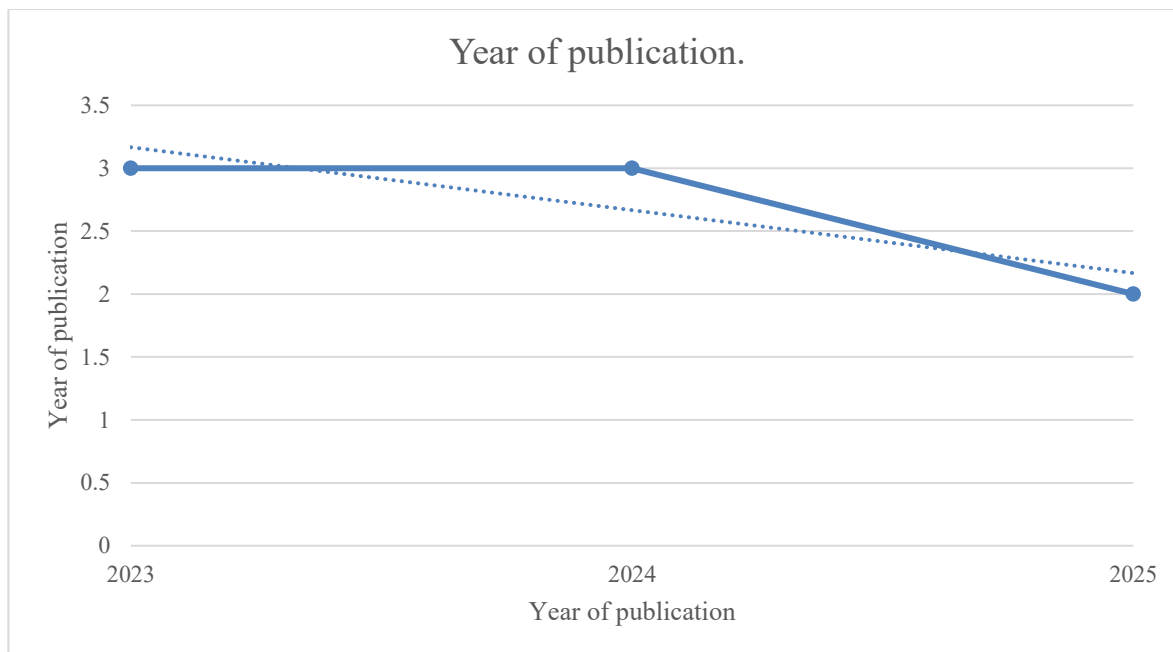


Figure 2: Publications per year (Source: Authors)

Thematic analysis of literature

Themes	Articles	Number of Articles
Ethical dilemmas that hinder adoption	(Xu, and Yu, 2024) and (McGrath, Cerratto Pargman, Juth and Palmgren, 2023)	2
Unclear roles and responsibilities	(Dakakni and Safa, 2023) and (Sanabria-Navarro, Silveira-Pérez, Pérez-Bravo, and de-Jesús-Cortina-Núñez, 2023)	2
Lack of institutional strategy and infrastructure	(Jose and Jose, 2024); Marshik, McCracken, Kopp and O'Marrah, 2025); (Niu, Zhang, Zhang and Chen, 2024)	3
Readiness of students and barriers associated with digital access	(Xu and Yu, 2024); (Liu, Deng and Ayub, 2025)	2

Ethical dilemmas that hinder the adoption of AI

An examination of international literature revealed ethical issues related to the utilisation of AI in higher education, which have substantially hindered its uptake. Among various concerns raised, researchers such as Xu and Yu assert that AI jeopardises academic integrity and the originality of scholarly work.¹⁸ Consequently, the propagation of plagiarism has been a longstanding concern in HE. McGrath, Cerratto Pargman, Juth, and Palmgren corroborate this idea, asserting that academic integrity in the age of AI is a contentious issue that needs greater discourse, particularly within the South African context, where disparities in technology access persist.¹⁹ The challenges are exacerbated by the utilisation of generative AI (GenAI), namely, large language models (LLMs) capable of content generation, such as ChatGPT and Gemini AI. While GenAI offers numerous beneficial functions in higher education, it also has significant negative repercussions stemming from ethical problems. Numerous experts have emphasised that the utilisation of GenAI in assessments and research is increasing, hence contributing

¹⁸ Libo Xu and Wenbo Yu, "Design and Implementation of Artificial Intelligence Online Learning Platform Based on Resource Scheduling Technology," *Journal of Cases on Information Technology (JCIT)* 26, no. 1 (2024): 1–22.

¹⁹ Cormac McGrath et al., "University Teachers' Perceptions of Responsibility and Artificial Intelligence in Higher Education-An Experimental Philosophical Study," *Computers and Education: Artificial Intelligence* 4 (2023): 100139.

to the stagnant integration of AI. This has also impacted the ethical issues of HEIs, as there are few ways to detect and penalise students who utilise AI, particularly for content generation.

Unclear roles and responsibilities

A principal problem in the application of AI in higher education is the unclear duties of various stakeholders, including educators and policymakers. This has intensified existing concerns about accountability related to policy implementation and enforcement in cases of misuse. Therefore, it is imperative to enhance standards for AI use by delineating specific tasks and removing ambiguity. Dakakni and Safa demonstrate that higher education institutions worldwide are grappling with issues of accountability, particularly around who is responsible for the exploitation of AI tools.²⁰ This has ignited debates over the accountability of HEIs, lecturers, or students in this context. This disparity is notably pronounced in South Africa, where training and staffing continue to pose challenges; hence, the implementation of AI may entail certain drawbacks. Furthermore, several authors emphasise problems related to academics, specifically on the competence required in using AI, which is an issue associated with IT, an area in which most lecturers lack training.²¹ Without well-articulated policies and guidelines, it becomes more complex.

Lack of Institutional strategy and infrastructure

The emergence of AI has been a prominent issue in higher education, particularly due to the absence of policies and guidelines for effective integration. The absence of initiatives for AI integration exacerbates the challenges faced by institutions in the global higher education community (Jose and Jose, 2024), adversely impacting teaching and learning quality. The dispersed implementation and unequal access complicate execution for HEIs. Marshik, McCracken, Kopp and O'Marrah (2025) contend that without adequate strategies for AI implementation, HEIs may encounter disparities in learning experiences, particularly in South Africa, a developing nation. Moreover, numerous obstacles have arisen regarding the technical support and capacity building necessary for the successful integration of AI; nonetheless, the absence of oversight and control continues to be the primary factor hindering progress (McGrath, Cerratto Pargman, Juth and Palmgren, 2023). Niu, Zhang, Zhang and Chen (2024) state that the absence of strategy and infrastructure continues to be a significant obstacle to the effective integration of AI in teaching and learning processes in HEIs. In the absence of adequate planning, investment in digital technology, and comprehensive benchmarking, this endeavor becomes ineffective and fraught with obstacles when competing with higher education institutions on a worldwide scale. Addressing the deficiencies facilitates the effective integration of AI in higher education.

Readiness of students and barriers associated with digital access

Online teaching and learning are undergoing significant transformations associated with artificial intelligence. Researchers are expressing concerns regarding student access and preparedness (Liu, Deng and Ayub, 2025). The stringent budgets exacerbate the problems, as the HEIs are unable to finance the effective integration of AI. Moreover, these problems are exacerbated by prevailing societal difficulties that obstruct the adoption of technologies. This results in a convoluted scenario in which higher education institutions are uncertain whether to embrace or disregard. Xu and Yu (2024) assert that access to the internet remains a challenge for some South African students at HEIs, primarily due to network and financial constraints. Higher Education Institutions have endeavoured to address these difficulties over the years; yet they persist due to economic stagnation, which has also contributed to the sluggish integration of AI. Requiring additional analysis and focus, as it hampers growth and diminishes competitiveness in the global higher education environment.

²⁰ Deema Dakakni and Nehme Safa, "Artificial Intelligence in the L2 Classroom: Implications and Challenges on Ethics and Equity in Higher Education: A 21st Century Pandora's Box," *Computers and Education: Artificial Intelligence* 5 (2023): 100179.

²¹ José-Ramón Sanabria-Navarro et al., "Incidences of Artificial Intelligence in Contemporary Education.," *Comunicar: Media Education Research Journal* 31, no. 77 (2023): 93–103.

DISCUSSION

This study aimed to examine the elements that lead to the stagnant integration of AI in HEIs. This study was based on a systematic review using the PRISMA process. The data indicate that the slow adoption of AI has several aspects. It is influenced by ethical concerns, institutional restrictions, stakeholder uncertainty, and persistent digital inequities. These findings are consistent with the global literature while emphasizing special issues in developing countries such as South Africa. A major concern identified in the review relates to ethical issues, especially those related to academic honesty and the authenticity of student work. The rising complexity of generative AI technologies, particularly large language models (LLMs), has sparked concerns among educators and policymakers. Researchers such as Xu and Yu (2024) and McGrath et al. (2023) point out that AI complicates long-standing problems with plagiarism and originality. This study supports these concerns, showing that HEIs struggle to consistently detect or manage AI-generated content, which greatly contributes to their reluctance to adopt AI. This aligns with global discussions that advocate the creation of ethical frameworks and detection technologies to promote responsible innovation in higher education. The study also revealed that unclear roles and responsibilities among stakeholders hinder effective AI implementation. Literature shows that uncertainty about accountability, whether it lies with institutional leaders, lecturers, students, or policymakers, creates confusion and weakens enforcement (Dakakni & Safa, 2023). This study confirms these findings, indicating that unclear institutional expectations and inadequate training for academic staff slow down the establishment of standardized practices. In South Africa, these challenges are intensified by ongoing skill shortages and limited opportunities for professional development in AI and digital literacy, supporting research by Sanabria-Navarro et al. (2023). The findings highlight the need for capacity-building and clearer governance structures for responsible and educationally sound AI use. Another critical theme is the lack of institutional strategies and proper digital infrastructure. The review finds that many HEIs, especially in developing countries, lack comprehensive policies, investment plans, or technological systems to support AI integration. This finding aligns with Jose and Marshik et al., whose research shows that fragmented implementation efforts lead to inconsistent adoption and widening digital gaps.²² The current study reinforces these concerns, demonstrating that without organized strategic planning, sustained investment, and proper oversight, efforts to integrate AI will remain ineffective. The results also show that inadequate oversight mechanisms act as a significant barrier to real progress, highlighting the need for structured governance frameworks.²³

Moreover, the study emphasizes that student readiness and limited digital access significantly slow AI integration. Researchers like Liu, Deng, and Ayub and Xu and Yu indicate that students in developing contexts often encounter financial, technological, and network barriers that limit their ability to engage with AI-enabled learning environments.²⁴ This study echoes these observations, confirming that socio-economic disparities and limited access to stable internet and digital devices hinder fair participation in AI-supported learning. While HEIs have tried to address these challenges, ongoing economic pressures continue to impede progress, ultimately affecting their competitiveness on a global level. This study contributes to the existing knowledge by providing a detailed and systematic overview of the issues preventing AI adoption in HEIs. Using a PRISMA-based systematic review allowed the identification of common patterns in international literature, along with specific challenges faced in the South African higher education context. In line with Tahiru, the systematic review approach helped uncover gaps in previous research and generated insights that individual studies

²² J Jose, "Educators' Academic Insights on Artificial Intelligence: Challenges and Opportunities," *Learning*, 2024, 59–77; Tesia Marshik et al., "Student and Instructor Perceptions and Uses of Artificial Intelligence in Higher Education," *Teaching of Psychology* 52, no. 3 (2025): 339–46.

²³ McGrath et al., "University Teachers' Perceptions of Responsibility and Artificial Intelligence in Higher Education-An Experimental Philosophical Study."

²⁴ Nannan Liu, Wenqiang Deng, and Ahmad Fauzi Mohd Ayub, "Exploring the Adoption of AI-Enabled English Learning Applications among University Students Using Extended UTAUT2 Model," *Education and Information Technologies* 30, no. 10 (2025): 13351–83; Jia Xu, Lixia Yu, and Xiaowen Zhang, "Bridging the Gender Gap in Academic Engagement among Young Adults: The Role of Anticipated Future Sex Discrimination and Gender-Role Orientation," *Journal of Youth and Adolescence* 53, no. 10 (October 16, 2024): 2192–2201, <https://doi.org/10.1007/s10964-024-02009-3>.

might have missed.²⁵ The integration of AI is not just limited by technological constraints but by a complex mix of ethical, structural, socio-economic, and governance factors. Overcoming these obstacles will require coordinated decision-making, strategic investment, and a commitment to equitable digital transformation. Future research should focus on empirical investigations within South African HEIs to validate these findings and develop context-specific models for responsible AI adoption.

RECOMMENDATIONS

Overcoming this stagnation necessitates a concerted national effort that moves beyond mere technological acquisition. It requires a strategic commitment to:

1. **Policy and Empowerment:** Crafting clear, actionable policies that demystify the use of AI, while simultaneously investing in comprehensive training that empowers lecturers to become confident and critical users of these new tools.
2. **Infrastructure and Equity:** Committing to significant investment not only in institutional infrastructure but also in national initiatives aimed at closing the digital literacy and access gaps for all students.

Ultimately, for South Africa, the path forward is not about simply "adopting AI." It is about thoughtfully and equitably weaving it into the educational fabric. Failing to address these core challenges of educator empowerment and student equity will ensure AI remains a source of exclusion, further cementing the nation's position on the wrong side of the global innovation divide.

CONCLUSION

The stagnant adoption of Artificial Intelligence in South Africa's online teaching and learning environments results from a convergence of structural, institutional, and human-related challenges. This issue represents a dual crisis of confidence and access, both of which impede progress and collectively constrain the potential of AI in higher education. A significant crisis of confidence persists among academic staff and decision-makers. The absence of well-defined institutional policies, ethical standards, and governance frameworks has generated uncertainty regarding the appropriate use of AI in teaching and learning. Insufficient training and professional development leave many lecturers unprepared and hesitant to adopt AI tools. This uncertainty undermines pedagogical authority and intensifies concerns about academic integrity and the ethical use of generative AI. Without structured support and capacity-building initiatives, academic staff remain reluctant to integrate AI into their practices, which contributes substantially to stagnation across higher education institutions. Alongside this is a persistent crisis of access, shaped by South Africa's longstanding socio-economic disparities. Many students continue to face significant barriers, including limited device availability, unreliable internet connections, and unaffordable data costs that hinder their ability to fully engage with AI-enabled learning. Despite institutional efforts to address these inequities, economic pressures and structural inequalities continue to impede meaningful progress. As long as these obstacles continue, the benefits of AI-enhanced education will remain out of reach for a substantial portion of the student population. The interdependence of these two crises perpetuates a cycle of stagnation. Institutions struggle to advance AI integration when educators lack confidence and competence, and even the most robust AI strategies remain ineffective if students cannot access or utilise the required digital resources. This situation is worsened by fragmented institutional initiatives, inadequate infrastructure, and unclear lines of accountability, all of which limit the effectiveness of attempts to deploy AI at scale. The stagnation in AI adoption within South African HEIs reflects broader systemic issues that extend beyond technological capability. Meaningful progress will require comprehensive interventions that focus on policy development, academic training, ethical governance, and improved digital access for all students. With coordinated and inclusive strategies, South Africa can begin to unlock the

²⁵ Tahiru, "AI in Education: A Systematic Literature Review."

transformative potential of AI in higher education and strengthen its position within the global academic landscape.

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