

Artificial Intelligence Integration in Educational Assessment: Implications for Curriculum Practice in South African Higher Education

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Abstract

The integration of Artificial Intelligence (AI) into educational assessment has accelerated in recent years, where AI tools are being incorporated into assessment as learning (AaL), assessment for learning (AfL) and assessment of learning (AoL). The study is contextualised within South Africa's developing higher education AI policy environment, with particular attention to ethical governance, data sovereignty and the mitigation of historical socioeconomic disparities. The theoretical framework guiding the study includes the intelligent Technological Pedagogical Content Knowledge (TPACK) framework and constructivist theory, which enabled the study to examine how personalised learning pathways, immediate feedback and predictive analytics are facilitated by AI tools such as generative models and intelligent tutoring systems. Grounded in a structured literature review approach, the study adhered to the guidelines and employed thematic synthesis of peer-reviewed articles published between January 2020 and July 2026. The findings indicate a distinct implementation gap, where knowledge of AI systems does not necessarily translate into pedagogical integration, highlighting the need for a shift towards authentic assessment methods and targeted teacher professional development. The study concludes that while AI presents significant potential for curriculum reform and decolonisation, its effective implementation in South African higher education depends on context-specific innovation that ensures equitable access and upholds human-centred learning principles.

Keywords: AI in Educational Assessment, Artificial Intelligence, Constructivism, Curriculum Practice, TPACK.

Introduction

There are significant changes in the uptake of AI in educational settings due to the rapid development of AI tools that aid learning processes (1). This advancement of AI tools is sometimes referred to as the Fourth Industrial Revolution (4IR), due to AI's ability to challenge traditional educational assessment practices that are mechanistic, perpetuate inequalities and are insufficient in capturing diverse student competencies (2). Although there are global calls to reform these traditional assessment models that are exclusionary, this push in the Global South is complex due to profound pre-existing structural vulnerabilities (3). These challenges are evident in the South African context where there are systemic issues including overcrowded classrooms, shortages of qualified teachers and deeply entrenched socioeconomic disparities which result from the legacy of apartheid (4). Educational assessment in higher education has long been shaped by traditional standardised practices that

prioritise measurable outcomes over inclusive and transformative learning. Prior research has shown that AI tools can support real-time feedback, automated grading and personalised learning pathways, thereby offering potential to move beyond purely summative models (5). Studies conducted in South African higher education contexts have further documented how generative models and intelligent systems are beginning to influence teaching and assessment practices, while also highlighting risks related to the digital divide, algorithmic bias and academic integrity (6). However, much of this earlier work has concentrated on the general adoption of AI technologies rather than on their specific integration into the three established domains of assessment (assessment for learning, assessment of learning and assessment as learning). As a result, the pedagogical implications of AI for authentic equitable and context-sensitive assessment design remain only partially explored.

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Educational assessments are traditionally categorized into three groupings namely assessment for learning (formative), assessment of learning (summative) and assessment as learning (metacognitive). These forms of assessment are being reconfigured by AI tools, providing new mechanisms for real-time feedback, automated grading and personalized learning trajectories (5). For instance, AI Large Language Models (LLMs) such as ChatGPT, Gemini and DeepSeek, are gradually changing the pedagogical relationships between teachers, learners and knowledge. However, although there are noticeable gains, the integration of AI in South African educational assessment practices is a complex socio-technical endeavour that is comprised of risks, including the increasing digital divide, algorithmic bias that privilege Global North epistemologies and threats to academic integrity (6). This study seeks to analyse current literature on AI and its integration in assessment, examining unique opportunities, ethical challenges and implications for curriculum practice and decolonisation within the South African higher educational landscape.

This study embarks on a Literature Review (LR) to examine how AI has been integrated into assessments in higher education contexts within South Africa between January 2020 and July 2026. This study, which has been necessitated by the growing AI-application studies within the South African educational sector, examines implementation strategies, uncovering unique opportunities, ethical challenges and implications of AI integration. Current empirical studies are predominantly focused on general AI applications in educational settings, which leaves significant gaps in evaluating AI's integration in assessment practices (7). These studies, while valuable in mapping broad technological uptake and institutional readiness, have tended to overlook the nuanced ways in which AI reshapes formative, summative and metacognitive assessment practices. Consequently, there remains a clear research gap concerning the systematic examination of AI's transformative effects on assessment for, of and as learning, as well as the associated opportunities and ethical challenges within the South African higher education context. Therefore, this review seeks to address these gaps through the following research questions: How is AI transforming assessment for, of and as learning?

What opportunities do AI tools provide for curriculum assessment practices? and Does AI integration in assessment raise any ethical and practical challenges? The overarching aim of the present study is to synthesise emerging evidence on the integration of artificial intelligence into educational assessment practices in South African higher education between January 2020 and July 2026. Its specific objectives are to examine how AI is transforming assessment for, of and as learning; to identify the opportunities that AI tools afford for curriculum assessment practices; and to analyse the ethical and practical challenges that accompany such integration.

These research questions guide the study in examining how AI is currently integrated in educational assessments, its current impact, opportunities and challenges that arise from such integration. This study contributes to higher education assessment scholarship by synthesising emerging evidence on the integration of artificial intelligence into assessment practices in South African higher education. Drawing on the intelligent Technological Pedagogical Content Knowledge (TPACK) framework and constructivist theory, the review identifies a persistent implementation gap between AI awareness and pedagogical assessment practice. It further advances the literature by proposing context-responsive recommendations for authentic assessment, educator professional development, ethical AI governance and curriculum transformation within resource-constrained higher education environments. In doing so, the study offers a novel contribution by linking AI-enabled assessment explicitly to questions of curriculum practice and decolonisation, thereby addressing a gap that previous general AI-in-education studies have left largely unexamined.

Methodology

The theoretical foundation and justification of the study is built on two theoretical frameworks: the TPACK model and Constructivist Theory. Both frameworks shed light on how higher institutions could navigate issues of technology, pedagogy and content knowledge in their quest to integrate AI in educational assessment.

The TPACK model serves as a framework for understanding how teachers integrate digital technologies in assessment practices. This model

outlines the intersection and complexity of three primary forms of knowledge required for effective technology integration (8). These include Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK) (9). TK refers to the ability of an educator to be aware of various AI tools, including their capabilities, underlying mechanisms and technical limitations; PK refers to an educator's ability to design learning processes that meaningfully incorporate AI-supported strategies; and CK deals with an educator's understanding of how AI reshapes disciplinary content and the nature of knowledge production within a field (10).

The TPACK model states that optimal learning can only be activated when all three domains are seamlessly integrated, thereby allowing educators to adopt the use of technology in pedagogically sound and subject-specific ways (8). This means that the successful integration of AI in assessments cannot be achieved through the mere provision of AI platforms (TK); rather, these tools and platforms must be aligned with sound assessment methodologies (PK) and specific curriculum objectives (CK). The integration of all three domains is necessary due to current gaps where educators possess high levels of AI tools awareness but lack the technical know-how to integrate such awareness with pedagogical approaches (11). Also, studies indicate that educators use AI mainly for technical tasks such as generating quiz questions, creating a gap in the use of AI as a catalyst for deep cognitive engagement and transformed assessment practices (12).

Therefore, TPACK as used in this study highlights critical training gaps among educators in digital literacy contexts, emphasizing how technological tools can serve curriculum practices rather than dictating curriculum practices. The TPACK-AI framework proposed in this study examines how South African educators can be trained and empowered with skills in interpreting AI-generated analytics, managing automated feedback and integrating AI use with context-specific outcomes.

The constructivist learning theory is rooted in the developmental psychology of Zone of Proximal Development (13, 14). The theory posits that learning is an active process where people construct their own knowledge through their experiences and social interactions with others.

The concept of scaffolding emphasises the importance of temporary structured support provided by educators to learners to enable them to learn tasks that are beyond their current capabilities. In line with this, AI tools could function as a more knowledgeable other, providing the necessary scaffolding that guides learners through their Zone of Proximal Development (ZPD) (15).

The integration of AI in assessment promotes the concept of Assessment as Learning (AaL) by leveraging assessment methodologies in actively driving and shaping student learning processes, rather than entirely measuring it retrospectively (16). The adoption of AaL is intended to empower learners to gain control over the learning process, equipping them with all necessary skills and tools in setting personal goals, monitoring progress and examining cognitive development. AI-based learning environments boost AaL through interactive content, exploratory tasks and iterative refinement opportunities, allowing learners to construct knowledge by means of purposeful engagement (17). Such purposeful engagement is in line with the constructivist notion of scaffolding, where learners are actively engaged within their optimal ZPD through the adoption of AI generative language models and intelligent tutoring systems that provide real-time and personalised feedback (18).

The successful integration of AI further promotes collaborative sense-making, enabling learners to enhance critical thinking and refine problem-solving strategies. Also, the constructivist approach provides a critical lens for critiquing the adoption of AI systems merely for generating complete solutions (19). If generative models such as ChatGPT are used solely to generate complete solutions, they create dependency, bypassing the stage of productive struggle that helps learners achieve independent reasoning and deep cognitive development (20). The integration of AI in assessment as an agent of scaffolding should avoid over-reliance on automated prompts that lead to cognitive dependency, hindering learners from internalising metacognitive control over planning and evaluation. Hence, a constructivist approach encourages the design and development of regulated AI assessment tools that stimulate critical inquiry, while encouraging heuristic

strategy development and fostering genuine student autonomy (21).

Study Design

This study employed a Literature Review (LR) methodology, underpinned by a qualitative interpretivist approach. This approach was particularly useful due to the exponential growth in research in the field of artificial intelligence in education (22). The LR approach ensured a transparent, structured and replicable process for identifying academic sources, thereby enhancing the rigour of the research and the credibility of the findings (23). The interpretivist approach was also adopted due to the complex historical, cultural and socio-economic realities surrounding the South African higher education context (1). This approach enabled the study to identify underlying trends, emerging debates and critical research gaps overlooked by quantitative measures. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were adopted, ensuring methodological rigour and reproducibility for transparency in the search, screening and reporting processes (24). However, the study is not a full systematic review or meta-analysis.

Research Question

Three research questions were developed to guide the search, selection and synthesis:

- a) How is AI transforming assessment for, of and as learning?
- b) What opportunities do AI tools provide for curriculum assessment practices?
- c) What ethical and practical challenges arise from AI integration in assessment?

Search Strategy

The researcher ensured that all empirical studies included and databases searched were comprehensive, sourced from four academic databases including Scopus, ERIC, Web of Science and Google Scholar. In a bid to ensure the quality of the data analysed, all four databases were selected due to the availability of extensive peer-reviewed studies on AI, educational technology and curriculum development.

The Boolean operator literature search strategy (AND, OR) was employed to achieve specificity and breadth. Core search strings included ("artificial intelligence" OR "AI") AND ("educational assessment" OR "assessment as learning" OR

"pedagogy") AND ("higher education") AND ("South Africa"). The search was limited to peer-reviewed journal articles, conference papers and official policy documents published between January 2020 and July 2026. The PRISMA flow diagram is illustrated in Figure 1.

Inclusion and Exclusion Criteria

A rigorous inclusion and exclusion criteria was applied during the literature selection process in order to use empirical studies most suitable for fulfilling the study's research questions. Studies selected were restricted to peer-reviewed journal articles, conference papers and official policy documents published between January 2020 and July 2026. Relying on studies from 2020 onwards ensured that all studies reflected recent and updated empirical knowledge on the integration of AI in educational assessment.

The review primarily included studies conducted in South African higher education context, with a limited number of school-based studies retained only where they provided contextual insights. All articles that were non-peer-reviewed, unrelated to assessment, or purely technical AI studies without a focus on education and assessment were excluded.

Data Extraction

Relevant information on study aims, AI tools examined, assessment domains addressed, key findings and reported limitations was extracted systematically from each included source. Consequently, a formal risk-of-bias or quality-appraisal instrument was not applied to the individual included studies. Instead, methodological rigour was maintained through clearly defined inclusion and exclusion criteria, restriction to peer-reviewed sources and official policy documents and a transparent thematic synthesis process (25).

The decision not to conduct a formal critical appraisal of each study is consistent with the interpretive and thematic nature of the review, which prioritises the identification of patterns, conceptual insights and context-specific implications for curriculum practice rather than quantitative synthesis or hierarchical ranking of evidence quality. The inclusion criteria themselves served as the primary mechanism for ensuring the relevance and scholarly credibility of the sources retained for analysis.

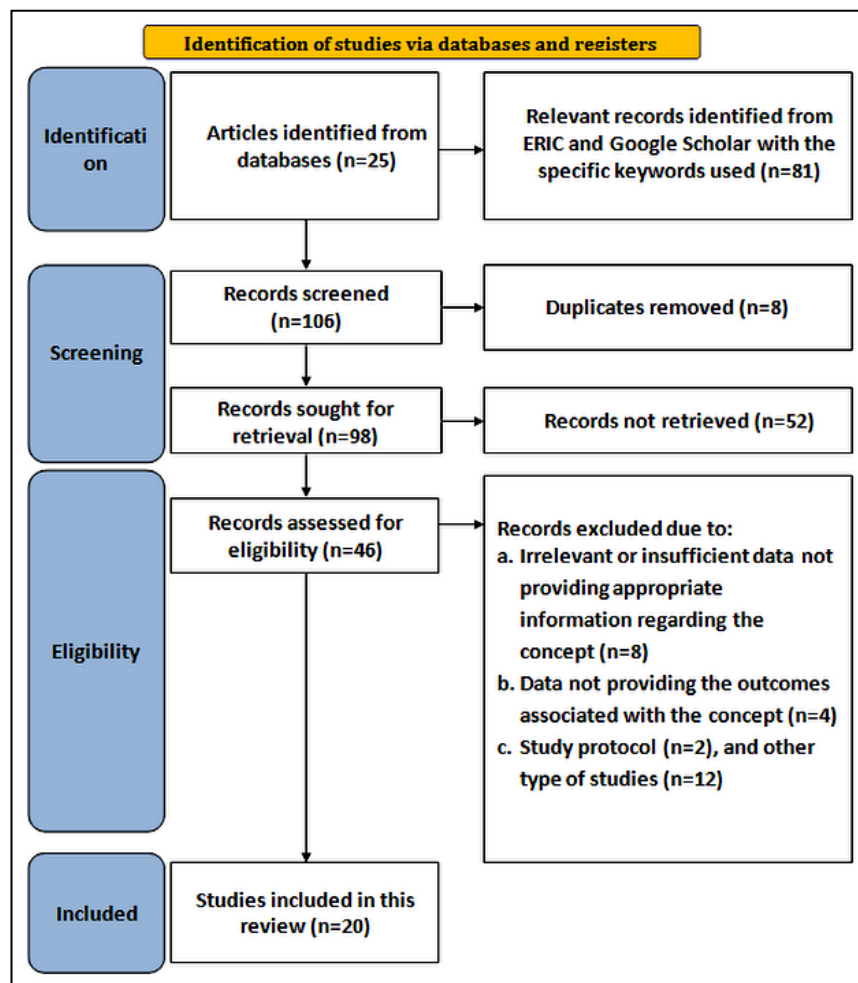


Figure 1: Search Strategy

Results

A six-phase framework of thematic analysis was adopted for analysing the data from empirical studies (25). This approach enabled the study to identify major patterns, such as ethical concerns, personalised learning and teacher readiness across the literature. The themes that emerged from the data were mapped against the theoretical framework of the study, ensuring that findings were firmly grounded in pedagogical and content-specific realities. The search strategy for the data is presented in Figure 1.

The Paradigm Shift in Educational Assessment in the South African Context

Findings from the data acknowledge the current growth and impact of AI and the transition that most institutions are facing as they integrate AI into educational assessments. This integration process as noted, is taking place concurrently with other notable events such as the call for

decolonization, historical redress for past wrongs and the AI revolution (6). There is evidence that the South African higher education system has witnessed a lot of issues such as underfunding, systemic inequalities and insufficient academic staff, all of which have created a mechanistic learning environment and the promotion of standardized assessments over inclusive pedagogical practices (26). The emergence of AI in educational contexts specifically the utilization of AI tools (machine learning algorithms, intelligent tutoring systems and generative large language models) promises a transformative agenda. Viewed through the theoretical lens of Constructivism, the current innovation ensures that assessments are not merely evaluative (Assessment of Learning) but serve as dynamic drivers of pedagogy (Assessment as Learning) (23).

Furthermore, recent South African studies are demonstrating how AI systems act as constructivist scaffolding. For instance, higher

education institutions are moving away from AI-Proofing assessment models and reframing assessments in a way that better aligns with authentic learning, critical thinking and ethical engagement (27). For example, a symposium jointly convened by the Centre for Innovation in Learning and Teaching (CILT), University of Cape Town's (UCT) and Centre for Teaching and Learning, Stellenbosch University's (SU) focused on "Assessment in the Age of AI." Educators highlighted the need for educational systems to move away from strict surveillance and control and move towards policies built on trust which promote student agency and deepen disciplinary knowledge. The non-integration of AI in assessments in South Africa is near impossible, hence any integration process must demand a critical, context-sensitive approach that empowers students to exercise active knowledge construction and self-regulation during complex assessment tasks (28).

Transforming Assessment for, of and as Learning

Current studies within South Africa demonstrate that the integration of AI in educational assessments is profoundly disrupting traditional approaches across three domains including Assessment of Learning (AoL), Assessment for Learning (AfL) and Assessment as Learning (AaL) (26, 28). These changes demand that traditional standardized assessment systems should change their focus from standardized metric compliance to methodologies that are inclusive and transformative. A practical example is the Honours-level assessments at the University of South Africa which are constructivist in nature due to their transformative integration of AI (29, 30). These systems are currently beneficial to Assessment of Learning (AoL), providing advanced efficiency with automated grading, detection of plagiarism and predictive analytics. However, while applying Foucault's concept of biopower, scholars observe that AI's integration in South African higher education institutions could exert a disciplinary force over students leading to penalization of indigenous knowledge expressions and marginalized linguistic backgrounds. Hence, they emphasize that such AI systems should be rigorously audited for bias (29).

While studies have highlighted the constructivist potential of AI integration in assessments,

achieving this potential is dependent on educator readiness, bringing the TPACK framework to the fore. For instance, while examining the patterns of AI usage among students at Tshwane University of Technology (TUT), researchers highlight the urgent need for educators to design assessments that emphasize critical engagement rather than regurgitation (31). An application of the TPACK model to these findings reveals that the successful integration of AI in South Africa is not simply a matter of Technological Knowledge (TK), it requires educators to intentionally align AI capabilities with sound assessment methodologies (Pedagogical Knowledge) and contextualized curriculum goals (Content Knowledge). A positive aspect from the study worth noting is the easy accessibility of AI tools in Assessment for Learning (AfL), which holds promise for democratizing personalized education in resource-constrained environments (31).

Furthermore, a previous study highlights how AI integration in educational contexts is redefining Assessment as Learning (AaL) by positioning learners as active co-regulators of their own cognitive development (23). Similarly, another study highlights how generative AI empowers learners in higher education to interrogate concepts, refine academic writing and generate responses that are contextually resonant (31). Studies also indicate that the intentional integration of AI strategies into assessment for learners at the Honours and postgraduate levels encourages them to transcend rote memorization to foster metacognitive awareness and complex problem-solving skills (29). Through this process, scaffolding through the integration of AI enables students to maintain their agency and voice as they grow.

Opportunities for Curriculum Practice and Pedagogical Innovation

Studies within South Africa show that the integration of AI in educational assessment introduces unprecedented opportunities for innovation and the mitigation of systemic educational bottlenecks in the curriculum. For instance, previous research demonstrates how some universities can utilise AI-driven Learning Analytics (LA) in synthesising disparate student engagement metrics into actionable, predictive insights (32). LA platforms are evolving from descriptive platforms to predictive and

prescriptive ecosystems. These ecosystems can synthesise disparate metrics from students' engagement into actionable insights, thereby allowing higher institutions of learning to deploy early warning systems and recommend timely interventions (32). Furthermore, another research highlights the opportunities offered by AI in alleviating severe burdens such as marking and administrative tasks. For instance, it is becoming possible for teachers to shed some of their workload through the implementation of automated formative feedback and rubric design systems (28). All these innovations enable educators to reclaim significant time which is channelled towards instructional activities and the role of the educator shifts from being a mere assessor to a facilitator of deep inquiry-based learning (1). These innovations enable a student-centred learning environment which promotes individualized student support and empathetic mentorship.

Systemic Challenges as a Result of AI Integration: The Digital Divide, Epistemic Violence and Ethical Governance

Although there are transformative results about the integration of AI in educational assessments, there remain some systemic challenges that need to be addressed for this integration to be sustainable and to achieve long-term positive impact. One of the challenges that arise is the stark dichotomy among institutions of higher learning where some possess the financial and infrastructural capital to establish dedicated AI research hubs, while others lack resources, grappling with basic internet connectivity, inadequate hardware and a stable source of electricity (6). This great digital divide disadvantages some learners and raises issues of unequal access to AI digital tools. Scholars emphasise that the successful integration of AI tools depends on the State's deliberate, equity-driven interventions and infrastructural investments to avoid widening existing educational disparities (7).

Secondly, the issues of epistemic violence and digital colonialism are challenges that affect the successful integration of AI tools in educational assessments. Studies show that the prominent LLMs and AI algorithms and datasets that are currently used in the South African context have

been developed in the Global North (33). Therefore, these raise concerns regarding cultural and linguistic biases and AI tools that lack context-specific information. Scholars have addressed this important gap by calling for the development and deployment of Afrocentric AI models that reflect the cultural reality of the South African context and models that promote epistemic justice (29). Furthermore, the over-utilisation of AI tools for output has led to concerns of academic integrity, which creates cognitive dependence among students and hinders intellectual and cognitive growth (31,32).

Implications for Curriculum Implementation: TPACK and Human-centric AI

The TPACK framework used in this study offers a profound lens in examining the competencies of educators in achieving a successful and effective integration of AI in educational assessment. The examined studies repeatedly echo that the availability of AI platforms is not enough; there is further need for educators to possess critical pedagogical knowledge, enabling them to seamlessly embed AI tools into subject-specific assessment methodologies, while avoiding total cognitive dependency on AI tools by learners. Also, a previous investigation highlights the uptake of AI systems in educational contexts and the concern raised by many educators who feel unprepared in navigating the ethical and pedagogical complexities of AI. The study highlights the urgent need for targeted, continuous professional development moving beyond basic digital literacy toward critical AI pedagogy (34). Similarly, the need for teacher education programs which empower pre-service teachers in integrating digital tools and AI into mathematics and STEM instruction was highlighted (35).

Secondly, the integration of AI in educational assessment requires a human-centric philosophy which denounces subjugation and upholds social justice. Moreover, a previous investigation advocates for AI models and systems which are grounded in the African philosophy which ensures that AI algorithms used in assessments foster human dignity, interconnectedness and equitable intellectual development (33, 36). The study further discourages AI systems that promote traditional colonial practices and biases (33, 36). Therefore, any AI integration attempt must be

deliberate in being culturally responsive, promoting inclusive education, empowering marginalized learners and achieving sustainable curriculum transformation.

Discussion

The findings presented above indicate that South African Institutions of Higher Learning are already at the forefront of integrating AI in educational assessment within the continent. The studies indicate that Institutions of Higher Learning are finding ways to integrate AI in assessments rather than policing students on the use of AI. From a constructivist perspective, the "Assessment in the Age of AI" symposium by the University of Cape Town and Stellenbosch University supports moving away from surveillance approaches toward authentic, process-focused assessment tasks, which shifts the locus of control to the student, promoting learner agency and self-regulated learning. This orientation is consistent with international guidance, such as the Quality Assurance Agency (QAA) recommendations in the United Kingdom, which similarly urge institutions to redesign assessment models for the generative-AI era rather than relying primarily on detection and prohibition (37). A move away from the traditional, mechanistic mindset of classical take-home assignments enables educators to embrace Assessment as Learning (AaL), where AI serves as a collaborative tool for active knowledge construction rather than a threat to academic integrity.

One key theme from the findings concerns the dual nature of AI adoption in educational assessments. While some studies acknowledge AI as a catalyst for learning, other studies highlight risks such as digital colonialism and exclusion (28, 32, 33, 36). This duality is consistent with findings from a UK study, which reported that AI integration enhanced technical fluency and ethical reflection among undergraduates while simultaneously raising concerns about equitable access and academic integrity (38). However, the South African evidence reveals a sharper contextual discrepancy: the risks of epistemic exclusion and digital colonialism appear more pronounced because of the country's historical socioeconomic inequalities and the predominance of Global North-trained algorithms (6, 33, 36). Employing the TPACK framework in this dual context

emphasizes the insufficiency of applying mere Technological Knowledge (TK). Addressing this issue requires the deliberate alignment of AI tools with context-sensitive Pedagogical Knowledge (PK) and localized Content Knowledge (CK) so that the available technology serves South African students rather than alienating them.

Operational scalability is one of the most important arguments for the adoption and integration of AI systems in educational assessments within South African institutions. This finding aligns with the systematic review, which demonstrated that AI-enabled language assessment tools deliver timely and consistent automated scoring and feedback, thereby reducing educators' marking workload (39). However, while scalability is a positive development, there are concerns that such automated systems raise issues of mechanistic evaluation and algorithmic bias (39). These concerns are consistent with a previous investigation, who found that machine-learning grading tools often fail to recognise alternative student expressions and varied reasoning patterns (40). In the South African context, this discrepancy is particularly consequential because it risks undermining constructivist principles and the scaffolding needed for learners to navigate the Zone of Proximal Development, especially when indigenous knowledge expressions and multilingual practices are involved. Global systematic review studies indicate that generative AI tools are transforming higher education assessments, promoting both cognitive engagement among learners and operational efficiency among educators (41, 42). Hence, the careful integration of AI systems should be encouraged among institutions of Higher Learning in South Africa.

The decolonisation of current AI systems which were developed with datasets from the Global North is an area of concern due to issues of epistemic violence and digital colonialism (33, 36). The researchers advocate for AI models and systems grounded in the African philosophy of Ubuntu (33, 36). These calls are consistent with broader African scholarship, who argues that the uncritical importation of uncontextualised AI frameworks deepens inequalities and threatens educational sovereignty (9). A clear discrepancy therefore exists between the global proliferation of large language models trained predominantly on

Global North data and the contextual needs of South African higher education. Therefore, achieving genuine Assessment as Learning requires moving beyond theoretical critique to practical, Afrocentric AI design. One approach is the development of structural data sovereignty and localized algorithmic training which are Afrocentric. The South Africa National Artificial Intelligence Policy captures this by calling for national investment in the development of diverse datasets, including indigenous languages, arts and literature (9). A study states that there is progress in Human Language Technology (HLT) tools developed for indigenous languages such as isiZulu and Siswati. These Afrocentric innovations ensure that AI systems process local syntax and translanguaging practices, providing feedback that reflects cultural expression (43). Therefore, the intentional development of Afrocentric AI systems is important for achieving genuine Assessment as Learning and inclusive AI systems should reflect the continent's epistemological diversity.

A major finding of this study is that the integration of AI in educational assessments faces setbacks caused by the digital divide and unequal access to technology. The findings by a previous research highlight the stark dichotomy among institutions of higher learning where some possess the financial and infrastructural capacity to establish AI research hubs, while others lack resources, including internet connectivity, hardware and stable electricity (6). This pattern is consistent with the broader African literature: while countries such as Kenya, Rwanda and Côte d'Ivoire have made measurable progress through state-supported AI education initiatives, South Africa continues to experience pronounced intra-system inequalities that risk widening existing educational disparities (7, 9). Previous research emphasizes that successful integration of AI tools in South Africa depends on state-led, equity-driven investment in infrastructure to avoid widening existing disparities. The Draft South Africa National Artificial Intelligence Policy highlights interventions for AI integration, but these can only be achieved when supported by strong implementation and funding mechanisms (7).

Finally, the TPACK framework adopted by this study is timely and important as it addresses the deficit in educator readiness in adopting AI systems. A study highlights the AI-knowledge gap

among educators in South Africa and recommends that education programs which empower pre-service teachers to integrate digital tools and AI into mathematics and Science, Technology, Engineering and Mathematics (STEM) instruction should be promoted (35). These findings are consistent with research from Kenya, which similarly reported limited AI training for in-service teachers and the absence of systematic AI integration in teacher education programmes (44). The cross-national consistency of this readiness gap suggests that the challenge is not unique to South Africa but is particularly acute in resource-constrained higher education systems where continuous professional development pathways remain underdeveloped. The successful adoption and integration of AI systems in educational assessments demands that educators be equipped with strong pedagogical knowledge to interpret AI outputs and design prompts that encourage critical inquiry among learners (44). Scholars are advocating for continuous professional development to enable educators to move from basic digital literacy to critical AI pedagogy (45). A successful integration of AI in South African educational systems does not depend on the availability of sophisticated AI tools, but on the capacity of educators and institutions to use these systems with equity and digital ethical awareness.

Conclusion

This literature review synthesised evidence on AI integration into educational assessment in South African higher education (2020–2026), guided by the intelligent TPACK framework and constructivist theory. The findings reveal a persistent implementation gap: while generative models, intelligent tutoring systems and learning analytics can reduce educator workload, support personalised pathways and enable predictive interventions across assessment for, of and as learning, awareness of these tools has not consistently translated into pedagogically coherent design. Without deliberate attention to equity, cultural relevance and educator capacity, AI risks deepening the digital divide, embedding Global North biases and fostering cognitive dependency. The study's main contribution is to link AI-enabled assessment explicitly to curriculum practice and decolonisation, showing that technological knowledge alone is insufficient and that authentic,

agency-preserving assessment requires integrated pedagogical and content knowledge alongside human-centred, Ubuntu-informed approaches.

Several limitations must be noted: the review drew only on peer-reviewed and policy sources up to mid-2026, did not apply formal risk-of-bias appraisal and offers qualitative rather than quantitative generalisation. Future research should examine actual classroom enactment and longitudinal learning outcomes, compare strategies across African higher-education systems, evaluate the sustained impact of professional development on TPACK and involve stakeholders in co-designing culturally responsive tools that accommodate indigenous languages and knowledge systems. Ultimately, successful integration depends less on technological sophistication than on equitable infrastructure, critical pedagogical capacity, ethical governance and a sustained commitment to human-centred learning principles.

Abbreviations

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Author Contributions

Tohida Cassim: Conceptualization, Study Design, Material Preparation, Data Collection, Testing and Analysis, Manuscript Preparation, Subsequent Revisions, Chatradari Devroop: Conceptualization, Study Design, Supervision, Validation. All the authors have read and approved the final manuscript.

Conflict of Interest

The authors declare that there are no conflicts of interest.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. All sources analysed are publicly available peer-reviewed publications and policy documents cited in the reference list.

Declaration of Artificial Intelligence (AI) Assistance

The authors acknowledge the use of generative AI to assist in the paraphrasing of certain parts of the manuscript. All content generated through AI was

critically reviewed, edited and verified by the authors to ensure accuracy, originality and compliance with academic standards. The authors take full responsibility for the integrity and validity of the manuscript.

Ethics Approval

This study does not involve human participants, animals, or personal data and therefore does not require ethical approval.

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