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Artificial Intelligence in Online Assessment: A Review of Pedagogy, Support and Millennial Retention in Higher Education

Keywords:
Artificial Intelligence, Millennial academics, Institutional support, Higher education, pedagogy

Abstract

Artificial Intelligence (AI) now emerges as an engine in education, with online assessments feeling its most immediate reverberations. This systematic literature review examines the connection between AI tools and the dynamics of the labour market, focusing on scholars in Higher Education Institutions (HEIs). Anchored in Herzberg's Two-Factor Theory, the review interrogates how AI-powered assessment platforms shape institutional support, retention tactics, and pedagogical practice. As Gen X declines in the labour market, millennials digital natives seeking innovative and supportive environments have become the prevailing cohort on campuses, pushing universities to rethink assessment practices. AI promises scalable, personalized, and streamlined feedback solutions, yet its rollout raises concerns about staff workload, institutional culture, and digital readiness.

To investigate these tensions, the study applied the PRISMA model. A total of 1267 records were retrieved, with 477 duplicates excluded. 790 titles and abstracts were screened, of which 412 were excluded for irrelevance. 378 full-text articles were assessed, and 292 were excluded for insufficient methodological rigor or lack of AI assessment focus. Finally, 86 studies were retained for synthesis. The review connects retention, institutional backing, and generational transitions to the growing use of AI in assessment. Findings show that AI can lift achievement and reduce administrative burdens, but its promise depends on alignment with millennial values and strong institutional endorsement. This study enhances understanding of how AI can sharpen assessment methods while supporting talent retention. In closing, the paper outlines take-aways for HEIs, acknowledges limitations, and offers directions for future research into AI's pedagogical and workforce repercussions.

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1. Introduction

HEIs now use AI to transform their online assessment systems (Govender & Rajkoomar, 2021; George & Wooden, 2023). The digital transformation process has forced HEIs to use AI tools for grading automation, personalized feedback delivery, and academic integrity protection (Katsamakas, et al., 2024; Chardonnens, 2025; Merino-Campos, 2025). The academic workforce now include millennials born between 1980 and 2000 (Butler, Sutton, Mockaitis & Zander, 2020; Ngotngamwong 2020a; Zarwi, Marchand, Kennard & Michael, 2023). This generational transition represents a fundamental transformation in educational practices, bringing new technological approaches to knowledge delivery and assessment methods (Akour & Alenezi, 2022; Guàrdia et al, 2021; Mohamed Hashim, et al., 2022; Oliveira & De Souza, 2022; Miller, 2023; Ajani et al., 2024; Camilleri & Spiteri, 2021).

The technological skills of millennials, along with their ability to multitask and their need for meaningful work, make them ideal users of AI-based educational systems (Gabrielova & Buchko 2021; Tan et al. 2024; Böhmer, Musch, Schubert & Schmidt, 2023; Demaj & Alushllari, 2023). Their learning preferences match AI capabilities because these systems enable customized learning paths, automated administrative work, and data-based academic choice support (Ilić et al., 2021; Alenezi, 2024; Mishra, 2025; Flogie et al., 2025; Ndofirepi, 2025). Successful integration of AI systems with millennial strengths requires purposeful design and institutional readiness (Abulibdeh et al, 2025; Draghici et al., 2024; Langat, 2025).

HEIs face growing difficulties in retaining millennial teaching staff as Generation X members leave the workforce (Bone 2021; Chan & Lee, 2023; Mantha & Krishna, 2024). The retirement of experienced faculty creates both a leadership gap and opportunities for new positions aligned with digital competencies (Colombari & Neirotti, 2022; Rubarth et al., 2023; Yuen & Schlote, 2024; Sirca et al, 2025). Institutions need flexible work arrangements, professional growth opportunities, and recognition systems to stop employee departures (Mwando et al, 2021; Atiku & Ganiyu, 2022). AI systems help academic staff by decreasing administrative work, enabling focus on research, teaching, and curriculum development (Rosenbusch, 2020; Oluwatoyin, 2024). The implementation of AI requires institutions to establish support structures aligned with organizational goals (ChaaCha & Oosthuysen, 2023; Huning et al., 2020; Lee, 2023). Without proper alignment, AI creates stress instead of empowerment (Sebele-Mpofu, 2020; Zulfikasari et al, 2024). Job satisfaction and retention depend on supportive environments fostering positive work cultures (Sishuwa & Phiri, 2020; Tan et al., 2024).

Research shows staff satisfaction increases with mentorship, inclusive leadership, and fair task distribution (Barnes et al., 2021; Gbobaniyi et al., 2023; Ng & Salamzadeh, 2020). AI tools require supportive frameworks to prevent negative impacts while building trust and collaboration (Willie, 2024; Zarwi et al., 2023). Financial constraints, heavy workloads, and insufficient resources challenge the academic environment (Sharma, 2020; Ng & Salamzadeh, 2020; Acheampong, 2021). AI systems will not produce desired results if institutions fail to address these problems (Abulibdeh et al., 2025; Katsamakas et al., 2024; George & Wooden, 2023). Inconsistent implementation arises when staff lack training and infrastructure remains insufficient, worsening inequalities (Akour & Alenezi, 2022; Ilić et al., 2021; Madikizela-Madiya, 2021). Adoption requires strategies including funding, resource distribution, and policy development (Gbobaniyi et al., 2023; Miller, 2023; Mishra, 2025; Department of Higher Education and Training, 2023). Herzberg's Two-Factor Theory helps explain AI's dual role as motivator and hygiene factor (Hoque et al., 2021; Ibrahim et al., 2023). Innovation opportunities and advancement prospects motivate satisfaction (Hoque et al., 2021; Huning et al., 2020). Workload management and compensation issues must be addressed to prevent dissatisfaction (Hoque & Tshutsha, 2022; Huning et al., 2020). Herzberg's framework shows organizations need both advanced technology and proper staff care (Ibrahim et al., 2023; Hoque & Tshutsha, 2022).

The research combines data on millennial retention, institutional backing, and AI implementation to present a complete picture of online assessment challenges and possibilities. It examines technological progress

through the lens of workforce expectations, combining educational science, organizational management, and technology to understand how to sustain academic staff in HEIs. Millennial academics are emerging quickly while HEIs face urgent digital transformation needs (Coolsaet, 2024; Marozva et al., 2024). The sector encounters obstacles from limited resources, conflicting policies, and socioeconomic inequalities (Department of Higher Education and Training, 2023; Davidescu et al., 2020). At the same time, opportunities exist for creative development and social progress (Dede et al., 2005; Guàrdia et al., 2021). The research investigates AI's effects on staff sustainability and assessment methods to inform better policies and practices (Abulibdeh et al., 2025; George & Wooden, 2023; Gbobaniyi et al., 2023). It fills a knowledge gap on AI's impact while offering recommendations for resilience and excellence (Akour & Alenezi, 2022; Alenezi, 2024; Chan & Lee, 2023; Colombari & Neirotti, 2022).

Methodology

The research design of this systematic literature review used a structured method to find and assess and combine existing studies about AI effects on online assessments in HEIs. The review examined peer-reviewed articles together with institutional reports and theoretical frameworks which appeared between 2020 and 2025. The research studies needed to demonstrate how AI affects assessment processes and how it impacts student retention and institutional backing and workforce management of different generations. The systematic literature review process followed the PRISMA model to ensure transparency and reproducibility.

Search Strategy

ACM digital library, AIS eLibrary (AISeL), Ebscohost, IEEE Xplore digital library, JSTOR, Proquest (ABI/INFORM collection), ScienceDirect and Scopus databases. The search used specific terms which combined "artificial intelligence" with "online assessment" and "higher education" and "millennial academics" and "institutional support" and "retention." The research team used Boolean operators together with filters to achieve better results that matched their research goals. Filters applied with publication years (2020–2025), English language, peer-reviewed status. Refinement was done through iterative screening ensured relevance to AI in assessment and institutional/HR contexts. Duplicate records were removed prior to screening.

Inclusion Criteria

- Studies published between 2020–2025.
- Peer-reviewed journal articles, institutional reports, or theoretical frameworks.
- Explicit focus on AI in higher education assessment, retention, institutional support, or workforce generational dynamics.
- Empirical or conceptual studies applying frameworks such as Herzberg's Two-Factor Theory, leadership models, or institutional transformation strategies.
- Studies with clear methodological descriptions and ethical approval.

Exclusion Criteria

- Studies outside the 2020–2025 timeframe.
- Non–peer-reviewed sources such as book chapters, conference proceedings, dissertations.
- Studies not focused on higher education or lacking explicit AI assessment relevance.
- Publications in languages other than English.
- Low-quality studies failing Critical Appraisal Skills Programme (CASP) checklist appraisal.

Screening and Eligibility

- Identification: 1267 records retrieved, 477 duplicated records were excluded.
- Screening: 790 titles and abstracts reviewed; 412 excluded for irrelevance.
- Eligibility: 378 full-text articles assessed; 292 excluded for insufficient methodological rigor or lack of AI assessment focus.
- Inclusion: 86 studies retained for synthesis.

Data Extraction and Synthesis

- Extracted data included study background, research design, theoretical framework, and findings.
- Thematic synthesis applied coding and categorization to identify recurring patterns.

Four dominant themes emerged:

  - AI-based assessment systems including transformative force, ethical concerns, leadership adaptation.
  - Retention and generational workforce management including millennial academics, institutional support.
  - Strategic planning and institutional culture including governance, inclusivity, workplace transformation.
  - Infrastructure and wellness including readiness, ethics, monitoring, digital wellness.

- Cross-referencing confirmed consistency and highlighted gaps, contradictions, and emerging trends.

Data Coding Process

To ensure study reproducibility, a structured coding process was applied:

- Researchers with expertise in AI and higher education independently coded the data.
- Coding was conducted manually and supported by NVivo software to manage qualitative data and facilitate thematic clustering.
- A hybrid approach was used. Deductive coding drew on established frameworks of Herzberg's Two-Factor Theory, while inductive coding allowed novel insights to emerge directly from the data.
- Reliability was assessed, yielding a score of 0.82 (strong agreement). Discrepancies were resolved through discussion until consensus was reached.

Quality Assessment

- The CASP checklist was applied to evaluate methodological strength, relevance, and contribution to the research question.
- Studies failing CASP standards were excluded to preserve integrity.
- Ethical standards were maintained: only publicly accessible studies with ethical approval were included. No human participants or primary data collection were required.

Following the removal of 477 duplicated articles from the original 1267 records, the researchers evaluated the remaining 790 articles for relevance by reviewing the titles, keywords, and abstracts. 412 of these papers were excluded not relevant to "cryptocurrency", "Fouth industrial revolution" and "Fouth industrial revolution". With further 378 irrelevant articles were excluded, Therefore, 86 articles were chosen for a final review pool based on their relevance to the study question. Below is figure 1 outlining the analysis of the study.

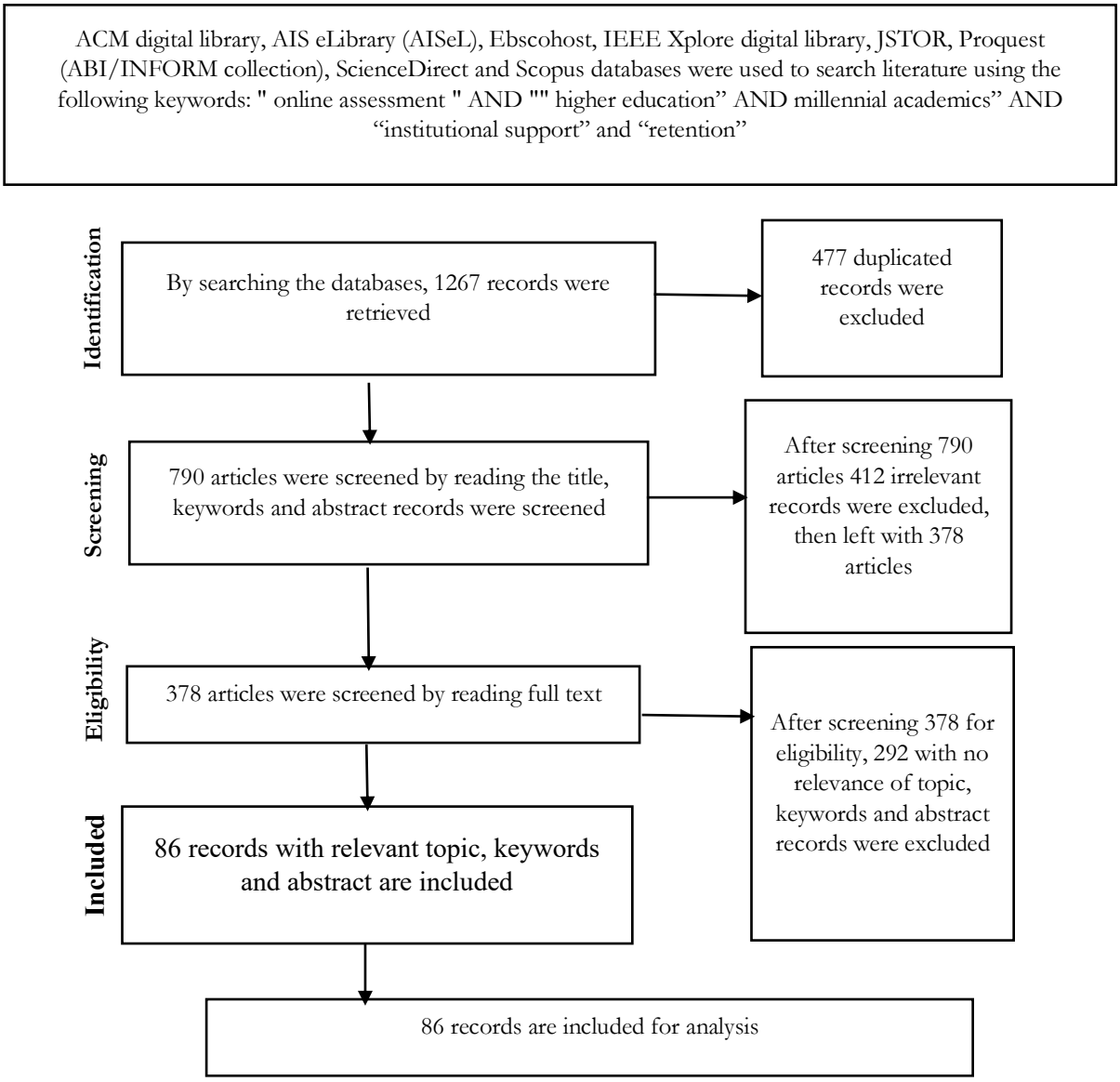

Figure 1: Literature identification diagram (source: Authors own construction)

Table 1: PRISMA records are included for analysis (source: Authors own construction)

No.	Article descriptions	Year
1	A Scoping Review of the Strategic Integration of Artificial Intelligence in Higher Education.	2025
2	Reward preferences of the youngest generation. Compensation & Benefits Review	2021
3	The pillars of trustworthiness in qualitative research.	2024
4	Modelling the link between developmental HR practices and work engagement.	2020
5	Impact of ChatGPT and generative AI on lifelong learning.	2024
6	Future of higher education through technology prediction.	2024
7	E-Portfolios in South African Higher Education.	2025
8	Higher education future in the era of digital transformation.	2025
9	The effect of emotional intelligence on higher education.	2024
10	Herzberg's two-factor theory in Omani hospitals.	2020

11	Flexible work options in higher education.	2022
12	A tale of two generations.	2024
13	Career management challenges of academics.	2021
14	Testing Herzberg's two factor theory on millennials.	2022
15	Machine Learning in collaborative learning.	2023
16	Cruel optimism and precarious employment.	2021
17	Conceptual and design thinking for thematic analysis.	2022
18	Millennial global leaders.	2020
19	Work-life balance and career mobility.	2021
20	Academic employees in dynamic South African HE.	2023
21	Qualitative research in dentistry.	2021
22	Gamification in education: A systematic review.	2023
23	The AI generation gap.	2023
24	Adapting educational practices for Gen Z.	2025
25	Closing the middle-skills gap.	2022
26	Technological advancements and Generation Alpha.	2024
27	Saturation controversy in qualitative research: Complexities and underlying assumptions.	2020
28	Virtual Collaborative Learning in Albania.	2023
29	Department of Higher Education and Training.	2023
30	Work flexibility and job satisfaction in Romania.	2020
31	Supporting the Ethical Use of Artificial Intelligence Applications in Universities.	2024
32	Transferability and generalization in qualitative research.	2025
33	Application of Guba and Lincoln's parallel criteria to assess trustworthiness.	2023
34	Humanizing UX design strategies with AR, VR, MR, Zoom, Ally and AI.	2020
35	Attitudes of engineering teachers towards humanoid robots	2025
36	Here comes Generation Z: Millennials as managers.	2021
37	Inclusive leadership and academic loyalty in HE.	2023
38	Managing strategic transformation of HE through AI.	2023
39	A multimodal model for learning, teaching and assessment in HE. In COVID-19	2021
40	IDEAS for transforming higher education.	2021
41	A simple method to assess thematic saturation.	2020
42	Implementation of Virtual Mobility and Internationalization at Home in Albania's Higher Education: A Catalogue of Recommendations for Action.	2023
43	Servant leadership, support, job satisfaction and turnover intentions.	2020
44	AI for assessment and feedback in HE.	2022
45	Job satisfaction in agribusiness: Herzberg's theory.	2021
46	Attraction and retention of academic employees.	2022
47	Motivation for learning using Herzberg's theory.	2023
48	Data analysis: types, process, methods.	2020
49	Justification for adopting qualitative research method.	2022
50	Emergence of wisdom research in HE.	2023
51	Criteria for trustworthiness in qualitative research.	2023
52	AI and transformation of HE institutions.	2024
53	University teachers' views on generative AI tools.	2024
54	AI-driven lifelong learning in Peru.	2025
55	Transition from analogue to digital technology in Kenya.	2025
56	AI-enabled evaluation in large-scale online courses.	2023
57	AI, ML, and XR in HE.	2021
58	Academic employers of choice.	2025
59	Learning preferences and motivational factors across generations.	2024
60	Building He Institutional Qa System and Qa Offices	2025
61	Factors affecting the retention of millennial academics.	2024

62	The impact of artificial intelligence on personalized learning in higher education	2025
63	Shifting Dynamics: Who Holds the Reins in Decision-Making with AI Tools?	2025
64	Impact of Herzberg two-factor theory on teachers' job satisfaction.	2022
65	Embracing the technological metamorphosis	2023
66	Revolutionizing education with AI and ML.	2025
67	Expansion of higher education in South Africa: Problems and possibilities.	2021
68	Higher education strategy in digital transformation.	2022
69	Conceptualizing Governance Issues in Higher Education.	2024
70	Academic talent: Perceived challenges to talent management in South African HE.	2021
71	Flexible working arrangements in HE.	2021
72	Application of sampling methods for research design.	2020
73	Deep Learning-Based AI Tools in Education: Perceptions of Gen-Z and Millennials.	2024
74	Ethical leadership and intention to stay among Gen-Y workforce.	2020
75	Artificial Intelligence and Its Impacts on Employability.	2020
76	Millennial Job Satisfaction and Retention.	2020
77	Digital transformation towards education 4.0.	2022
78	Leveraging IT for organisational learning and KM.	2024
79	Herzberg's motivation theory in workplace.	2022
80	Higher Education Dropout in Slovenia.	2025
81	Massification at universities in South Africa.	2020
82	Digital revolution in HE.	2023
83	Herzberg's two factor theory: Nurses' motivation.	2021
84	Artificial Intelligence in HE Business Area.	2025
85	Technology intervention: rethinking faculty in digital environment.	2020
86	Virtual Mobility and Internationalization at Home in Albania.	2023

2. Literature Review : AI Integration and Transformation in Higher Education

This section synthesizes contemporary scholarship on the role of AI in reshaping HEIs, with particular emphasis on online assessment systems, institutional transformation, and workforce dynamics. Drawing on studies published between 2020 and 2025, the literature highlights AI as both a technological innovation and a strategic enabler of change. These themes illustrate how AI is simultaneously a driver of operational efficiency, a catalyst for pedagogical innovation, and a challenge requiring ethical, cultural, and strategic responses.

AI as a Transformative Force in Online Assessment Operations

HEIs now recognize AI as a significant transformative force in online assessment operations (Abulibdeh et al., 2025). Tools such as automated grading, adaptive testing, and real-time feedback have replaced traditional methods, offering scalable solutions for overcrowded classrooms and limited academic resources (Akour & Alenezi, 2022; Ajani, Msimango & Mtshali, 2024). AI enables immediate feedback, identifies learning deficits, and delivers personalized instruction suited to diverse digital learning environments (Alenezi, 2024; Camilleri & Spiteri, 2021; Hooda et al., 2022).

AI-Based Assessment Systems and Educational Practice Transformation

AI-based systems support continuous formative assessment, reduce grading errors, and assist curriculum development through data analysis (George & Wooden, 2023). They handle large student volumes efficiently, eliminating manual grading inconsistencies (Davidescu et al., 2020). By automating administrative tasks, AI allows educators to focus on core teaching responsibilities (Chan & Lee, 2023). Recent studies highlight broader applications of AI and digital technologies in higher education. Research emphasizes

ethical use and sustainable development in AI adoption (Asad & Ajaz, 2024; MakeLearn 2024), the role of humanoid robots in teaching (Flogie, Škrobar & Zemljak, 2025), and leveraging information technologies to enhance access and educational outcomes for rural students (Oluwatoyin, 2024). Other investigations examine dropout trends in Slovenia (Pezdir, 2023), the implementation of virtual mobility and internationalization strategies in Albania (Fisher and Baird, 2020; Rubarth et al., 2023), and the development of institutional QA systems in Kosovo and Albania (Sirca, Halili, Bexheti & Shala, 2025).

Millennial Academics and AI-Driven Assessment Systems

Millennial academics prefer digital fluency, efficiency, and autonomy, aligning well with AI-driven systems (Gabrielova & Buchko, 2021; Ajani, Msimango & Mtshali, 2024). Their emphasis on teamwork and work-life balance supports the use of AI to enhance academic operations and student engagement (Davidescu et al., 2020; Camilleri & Spiteri, 2021). Research further shows that ethical use of AI in universities and collaborative learning environments strengthens institutional practices (Draghici, Luminosu, Repanovici, Koukourakis, Dermol & Taucean, 2024; Rubarth, Aschenbrenner, Salhi & Altmann, 2023).

Millennials' innovative mindset and adaptability align with AI's potential to transform higher education, including applications such as humanoid robots in teaching (Waleed et al., 2023; Nair, 2024; Flogie, Škrobar & Zemljak, 2025), leveraging information technologies for rural student access (Oluwatoyin, 2024), and addressing dropout challenges in Slovenia (Pezdir, 2023; Lara-Navarra et al., 2025). Institutional reforms, such as QA system development in Kosovo and Albania (Sirca, Halili, Bexheti & Shala, 2025), and blended learning engagement during the COVID-19 recovery phase (Ndofirepi, 2025), further demonstrate the breadth of AI's impact.

Strategic Planning and Institutional Evaluation for AI Implementation

Effective AI implementation requires strategic planning, institutional support, and contextual adaptation (Abulibdeh et al., 2025). HEIs must assess integration across social, cultural, technological, and policy dimensions (Colombari & Neirotti, 2022). Without governance, ethics, and inclusive design, AI may worsen inequalities (George & Wooden, 2023). Successful deployment depends on stakeholder involvement, staff development, and continuous evaluation (Akour & Alenezi, 2022).

Retention of Millennial Academic Staff Through AI Support

HEIs must retain millennial academics who seek flexibility, career growth, and recognition (Gabrielova & Buchko, 2021; Davidescu et al., 2020). Institutions failing to meet these needs risk high turnover and reduced innovation (Colombari & Neirotti, 2022). AI supports retention by reducing administrative burdens and generating performance data for advancement (Alrawahi et al., 2020; Alenezi, 2024).

Human-Centered Design and Institutional Support for AI Tools

AI benefits materialize when institutions apply human-centered design and allocate sufficient resources (ChaaCha & Oosthuysen, 2023). Systems must be transparent, accessible, and aligned with academic values (Gbobaniyi et al., 2023). Training, digital literacy, and feedback mechanisms empower staff to shape AI development (Abulibdeh et al., 2025). Without support, faculty may resist AI as a top-down imposition (George & Wooden, 2023).

Infrastructure Readiness and Digital Competence for AI Deployment

AI deployment depends on infrastructure readiness and staff digital competence (Mohamed Hashim et al., 2022). Millennials often lead digital efforts, while older staff require targeted training (Musakuro & De Klerk, 2021). Institutions must invest in stable networks, secure data systems, and compatible platforms, alongside continuous training (Rosenbusch, 2020; Gbobaniyi et al., 2023). Poor planning leads to technical issues and

unclear guidelines (Mwando et al., 2021). Unequal training and resource gaps create generational divides and institutional fragmentation (Tan et al., 2024). Inclusive transformation requires tailored solutions for all academic groups (Sishuwa & Phiri, 2020).

Institutional Culture and AI Integration Outcomes

Institutional culture shapes AI integration outcomes (Barnes et al., 2021). Academic success depends on mentorship, inclusive leadership, and open communication (ChaaCha & Oosthuysen, 2023). AI should enhance existing systems, not disrupt them (Rosenbusch, 2020). Trust-based environments and collaborative innovation maximize AI's benefits (Zarwi et al., 2023). Institutions must create spaces for experimentation and appoint ethical digital leaders to guide governance (Mohamed Hashim et al., 2022).

Human-Focused Transformation and Workplace Culture

Research shows that digital transformation requires human-focused methods which build trust and foster continuous improvement and teamwork (Sebele-Mpofu, 2020). The failure of institutions to develop supportive work cultures will drive their staff members away while simultaneously eliminating AI benefits (Smith, 2023). The way staff members perceive and adopt AI technology depends on their workplace culture (Zarwi et al., 2023). Staff members who experience value and support and empowerment at work will adopt AI technology as an enhancement tool instead of using it for surveillance or control purposes (Tan et al., 2024).

Urgency and Complexity in Higher Education AI Implementation

The higher education sector needs to implement AI technology with both urgency and complexity because of its specific requirements (Mohamed Hashim et al., 2022). The higher education sector faces distinct obstacles because it experiences fast student population expansion and needs to meet national development goals while dealing with insufficient support systems and limited infrastructure capacity (Marozva et al., 2024). The current situation demands AI adoption strategies which combine technological progress with workforce stability in a way that suits the local environment (Hoque & Tshutsha, 2022; Khlaif et al., 2024). HEIs need to handle technology access disparities and language differences and past discrimination while they work to improve their assessment methods (Pillay, 2020).

Context-Specific AI Solutions and Innovation Systems

HEIs need to implement AI through institutional plans which tackle both educational policy alignment and rural network expansion and industry-government partnership development (Mohamed Hashim et al., 2022). The development of context-specific AI solutions for higher education requires strengthening local innovation systems (Rosenbusch, 2020). The development of AI tools for higher education requires local innovation systems to create solutions that match the specific needs of institutions (Sishuwa & Phiri, 2020).

Structural Challenges and AI Capabilities in HEIs

AI systems help HEIs solve two major structural problems which include high student-to-staff ratios and inconsistent assessment methods (Mlambo et al., 2021). The combination of automated grading with adaptive feedback systems enables institutions to perform assessment tasks at scale while preserving both assessment quality and student response times (Pillay, 2020). The capabilities of AI systems prove essential for resource-limited institutions because they help academic staff who handle excessive workloads with insufficient support (Mwando et al., 2021). AI technology enables educational institutions to deliver personalized learning paths and multilingual feedback and accessibility features for students with diverse needs (Yawson & Yamoah, 2020; Mohamed Hashim et al., 2022).

Infrastructure, Ethics, and Monitoring for AI Success

The success of these systems requires institutions to build infrastructure and train staff while implementing ethical governance practices (Rosenbusch, 2020). Institutions need to create specific guidelines about data protection and algorithmic visibility and academic standards to prevent AI tool misuse (Gbobaniyi et al., 2023). The evaluation process needs ongoing monitoring to determine how AI affects student achievement and staff workload and institutional fairness (Sebele-Mpofu, 2020). The current economic situation together with rising expenses has made millennial academics more demanding of external rewards which now include better compensation and career advancement opportunities and public recognition (Acheampong, 2021). AI systems monitor research output and teaching performance and student participation to create evidence for academic advancement based on merit (Zarwi et al., 2023). The tools will maintain existing power structures instead of creating fairness and recognition when institutions lack clear policies and inclusive leadership (Musakuro & De Klerk, 2021; Pillay, 2020).

The use of AI data requires institutions to apply ethical interpretation methods which will help them support human decision-making instead of replacing it (Rosenbusch, 2020; Ngotngamwong, 2020; Merzifonluoglu, & Gunes, 2025). Recognition systems need to embrace diversity by acknowledging all types of academic work including community service and teaching and curriculum development (Mwando et al., 2021; Musakuro & De Klerk, 2021). AI technologies have transformed the way students learn through their impact on educational assessment systems and their influence on academic staff work (Oliveira & De Souza, 2022; Ngotngamwong, 2020). AI platforms use personalized learning paths and content adaptation and predictive analytics to help students who need help with their studies (Oliveira & De Souza, 2022). The system enables teachers to create early intervention plans which enhance student retention and academic achievement for big student bodies with diverse needs (Rosenbusch, 2020; Mwando et al., 2021).

AI tools enable students to develop self-regulation skills and academic confidence through their real-time feedback and learning support features (Oliveira & De Souza, 2022; Rosenbusch, 2020). AI assessment integration enables the development of competency-based education systems which represent the next stage of educational evolution (Oliveira & De Souza, 2022; Ngotngamwong, 2020). AI technology enables HEIs to connect their teaching methods with real-world job requirements, thus fulfilling national development targets and Industrial Revolution requirements for digital competencies and flexible work approaches (Mwando et al., 2021; Pillay, 2020; Ngotngamwong, 2020; Qolamani & Mohammed, 2023). The alignment between higher education and labour market requirements becomes essential because digital competencies and adaptability skills have become essential for national development (Tan et al., 2024; Musakuro & De Klerk, 2021; Ng & Salamzadeh, 2020).

Ethical Concerns in AI-Based Assessment Systems

The implementation of AI in assessment systems requires institutions to address multiple ethical concerns which affect assessment operations (Abulibdeh et al., 2025; Alenezi, 2024). Research studies now focus on three main concerns which involve algorithmic discrimination, data protection, and decision-making process transparency (Chan & Lee, 2023; Kakar et al., 2023; Ahmed, 2024). The absence of solutions for these problems will damage public trust in AI systems while threatening academic integrity standards (Colombari & Neirotti, 2022; Guest et al., 2020). The development of these frameworks requires collaboration between faculty members, students, and IT professionals to create AI systems which match institutional values and priorities (ChaaCha & Oosthuysen, 2023; Gbobaniyi et al., 2023; Aithal et al., 2024).

Mental Health and Digital Wellness in AI Integration

The implementation of AI systems in educational settings requires researchers to study how these systems affect the mental state of teaching personnel (Chan & Lee, 2023; ChaaCha & Oosthuysen, 2023). AI systems help reduce administrative work, but they create new types of stress because users need to monitor systems,

interpret data, and handle performance tracking (Rosenbusch, 2020; Colombari & Neirotti, 2022). The implementation of algorithmic standards in education creates pressure on teachers to match these standards while simultaneously causing them to doubt their professional expertise (Ilić et al., 2021; Katsamakas et al., 2024). Educational institutions need to create digital wellness programs which demonstrate AI support functions instead of using technology for monitoring purposes (Miller, 2023; Mishra, 2025). The institution should offer mental health services and teach digital skills while creating spaces for staff to discuss how technology affects their academic work (Barnes et al., 2021; Hoque & Tshutsha, 2022).

Leadership Transformation for AI Assessment Integration

Academic institutions need to transform their leadership structures and governance systems because AI assessment integration requires new approaches (Mohamed Hashim et al., 2022; Mthethwa, 2024). The current top-down organizational structure does not match the fast-paced collaborative work environment of digital transformation initiatives (Guàrdia et al., 2021; Dede et al., 2005). The success of AI strategy development depends on distributed leadership models which grant faculty members, instructional designers, and IT specialists the authority to work together on AI initiatives (Davidescu et al., 2020; Huning et al., 2020). Academic leaders need to receive training about digital strategy, ethical technology usage, and change management techniques to handle AI integration complexities (Smith, 2023; Ng & Salamzadeh, 2020).

Financial and Policy Support for Sustainable AI Adoption

HEIs need to maintain AI adoption through sustained financial support and policy support for long-term success (Oliveira & De Souza, 2022; Rosenbusch, 2020). The success of short-term AI pilot programs and externally funded projects tends to be short-lived because they lack institutional backing for expansion and maintenance (Pillay, 2020). The educational system needs to solve three main problems which include restricted broadband access, insufficient technical assistance in distant institutions, and inconsistent policy execution (Marozva et al., 2024; Hoque & Tshutsha, 2022).

Inclusive Transformation Through AI in Higher Education

Research evidence shows AI functions as a transformative tool when organizations use it correctly and include all stakeholders in the process (Akour & Alenezi, 2022; Alenezi, 2024). The assessment system and academic staff support and student achievement improvement through AI require institutions to build essential infrastructure, provide training, establish ethical frameworks, and create cultural changes (Alharahsheh & Pius, 2020; Barnes et al., 2021). The educational sector faces an essential task to evolve in response to demographic changes and social transformations (Atiku & Ganiyu, 2022; Ayoobzadeh et al., 2024).

AI as a Thoughtful and Inclusive Enabler of Transformation

The literature underscores that AI is not a panacea but a powerful enabler of transformation when implemented thoughtfully and inclusively (Cavus et al., 2023; George & Wooden, 2023). Its potential to enhance assessment, support academic staff, and improve student outcomes is significant but only if institutions invest in the necessary infrastructure, training, ethical safeguards, and cultural change (Colombari & Neirotti, 2022; Davidescu et al., 2020). As higher education continues to evolve in response to technological, generational, and societal shifts, AI will play an increasingly central role in shaping the future of teaching, learning, and academic work (Chan & Lee, 2023). This section is summed up by conceptual framework illustrating the multifaceted dynamics of integrating AI into assessment systems within HEIs in figure 2. At its core, the framework positions AI as a transformative force and a thoughtful, inclusive enabler reshaping how academic institutions assess, support, and evolve in response to technological advancements.

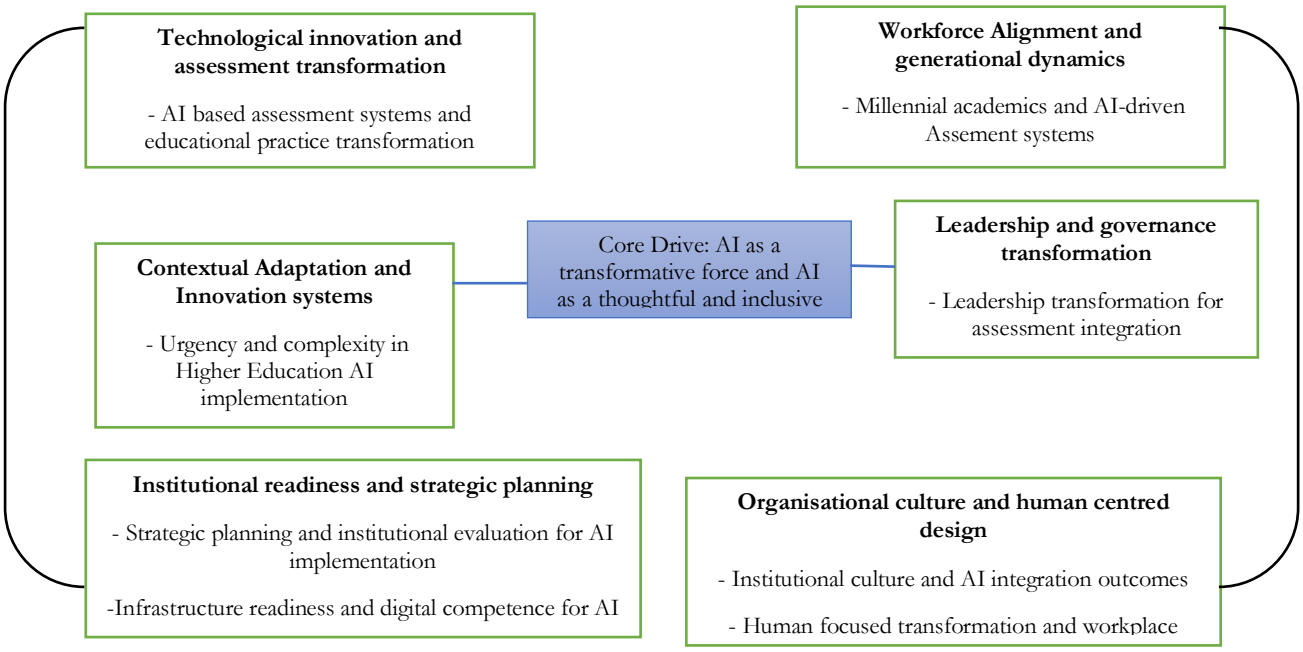

Figure 2. Conceptual Framework: AI Integration in Higher Education Assessment Systems (Source: Owner compilation)

3. Theoretical Framework: Herzberg's Two-Factor Theory in the Context of AI-Driven Online Assessment in Higher Education

Herzberg's Two-Factor Theory offers a valuable framework for analyzing student engagement and retention in AI-based online assessment systems in higher education (Herzberg,1959; Yousaf, 2020; Ibrahim et al., 2023). As AI adoption grows, universities must understand how millennial students respond to both motivational and hygiene factors (Bhatt et al., 2022; Miah & Hasan, 2022; Peramatzis & Galanakis, 2022; Rai et al., 2021). Motivators in AI-driven assessment include personalized feedback, adaptive learning pathways, gamified elements, and recognition of academic progress, which foster achievement and self-directed learning (Ibrahim et al., 2023; Alrawahi et al., 2020; Miah & Hasan, 2022; Hoque et al., 2021).

Hygiene factors encompass platform reliability, clarity of assessment criteria, technical support, and institutional AI usage policies (Herzberg,1959). Their absence such as system downtimes, lack of human support, and opaque grading algorithms leads to dissatisfaction and erodes trust (Thant & Chang, 2021; Yousaf, 2020; Alrawahi et al., 2020; Miah & Hasan, 2022; Hoque et al., 2021). Support mechanisms like AI chatbots, virtual office hours, and peer forums stabilize the learning environment and reduce student anxiety during assessments (Ibrahim et al., 2023; Miah & Hasan, 2022; Bhatt et al., 2022).

Institutional handling of AI implementation data protection, algorithmic fairness, and academic integrity also falls under hygiene factors. Transparency and stakeholder involvement are essential to maintain student trust and satisfaction (Thant & Chang, 2021; Hoque et al., 2021; Alrawahi et al., 2020; Bhatt et al., 2022; Ibrahim et al., 2023). Herzberg's framework supports qualitative research methods such as focus groups and thematic analysis to explore student perceptions of motivators and hygiene factors (Miah & Hasan, 2022; Rai et al., 2021; Yousaf, 2020; Guest et al., 2020).

Developing Standard Operating Procedures (SOPs) for AI integration requires attention to both motivational elements such adaptive feedback, recognition platforms and hygiene elements such as platform availability, support escalation (Peramatzis & Galanakis, 2022; Rai et al., 2021; Alrawahi et al., 2020).

Emotion detection and predictive analytics may further enrich Herzberg's dual-factor model to support human-centered educational outcomes (Ibrahim et al., 2023; Peramatzis & Galanakis, 2022). Educational institutions can leverage Herzberg's theory to create AI-enhanced pedagogical approaches that promote student satisfaction and reduce attrition (Herzberg, 1959; Bhatt et al., 2022; Hoque et al., 2021).

4. Results and Discussion

The research findings demonstrate how AI interacts with institutional systems to affect millennial employee retention in HEIs. The research confirms Herzberg's Two-Factor Theory by showing AI technologies function as motivators which boost academic involvement and as hygiene factors which need institutional backing to stop employee dissatisfaction.

Annual scientific production

Figure 2 visualizes the clusters that have emerged in the count of scientific publications on AI in higher education. The assessment cluster makes its debut in 2020 then rebounds powerfully from 2022–2025 mirroring the uptake of assessment tools and the accompanying ethical debates. In contrast the retention cluster surfaces, in the pandemic-era window of 2020–2021 when workforce strains were pronounced and persists through 2023–2024 tied to the concerns of faculty and the expanding role of AI support. From 2020 through, to 2025 the strategy cluster never wavers, continually spotlighting the need for planning, governance structures and institutional evaluation as AI takes hold. The infrastructure cluster commands attention over the 2020-2024 window foregrounding readiness, safeguards, monitoring routines and the financial and policy support that keep the machine humming. Between 2022 and 2024 a wellness cluster makes its entrance linking AI rollout to mental-health considerations and the broader currents of well-being. Finally, the urgency cluster surfaces, in the stretch of 2023-2025 echoing a growing awareness of the time-sensitive challenges that AI implementation poses for higher education.

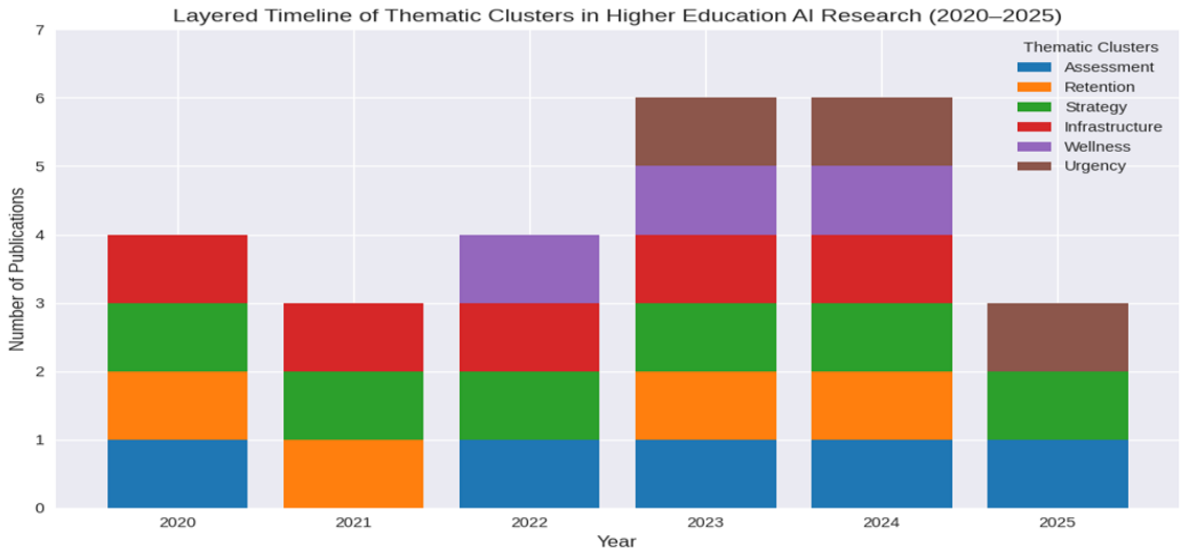

Figure 3. Annual scientific production thematic cluster in Higher education AI (Source: Owner compilation)

The research shows that AI-based online assessment systems create substantial intrinsic motivation among millennial academic staff motivators which include achievement and recognition and advancement. The elements create academic purpose and intellectual engagement which drive millennial academics to stay in their academic positions.

Most recent sources

Figure 4 shows the top 25 most relevant sources in the AI higher education domain in which a were published. International Journal of Management, Knowledge and Learning lead with (11) in educational journals, SA Journal of Human Resource Management is second with (5) articles as its primary niche is to extend the boundaries of AI in higher education research. third is Sustainability, Education Sciences with (4) articles, Jointly followed by Administrative Sciences, Studies in Higher Education, International Review of Research in Open and Distributed Learning, Frontiers in Education, Smart Learning Environments, Education and Information Technologies, Informatics in Education, Personnel Review, Journal of Business Ethics, Global Business Review, Psychology (generic journal), Gender & Behaviour, Cogent Social Sciences, Common Knowledge (context), International Journal of Service Science, Management, Engineering, and Technology (IJSSMET), Journal of Facilities Management, Education and Society, International Journal Software Engineering and Computer Science (IJSECS), Multidisciplinary Journal for Education, Social and Technological Sciences, European Journal of Education with (1) articles.

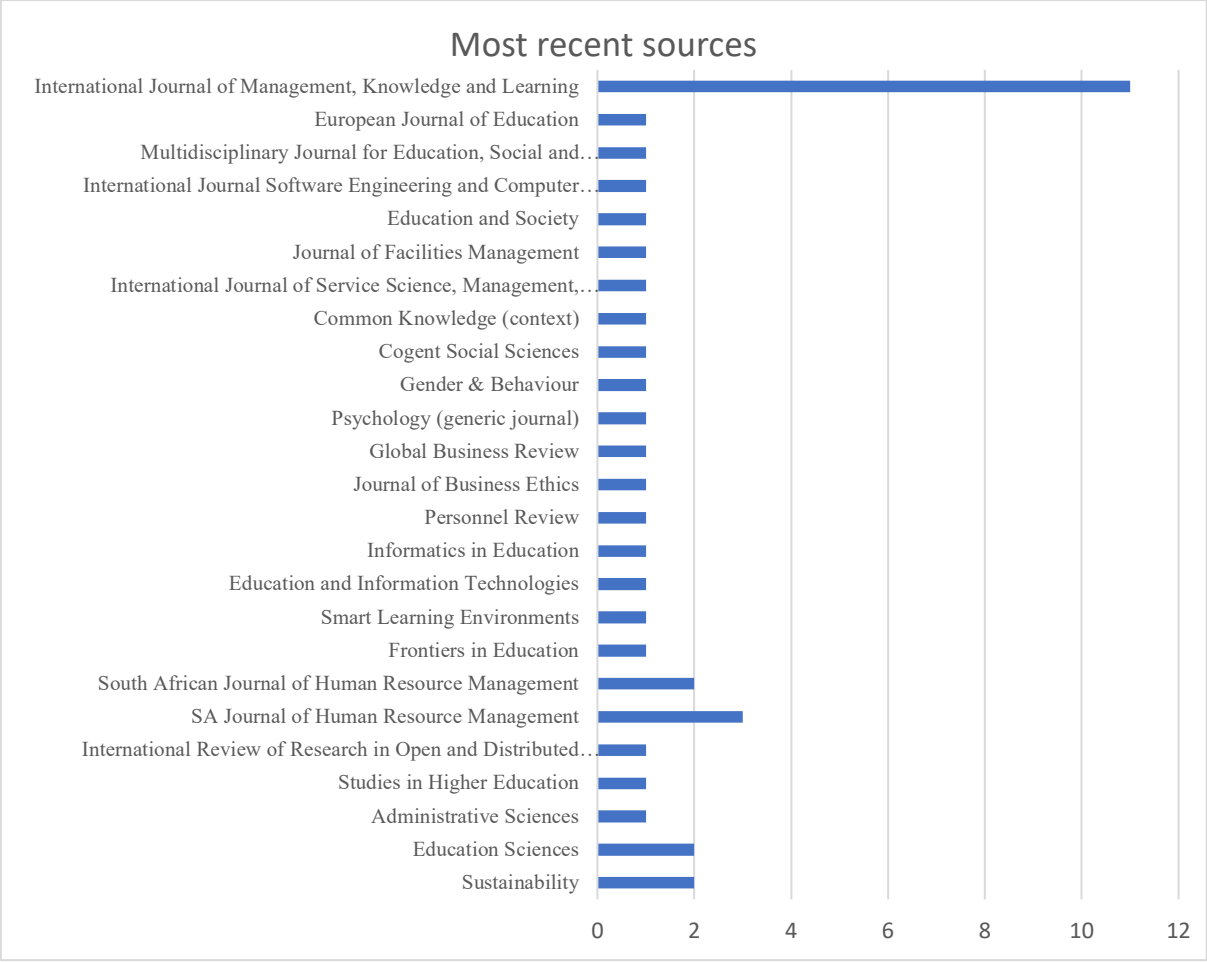

Figure 4: Most recent sources (Source: Owner compilation)

Most frequent keywords and Word-Occurrences

Figure 5 present the most frequent keywords used by authors in their publications and network visualization related to AI higher educational research in the research database performed using VOSviewer. AI higher education has the highest number of occurrences (383), The network revealed strong connections between AI as a Transformative force in online assessment operations, AI-based assessment systems and educational practice transformation, millennial academics and AI-driven assessment systems, strategic planning and institutional evaluation for ai implementation, retention of millennial academic staff through AI support,

human-centered design and institutional support for AI tools, infrastructure readiness and digital competence for AI deployment, institutional culture and AI integration outcomes, human-focused transformation and workplace culture, urgency and complexity in higher education AI implementation, context-specific AI solutions and innovation systems, structural challenges and AI capabilities in HEIs, infrastructure, ethics, and monitoring for AI Success, ethical concerns in AI-based assessment systems, mental health and digital wellness in AI integration, leadership transformation for AI assessment integration, financial and policy support for sustainable AI Adoption, inclusive transformation through AI in Higher Education and AI as a Thoughtful and Inclusive Enabler of Transformation.

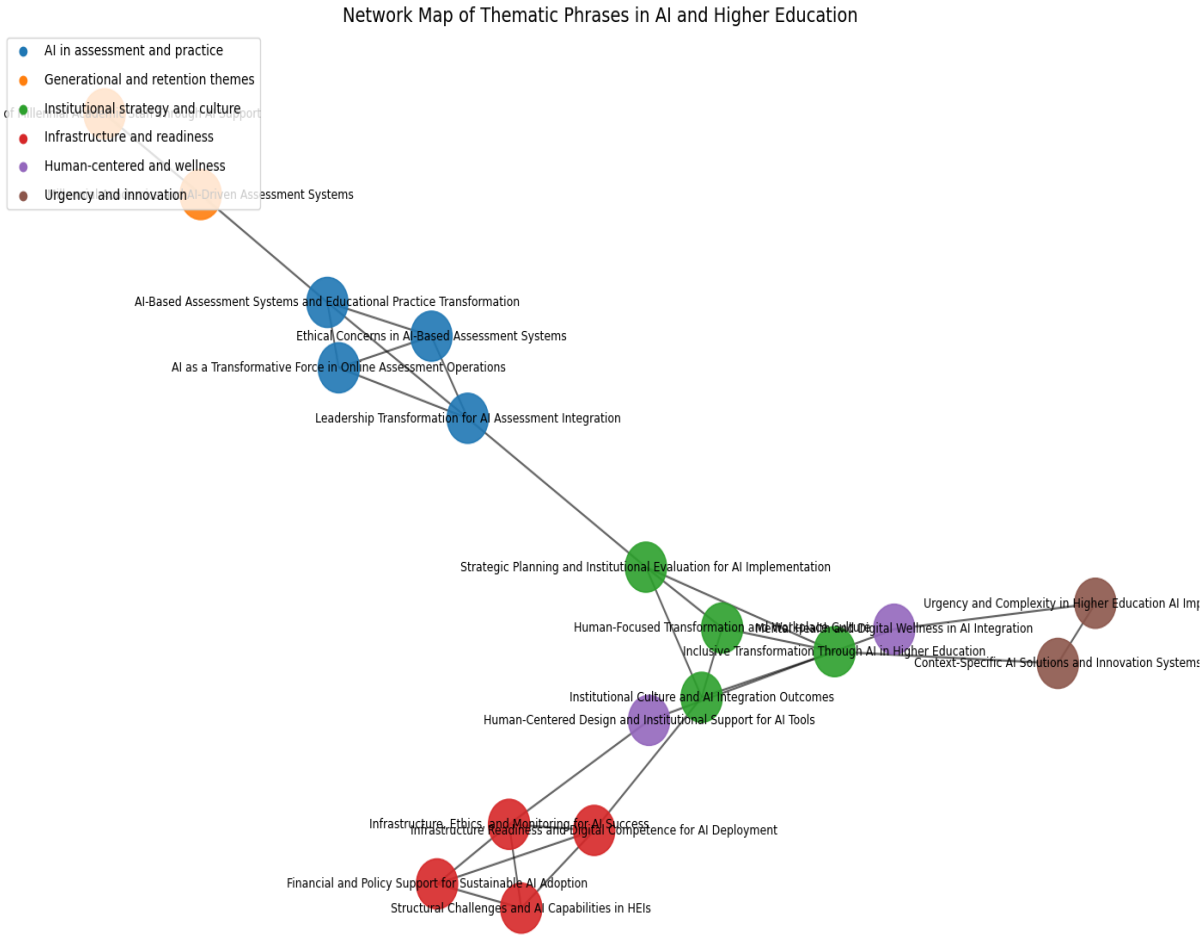

Figure 5: Most frequent keywords and Word-Occurrences (Source: Owner compilation)

Theme 1: AI-Based Assessment Systems

The implementation of AI systems enables universities to handle large student numbers and limited resources and inconsistent assessment methods (Katsamakas et al.,2024; Ilić et al.,2021). The assessment tools provide flexible evaluation methods which produce quick feedback that leads to better operational results and academic success (Islam, M., 2020). AI technology brought student assessment into a new era through its automated grading system and adaptive testing capabilities and its ability to deliver instant feedback (George & Wooden, 2023; Guàrdia et al.,2021). The tools align with contemporary workplace behaviors to reduce administrative tasks which results in better employee satisfaction (Huning et al.,2020; Guest et al.,2020). AI-based assessment systems operate at increased speeds but generate new challenges for system maintenance and data interpretation and ethical standards (Chan & Lee, 2023; Colombari &

Neirotti, 2022). Organizations need to achieve equilibrium between technological advancement and employee assistance to stop staff dissatisfaction (Ibrahim et al.,2023).

Theme 2: Retention and Generational Workforce Management

The digital native workforce of millennials shows interest in AI tools that simplify administrative work and create opportunities for academic involvement (Ngotngamwong, 2020a; Oliveira & De Souza, 2022). Flexible work arrangements, career development, and recognition systems improve retention when supported by AI platforms (Ngotngamwong, 2020b; Pillay, 2020). Millennial academics increasingly seek external rewards due to financial pressures. AI-generated performance data supports recognition programs and helps institutions retain top talent in competitive environments. Retention plans must address millennial needs for flexibility, recognition, and development (Smith, 2023; Sishuwa & Phiri, 2020). AI helps by reducing administrative burdens and enabling focus on academic tasks. Economic strain drives millennials toward external rewards, and AI helps validate their contributions (Acheampong, 2021). Retention strategies must address AI's dual impact on academic staff (Butler et al., 2020).

Theme 3: Strategic Planning and Institutional Culture

Institutions need to transform their cultural environment to support teamwork and open communication and continuous improvement. The implementation of inclusive governance systems enables technological advancement to support human values which leads to enhanced academic results and better student retention (Katsamakas et al.,2024; Mantha & Krishna, 2024). HEIs need to link their technological progress with their student retention programs. AI operates best when organizations create systems which unite mentorship programs with policy transformations and employee training programs (Ilić et al.,2021; Coolsaet, 2024). Academic institutions dedicated to digital transformation and human development work to build academic excellence and stability according to Madikizela-Madiya (2021) and Kiger & Varpio (2020). The digital skills of millennials make them suitable to lead AI-based initiatives (Gabrielova & Buchko, 2021). The Two-Factor Theory of Herzberg demonstrates that AI implementation produces conflicting staff responses because it generates positive and negative effects. The combination of job satisfaction from innovation and advancement fails to compensate for poor workload management and insufficient compensation (Ibrahim et al.,2023). Organizations need to create mentorship programs and professional development initiatives and inclusive leadership practices to succeed with AI integration (Gbobaniyi et al.,2023; Mthethwa, 2024).

Theme 4: Infrastructure and Wellness

Successful deployment of successful systems needs both robust digital infrastructure and complete staff training according to Islam & Aldaihani (2022) and Kakar et al. (2023). Rosenbusch (2020) states that organizations need to build suitable infrastructure and train all staff members who will execute the process for successful deployment. The institutional framework requires fundamental changes to establish modern workplace values which match the current preferences of millennials. AI tools require operation within systems which enable teamwork and professional development according to ChaaCha & Oosthuysen (2023). Online assessment deployment requires technological progress to work alongside systems which fulfill human requirements. Organizations which focus on digital transformation and employee retention development will achieve better results and maintain stability. Organizations need mentorship programs and training sessions and inclusive leadership approaches to achieve successful AI implementation (Mthethwa, 2024). The current workload and cultural problems will become more severe because AI systems need staff members to receive proper training for their work responsibilities (Barnes et al., 2021).

5. Conclusion

Contribution of the Study

The research adds new knowledge to digital transformation studies in higher education through its analysis of AI effects on online assessments specifically among millennial academics. The research connects technological progress to human workforce management to show how AI tools affect employee retention and job satisfaction and institutional backing. The study uses Herzberg's Two-Factor Theory to develop a theoretical framework which explains how AI functions as both a motivator and a hygiene factor in academic environments (Ibrahim et al. 2023). The research establishes these results within the HEI environment to demonstrate the need for institutional changes that support demographic changes and national development targets (Marozva et al. 2024; Hoque & Tshutsha 2022).

Practical Implication

The research results create essential implications which affect HEI administrators together with policymakers and academic leaders. Educational institutions need to allocate funds for building AI systems and training staff to achieve successful online assessment tool implementation. Academic staff need enhanced support systems which include mentorship programs and professional development opportunities and inclusive leadership approaches to learn AI technologies. Organizations need to develop retention plans which match the preferences of millennials by offering flexible work arrangements and recognition programs and meaningful work experiences. The implementation of AI tools requires a supportive institutional environment to boost academic results and minimize employee departure rates.

Limitation of the Study

The review provides detailed information, but its analysis depends on secondary data from published studies between 2020 and 2025. The review excludes non-English sources and grey literature which might have contained important viewpoints. The research lacks empirical evidence and HEI-specific case studies which would have delivered more detailed contextual information. The research focuses on millennial academics, yet it disregards the impact of AI adoption on other generational groups.

Recommendation

HEIs need to implement a complete strategy for AI implementation which will link technological progress to sufficient support infrastructure. Academic staff members need institutions to perform periodic needs evaluations which will help identify their AI tool readiness levels and their related concerns. The development of policies needs to focus on three essential areas which include ethical matters and data protection and AI assessment workload management. Institutions need to create shared platforms which enable members to exchange successful methods and develop new solutions together.

Future Direction of the Study

Research should investigate AI implementation in HEIs through empirical studies which evaluate student achievement and school attendance and institutional environment changes. Research studies that compare AI technology acceptance between different age groups would reveal how people from different generations interact with AI systems. Research spanning multiple years will help scientists understand how AI affects teaching methods and maintains staff numbers in educational institutions. Research that unites educational technology with human resource management and organizational psychology will create a more complete understanding of AI functions in HEIs.

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