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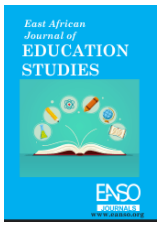

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*Original Article*

# Advancing Higher Education through Artificial Intelligence (AI): A Framework for Teaching, Assessment, and Research Integration

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## ABSTRACT

The benefits of using Artificial Intelligence (AI) in higher education cannot be overstated. Several studies have demonstrated its importance in improving explicit teaching and learning, argumentation and decision-making, assessment and curriculum design, and other research efforts. However, insufficient comprehensive frameworks for guiding effective usage result in abuse, bias, fragmented efforts, and inconsistent outcomes. The study population comprises approximately 6,000 people, including academic staff and students from the Ladoke Akintola University of Technology (LAUTECH) Open and Distance Learning Centre in Ogbomoso. The sample size of 362 was determined using Cochran's formula. However, only 333 participants completed the questionnaire. The study employed convenience sampling and informed consent for respondents, analysing closed-ended data using descriptive analysis and open-ended data using thematic analysis to identify patterns and subthemes. The results revealed mixed opinions. Respondents emphasised the advantages of AI in terms of contextualised, tailored teaching content, efficient assessment, and research support. On the other hand, academic staff expressed concerns about overreliance on technology, a lack of human oversight, insufficient infrastructure, and data privacy issues. These findings underscore the need for transparent, balanced, and accountable AI integration that mitigates unethical use while preserving essential human elements. As a result, a framework was created to guide the ethical and practical use of AI, ensuring higher educational quality and innovation while preserving academic integrity and inclusivity.

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## INTRODUCTION

Large Language Models (LLMs) such as ChatGPT, Gemini, Microsoft Copilot, etc. have stirred significant interest and controversy in higher education institutions (HEIs). Some educators perceive LLMs as agents for advancing personalised learning and enhancing teaching, assessment, and research methods (Anas & Belle, 2023; Crompton & Burke, 2023). Others view them as a looming threat, potentially signalling traditional educational institutions' obsolescence in instilling critical thinking and creativity into students (Stokel-Walker, 2022; Thorp, 2023; Tlili et al., 2023). LLM is a computational model notable for its ability to achieve general-purpose generation and other natural language processing tasks such as classification, translation, summarization, and question-answering. These models acquire their abilities by learning statistical relationships from vast text documents during a computationally intensive self-supervised and semi-supervised training process (OpenAI, 2019). LLMs, being a form of generative AI, can be used for text generation. Given an input text, they predict the next token or word, creating coherent and contextually relevant sentences. They are designed to understand and generate human-like text. This suggests endless possibilities with LLM.

The simulation of human intelligence by LLMs, popularly referred to as AI, is increasingly relevant in society (Crompton & Burke, 2023). Integrating AI into higher education institutions (HEIs) promises teaching, assessment, and research improvements. However, current frameworks like AI for Education (AIED) (Hong et al., 2022) do not fully meet the diverse needs of higher education, resulting in fragmented implementations and inconsistent outcomes. Additionally, in developing nations, while expectations for AI's impact on teaching and learning are high, little progress has been made, highlighting the need for ongoing research in AI adoption (Kshetri, 2020).

Drach et al., (2023), Lukianets and Lukianets (2023) and Sallu et al., (2023) provide the basis for which AI is being applied particularly in higher education. They identified four key areas of AI applications in teaching and learning: profiling and prediction, intelligent tutoring systems, assessment and evaluation, adaptive systems, and personalisation. Chang et al. (2022) proposed frameworks that include an AI-assisted integrated teaching-learning model that uses extreme learning machine techniques for student evaluation. Furthermore, Goosen and Mugumo (2024) proposed a four-dimensional framework addressing the pedagogical, governance, operational, and ethical aspects of AI implementation in education. Hong et al. (2022) proposed an AI for Education (AIED) framework that aims to promote ethical practice in using AI in education.

Allen and Kendeou (2023) emphasise the importance of a multidisciplinary AI literacy framework in education, outlining six key components: knowledge, evaluation, collaboration,

 

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contextualisation, autonomy, and ethics. Olari and Romeike(2021) and Black et al. (2024) reviewed the relationship between AI and data literacy for educators, identifying several gaps in current AI literacy frameworks such as limited coverage of data literacy, absence of a holistic framework addressing both AI and data literacy, gaps in the relationship between AI and data literacy competencies. They propose an integrated approach using the data lifecycle and aim to develop a comprehensive education strategy for educators in AI and data literacy. They stress the urgent need for educator preparation programs to ready educators for AI integration, advocating for a strategic, systemic approach to AI literacy education and comprehensive research efforts (Black et al., 2024; Olari & Romeike, 2021).

Thongprasit and Wannapiroon (2022) presented a framework for an educational AI learning platform, emphasising digital skills development and classifying AI technology based on functionality and capabilities. This framework includes curriculum components like advanced learning, data analysis, assessment, and quality monitoring. Thongprasit's work focuses on utilising AI to enhance the education system and prepare for digital transformation (Thongprasit & Wannapiroon, 2022). From the identified frameworks, it is clear there is a consensus on the need for an AI framework for competency-based learning.

Despite the existence of various AI frameworks focusing individually on aspects such as teaching or assessment, there is a notable gap: no existing framework holistically integrates AI's application across teaching, assessment, and research within higher education, while simultaneously addressing ethical considerations, inclusivity, infrastructure challenges, and human-AI balance. This research specifically aims to fill this gap by developing a comprehensive and practical framework tailored to the complex needs of contemporary higher education institutions, particularly in the context of developing countries.

The study will provide educators and policymakers with practical strategies to effectively leverage AI, enhancing learning experiences and academic outcomes by evaluating current practices and challenges. The goal is to empower academics and organisations to utilise AI for innovation and quality while ensuring ethical use and maintaining academic standards. The research question for this study is: How can AI be effectively utilised in teaching, assessment, and research in higher education to enhance educational outcomes and efficiency?

## Theoretical Frameworks

This study identified two relevant theories, the Complex Adaptive System Theory and the Technology Acceptance Model (TAM), which anchor this study. Complex Adaptive System Theory views AI in education as a complex system with many interacting components. While TAM is used to measure the level of acceptance of AI in higher education from the stakeholders' perspective.

### *Complex Adaptive Theory (CAS)*

Complex Adaptive Systems (CAS) is a framework for studying, explaining, and understanding systems of agents that collectively combine to form emergent, global-level properties (Carmichael & Hadžikadić, 2019). CAS has been gaining recognition in higher education as a framework for understanding educational systems' non-linear and dynamic nature (Ueland et al., 2021). In this context, complex adaptive systems refer to diverse entities that interact unpredictably, leading to emergent behaviours and outcomes. Higher education institutions exemplify such systems, with multiple factors such as teaching, assessment and research, pursuing distinct goals and priorities.

By incorporating complex adaptive theory, AI frameworks can address the inherent complexity of

 

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higher education, creating more flexible, responsive systems that promote improved educational outcomes, innovative teaching practices, and robust research methodologies (Neely, 2015). This underscores the necessity of the theory in crafting solutions that align with the dynamic and interconnected nature of educational systems, ensuring institutional success in an ever-changing environment.

### *Technology Acceptance Model (TAM)*

The Technology Acceptance Model (TAM) provides a robust theoretical framework for evaluating stakeholders' acceptance of AI in higher education, particularly in teaching, assessment, and research. TAM posits that perceived usefulness and perceived ease of use are critical factors influencing an individual's intention to adopt a technology (Samaradiwakara & Gunawardena, 2014). In the context of AI frameworks for education, this theory is invaluable for assessing how stakeholders, students, educators, and administrators perceive AI's potential to enhance teaching effectiveness, streamline assessment processes, and advance research capabilities. For example, perceived usefulness might relate to AI's ability to automate grading, provide personalised feedback, and support adaptive learning. Similarly, perceived ease of use could pertain to the simplicity of integrating AI tools into existing workflows and the user-friendliness of AI-driven platforms.

By leveraging TAM, researchers can systematically analyse acceptance levels and identify barriers to adoption, enabling the development of AI frameworks that align with stakeholders' needs and expectations(Na et al., 2022). This approach ensures that AI solutions are technologically advanced, practically viable, and widely accepted, thereby maximising their impact on educational outcomes.

## METHODOLOGY

In this study, a survey was used to gather data from students and academic staff, identified as the major stakeholders in framework development for teaching, assessment, and research, at Ladoke Akintola University of Technology Open and Distance Learning Centre. The Nigerian national regulator licenses the centre. The Nigerian national regulator licenses the centre to deliver blended learning. The centre has 6000 plus learners in six programmes. The survey was administered through an online questionnaire, featuring a mix of closed-ended and open-ended questions. The questionnaire was designed based on a review of current literature on AI use in higher education, with a focus on teaching, assessment, research, and the perceived challenges associated with AI integration in these areas. The theoretical frameworks further guided the instrument design. CAS theory informed the inclusion of items related to interaction with AI, adaptability, and self-organization within dynamic educational environments, while the TAM directly shaped the development of questions capturing participants' attitudes toward technology adoption (Figure 1). The study population consists of approximately 6,000 individuals. Using Cochran's formula, a sample size of 362 was calculated. However, only 333 participants completed the questionnaire.

 

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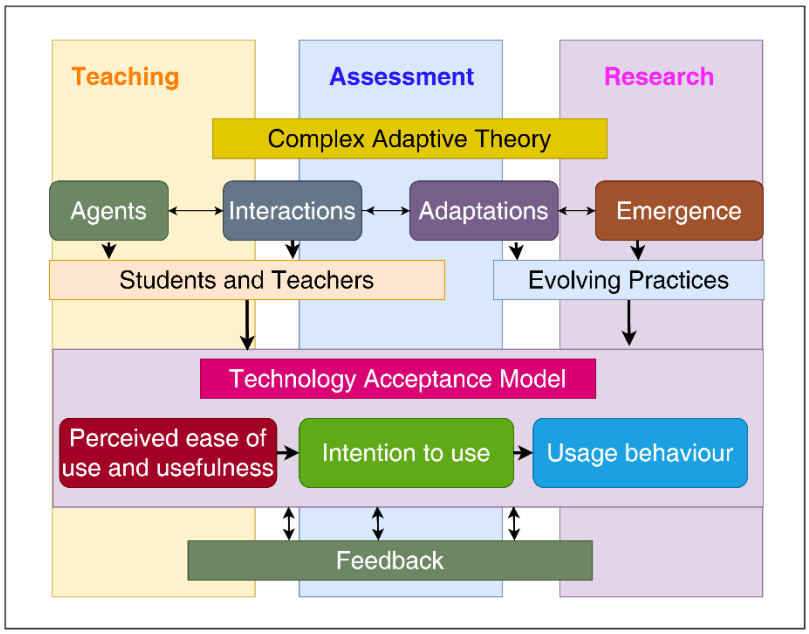
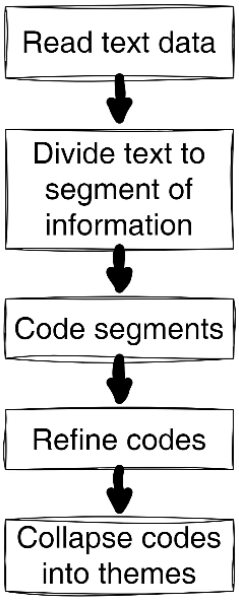
**Figure 1: Integrated Framework Adopted for this Study**




**Source:** *(Author's compilation)*

A convenience sampling method was employed for selecting the respondents, based on their availability and willingness to participate in the study, although this approach may introduce sampling bias and limit the generalizability of the findings. Before completing the survey, participants acknowledged a consent form outlining voluntary participation, anonymity, and data protection measures, assuring data use for research purposes only. The data from closed-ended questions were analysed using descriptive analysis and the open-ended questions were analysed using a thematic analysis approach which involved identifying patterns in the data to form themes and sub-themes. An inductive approach was used to analyse the responses. The stages of the coding process are presented in Figure 2. The two analyses gave us a holistic view of the respondent's perception of AI in teaching, assessment and research. This understanding is instrumental in developing a comprehensive framework to guide policy development for the effective and ethical use of AI in these areas.

**Figure 2: Coding Process**




## RESULTS

This section presents the results of both quantitative and qualitative analyses to provide a comprehensive understanding of respondents' views on AI adoption in teaching, assessment, and research. These insights will inform the development of a

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holistic framework that incorporates the perspectives of all stakeholders.

**Result of Quantitative Analysis**

***Demographic Analysis***

The results are analysed based on participants' responses. Table 1 shows demographic information related to advancing higher education through AI. Most participants are female (67.57%) and married (78.08%). A significant portion (53.45%) is aged 21 to 30. Staff and students make up 19.52% and 80.48% of respondents, respectively, reflecting a diverse learning environment that is well-positioned to leverage AI in enhancing education through varied perspectives and experiences.

**Table 1: Demographic Characteristics of Respondents**

| Variables | Distributions | Frequency | Percentage (%) |
|---|---|---|---|
| **Gender** | Male | 108 | 32.43 |
| | Female | 225 | 67.57 |
| | **Total** | **333** | **100** |
| **Age range** | 16-20 | 19 | 5.71 |
| | 21-30 | 178 | 5.35 |
| | 31-40 | 75 | 22.52 |
| | 41-50 | 40 | 12.01 |
| | Above 50 | 21 | 6.31 |
| | **Total** | **333** | **100.00** |
| **Status** | Staff | 65 | 19.52 |
| | Student | 267 | 80.48 |
| | **Total** | **333** | **100** |
| **Marital Status** | Single | 35 | 10.51 |
| | Married | 260 | 78.08 |
| | Divorced | 60 | 18.02 |
| | **Total** | **333** | **100** |

**Source**: *Authors' compilation (2024)*

***AI in Teaching***

As presented in Table 2, both students and academic staff moderately agree on using AI-powered tools for transcribing lecture notes, with students showing slightly higher agreement. There is some variability in responses regarding usage and satisfaction. Students are more optimistic about AI providing personalised learning experiences. Both groups agree that AI can replace s teaching tasks without compromising quality, though opinions vary. Additionally, AI is viewed as moderately effective in identifying at-risk students, with students again showing slightly higher agreement.

Students are generally more optimistic about AI's future impact on higher education than academic staff, though both agree that integrating AI into the institution's LMS may improve learning outcomes. While opinions on AI's effects on LMS differ, both groups acknowledge its potential benefits. The low standard error suggests that the sample means reliably represent the population, supporting the generalisability of the findings.

 

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**Table 2: AI in teaching**

| Variables | Status | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| AI-powered tools are currently used for transcribing lecture notes | Student | 239 | 3.48 | 1.353 | .088 |
| | Academic staff | 94 | 3.33 | 1.177 | .121 |
| AI-based systems can offer an extensive personalised learning experience for students | Student | 239 | 3.64 | 1.311 | .085 |
| | Academic staff | 94 | 3.34 | 1.275 | .131 |
| AI can effectively replace certain teaching tasks without compromising educational quality. | Student | 239 | 3.39 | 1.392 | .090 |
| | Academic staff | 94 | 3.24 | 1.242 | .128 |
| AI can help in identifying students who are at risk of falling behind. | Student | 239 | 3.26 | 1.362 | .088 |
| | Academic staff | 94 | 3.21 | 1.327 | .137 |
| I am optimistic about the prospects of advancing higher education through AI integration. | Student | 239 | 3.58 | 1.306 | .085 |
| | Academic staff | 94 | 3.33 | 1.239 | .128 |
| Incorporating AI in our institution's Learning Management System (LMS) will improve student learning outcomes. | Student | 239 | 3.58 | 1.310 | .085 |
| | Academic staff | 94 | 3.44 | 1.332 | .137 |

**Source**: *Authors' compilation (2024)*

***AI in Assessment***

As presented in Table 3, the analysis reveals insights into students' and academic staff's perceptions of AI-based solutions in assessment practices. Both groups exhibit mild agreement on implementing AI-based remote-proctored examinations to ensure exam integrity, though variability in responses indicates diverse opinions. Students report near-neutral familiarity with AI-powered exam solutions (mean = 2.99), while academic staff show slightly higher familiarity (mean = 3.17). Overlapping variability suggests that targeted awareness efforts could bridge gaps in understanding.

Regarding AI-driven assessments, both groups moderately agree on their accuracy in measuring learning outcomes, with students (mean = 3.53) and staff (mean = 3.46) showing similar perceptions. Agreement is also observed on AI's ability to provide timely and constructive feedback, though moderate variability hints at conditions affecting perceived effectiveness. Both groups prioritise factors like accessibility, cost, and scalability in adopting new technologies, with students (mean = 3.64) expressing slightly stronger agreement than staff (mean = 3.47). Both groups recognise AI's potential to enhance assessment efficiency (mean = 3.62 for both), though variability highlights differing opinions. Students and academic staff agree on integrating new technologies into assessment practices, considering factors like effectiveness, accessibility, security, cost, ease of use, training, support, and scalability, with students showing slightly stronger agreement.

 

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**Table 3: AI in Assessment**

| Variables | Status | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Our institution should implement AI-based remote-proctored examinations or similar measures to ensure exam integrity. | Student | 236 | 3.47 | 1.280 | .083 |
| | Academic staff | 92 | 3.25 | 1.246 | .130 |
| I am familiar with AI-powered solutions designed to monitor and maintain exam integrity during remote assessments. | Student | 236 | 2.99 | 1.351 | .088 |
| | Academic staff | 92 | 3.17 | 1.281 | .134 |
| I believe that AI-driven assessments can accurately measure student learning outcomes. | Student | 236 | 3.53 | 1.256 | .082 |
| | Academic staff | 92 | 3.46 | 1.208 | .126 |
| AI is capable of providing timely and constructive feedback to students. | Student | 236 | 3.72 | 1.275 | .083 |
| | Academic staff | 92 | 3.67 | 1.250 | .130 |
| I consider factors such as effectiveness, accessibility, security, cost, ease of use, training and support, and scalability when integrating new technologies, including AI, into assessment practices. | Student | 236 | 3.64 | 1.255 | .082 |
| | Academic staff | 92 | 3.47 | 1.235 | .129 |
| To what extent do you agree that AI can improve the efficiency of the assessment process? | Student | 236 | 3.62 | 1.254 | .082 |
| | Academic staff | 92 | 3.62 | 1.257 | .131 |

**Source**: *Authors' compilation (2024)*

***AI in research***

The mean scores in Table 4 indicate moderate agreement between students and academic staff on the contribution of AI to new research opportunities, with students showing slightly more agreement than academic staff. However, there is moderate variability in responses within each group, suggesting some disagreement about the extent of AI's contribution, but not extreme spread.

The sample mean's lower values indicate a reliable estimate of the population mean, with a low standard error for students and a slightly higher standard error for academic staff. Students and academic staff agree that AI moderately contributes to new research opportunities, with students seeing AI's contribution slightly more than academic staff. The study shows that both students and academic staff moderately use AI tools to ensure research originality and prevent plagiarism, with academic staff showing slightly higher usage than students. The standard deviations show moderate variability in responses within each group, with some using AI tools extensively while others use them sparingly or not at all. The sample means are reliable estimates of the broader student and academic staff populations, with lower values suggesting a good estimate of the population mean. Students and academic staff moderately use AI tools to ensure research originality and prevent plagiarism, with mean scores of 3.19 for students and 3.26 for academic staff. The two groups moderately use AI tools for originality and plagiarism prevention, with academic staff slightly more inclined, with moderate variability in responses and reliable estimates.

 

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Both groups have moderate awareness of AI-powered literature search systems, with students slightly more aware. They find AI tools helpful in managing large datasets, with students slightly more favourable. Both groups support AI in facilitating peer review, with students being more supportive than academic staff. Both groups express moderate ethical concerns about AI in research, with students showing slightly higher concerns, with moderate variability and reliable estimates.

**Table 4: AI in research**

| Variables | Status | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| To what extent has AI contributed to the discovery of new research opportunities in your field? | Student | 239 | 3.53 | 1.279 | .083 |
| | Academic staff | 94 | 3.40 | 1.256 | .130 |
| To what extent do you currently use AI tools to ensure the originality of your research work and prevent plagiarism? | Student | 239 | 3.19 | 1.327 | .086 |
| | Academic staff | 94 | 3.26 | 1.269 | .131 |
| To what extent are you aware of AI-powered systems that assist in literature search and recommendation? | Student | 239 | 3.35 | 1.258 | .081 |
| | Academic staff | 94 | 3.23 | 1.355 | .140 |
| To what extent do you find AI tools helpful in managing large datasets for research purposes? | Student | 239 | 3.51 | 1.283 | .083 |
| | Academic staff | 94 | 3.31 | 1.253 | .129 |
| Should AI be used to facilitate peer review in research publications? | Student | 239 | 3.46 | 1.282 | .083 |
| | Academic staff | 94 | 3.28 | 1.168 | .120 |
| Are there ethical concerns regarding the use of AI in research that need to be addressed? | Student | 239 | 3.33 | 1.264 | .082 |
| | Academic staff | 94 | 3.02 | 1.173 | .121 |

**Source**: *Authors' compilation (2024)*

***Challenges of AI in Education***

The results of the study reported in Table 4 show that both students and academic staff perceive a moderate lack of transparency in AI-based assessment methods, with a slightly higher mean for academic staff. The variability in responses suggests differing opinions within each group. Students show slightly higher concern for ethical issues related to AI in education compared to academic staff, with moderate variability in responses. These differences suggest students may be more sensitive to ethical issues, with low standard error means indicating reliable population estimates. This could be due to students' exposure to discussions about AI ethics in contemporary educational settings, while staff may focus more on operational challenges.

Students and academic staff agree that AI implementation in education requires significant adaptation, with students showing stronger agreement. The mean indicates moderate to high agreement, with low standard error means indicating reliability for the broader population.

Table 4 shows that students and academic staff are moderately concerned about the potential worsening of educational disparities due to AI personalisation, with students showing slightly more concern than academic staff.

Students and academic staff generally agree on fairness in AI assessments, with students showing stronger agreement. Means are above the neutral midpoint, with moderate variability in responses and low standard error means suggesting reliable population estimates.

 

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Students show slightly higher concern or agreement than academic staff in all measured aspects, suggesting they may be more sensitive to AI issues and benefits in education and research. However, individual opinions vary. The low standard error means that the sample mean suggests the results are reliable, indicating the generalisability of the findings. Both students and academic staff acknowledge AI's importance in education and research but also express concerns about transparency, ethics, and fairness.

**Table 5: Challenges of AI in Education**

| Variables | Status | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| To what extent do you perceive a lack of transparency in AI-based assessment methods? | Student | 239 | 2.97 | 1.277 | .083 |
| | Academic staff | 94 | 3.03 | 1.168 | .120 |
| To what extent do you perceive ethical concerns arising regarding data privacy, bias, and responsible use of AI in education? | Student | 239 | 3.15 | 1.215 | .079 |
| | Academic staff | 94 | 2.91 | 1.104 | .114 |
| To what extent do you believe that implementing AI in education requires significant adaptation by educators and institutions, which is hindered by resistance and understanding gaps? | Student | 239 | 3.44 | 1.207 | .078 |
| | Academic staff | 94 | 3.24 | 1.224 | .126 |
| To what extent do you believe that personalisation with AI may worsen educational disparities without equitable access and bias mitigation? | Student | 239 | 3.10 | 1.332 | .086 |
| | Academic staff | 94 | 2.99 | 1.274 | .131 |
| To what extent do you believe there are adequate measures in place to ensure fairness in AI assessments? | Student | 239 | 3.33 | 1.252 | .081 |
| | Academic staff | 94 | 3.17 | 1.132 | .117 |

**Source**: *Authors' compilation (2024)*

**Result of Qualitative Analysis**

Table 6 represents the themes and subthemes for the research question on AI integration in teaching, assessment and research. Considering the responses there is a positive perception of the respondents to the integration of AI in teaching, assessment and research which is in support of the quantitative data analysed. However, some concerns were observed, this is presented as follows:

- AI in teaching: The respondents acknowledge the importance of AI in personalised learning experiences as stated in the excerpts of the respondents. This means that there is a need for the development of curricula that are flexible and adaptable to individual student's needs. This could be in terms of incorporation of an AI-driven model that can dynamically adjust contents based on real time assessment of the student or have instructional frameworks that leverage AI to differentiate instruction, providing various teaching methods and resources that cater to diverse learning preferences.

 

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**Table 6: Themes and Subthemes from Thematic Analysis**

| Theme | Sub-themes | Supporting Excerpts |
|---|---|---|
| AI in Teaching | Personalised Learning | "It can be used to generate an easy-to-understand process of information dissemination." |
| | Progress Monitoring | "AI-based system can also be used to monitor learners progress in their study." |
| | Accessibility and Inclusivity | "Effective integration requires ensuring accessibility, providing lecturer training, and maintaining ethical standards." |
| | Educator's Training | "Providing lecturer training and maintaining ethical standards." |
| | Ethical Standards | "Maintaining ethical standards." |
| AI in Assessment | Adaptive Testing | "Adaptive testing performance analytics and accessibility." |
| | Consistency and Efficiency | "The potential benefits include: efficiency consistency personalised feedback." |
| | Personalised Feedback | "Personalised feedback." |
| | Bias and Equity Issues | "The potential risks include: bias equity issues data privacy issues and security and over-reliance on technology." |
| | Data Privacy and Security | "Data privacy issues and security." |
| AI in Research | Data Analysis | "Data analysis for an informed decision." |
| | Plagiarism Detection | "How will I know an article written by AI or differentiate between articles written by AI and those written by humans." |
| | Ethical Concerns | "Ethical concerns." |
| | Research Authenticity | "What will be the determinant factor to confirm if truly a research has been done and the result is as reported." |
| | Technological Dependence | "Over-reliance on technology." |

 

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This includes multimedia resources, interactive simulations, and customised practice exercises as well as a structured feedback mechanism. Likewise, since student access to laboratories could be limited due to resource constraints, incorporating AI for teaching enhancement could be a suitable solution. The use of AI-powered interactive learning tools, such as virtual labs, simulations, and educational games can provide hands-on experiences and make abstract concepts more tangible, catering to various learning styles and enhancing student engagement. However, the respondent noted that equal accessibility, inclusivity and proper training in the use of AI are of greater priority. There is a need for the academic staff to be skilled in the use of this AI. When academics are proficient in using AI, it becomes easier to integrate it into teaching, thereby enhancing student outcomes.

- AI in assessment: The respondents acknowledged that the integration of AI in assessment has the potential to offer adaptive testing, consistency, efficiency, and personalised feedback, which can enhance the educational experience. However, there are significant concerns regarding bias, equity issues, data privacy, and security. This means that while AI can improve the assessment process, careful consideration must be given to mitigate risks associated with fairness and the protection of personal information. Additionally, there is a risk of over-reliance on technology, which suggests the need for a balanced approach that incorporates AI without displacing essential human elements of education and assessment. Overall, the analysis indicates a dual perspective on AI in assessment, recognising its benefits while cautioning against its potential pitfalls.

- AI in research: AI is recognised as a valuable tool in the research process, particularly in data analysis, where its capability to handle large datasets and provide insights enhances analytical capacity and efficiency. However, the respondents raised concerns about detecting AI-generated content and distinguishing it from human-written work. This concern highlights the need for robust plagiarism detection tools to maintain the integrity of academic writing. Ethical issues also arise, including bias in AI algorithms, potential misuse in generating deceptive research outputs, and the moral implications of relying on AI in academia. Addressing these ethical concerns is crucial for the responsible use of AI in research. Additionally, scepticism about the authenticity of AI-facilitated research underscores the need for transparency and verification mechanisms to ensure accuracy and credibility. Lastly, there is a concern about over-reliance on AI, which could diminish human skills, creativity, and critical thinking, suggesting the importance of balancing AI use with human expertise.

**Findings from the Study**

The data on the integration of AI in teaching indicates a generally positive outlook on its adoption, with both students and academic staff recognising its potential benefits. However, there is a slight difference in optimism levels, with students being more optimistic than academic staff. This could be a result of ethical concern from the staff or lack of exposure or openness to change, which aligns with the findings of Zhai (2022) and Kasneci et al., (2023), who emphasized that apprehensions about ethical use and control over AI often temper educators' attitudes toward adoption. The qualitative insights align with the quantitative data, emphasising the importance of accessibility, inclusivity, academic training, and ethical standards. These themes mirror observations made by (Viberg et al., 2024), who argue that successful AI integration in higher education requires robust support structures and inclusive policies to prevent widening educational inequalities. Likewise, in assessment, the academic community is more concerned about the over-reliance on technology which makes the issue of practical base/authentic assessment an option as proposed by Chan (2023). This will help to limit student reliance on AI and improve critical

 

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thinking and practical application of what they are being taught, thereby improving student engagement, addressing bias and equity issues, and improving educational outcomes. Also, there is a concern on insufficient infrastructure to ensure effective implementation of AI in assessment, causing a bias in the assessment process (Poornesh, 2024).

Research plays a pivotal role in higher educational institutions, and from the results, we can see that transparency and ethical concerns are critical issues raised in the integration of AI into the research process. It is surprising to see that students tend to be more apprehensive about these issues compared to academic staff, possibly reflecting their direct experiences and concerns about the data manipulative capacity of AI and bias. This shows that if AI in research is not managed properly, it has the potential to worsen the research outcomes in institutions. This raised a concern about the need to have an effective measure in place to create a check and balance in assessing research output and ensuring the integrity of research in higher educational institutions (Doraid Dalalah & Osama M.A. Dalalah, 2023).

## PROPOSED FRAMEWORK

Based on the results obtained and concerns raised in this study, we propose a framework for adopting AI in teaching, assessment, and research in Higher education institutions. The framework is hinged on six identified pillars which are Accessibility and inclusivity; bias, equity, and ethical issues; data privacy and security, over-reliance on AI, Academic integrity and authenticity; and infrastructure and operational efficiency. The proposed framework is presented in Table 7.

**Table 7: Proposed Framework for the Adoption of AI in Teaching, Assessment, and Research in HEI**

| | Teaching | Assessment | Research |
|---|---|---|---|
| **Accessibility and Inclusivity** | Integrate introductory AI courses into the curriculum.<br>Ensure AI tools and resources are accessible to all students.<br>Provide proper training for academic staff to use AI tools. | Provide training for academic staff to use AI in assessments effectively. | Ensure researchers have access to AI tools; provide training on AI use in research methodologies. |
| **Bias, Equity, and Ethical Issues** | Develop and use AI systems that address and mitigate educational content and delivery bias. | Use tools to identify and mitigate biases in assessments;<br>Ensure fairness and equity in AI-driven evaluations. | Address bias in AI algorithms.<br>Establish ethical guidelines for AI use in research to prevent deceptive outputs. |
| **Data Privacy and Security** | Implement robust security measures to protect student data in AI systems.<br>Comply with data privacy regulations. | Ensure AI assessment tools adhere to privacy regulations.<br>Protect student assessment data from breaches. | Protect research data handled by AI tools.<br>Ensure compliance with privacy laws and regulations in AI-facilitated research. |

 

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| | Teaching | Assessment | Research |
|---|---|---|---|
| **Over-Reliance on AI Technology** | Balance AI use with human judgment and creativity in teaching. Encourage critical thinking alongside AI tools. | Combine AI with human assessment oversight to maintain essential human elements and judgment. Use an authentic assessment/practical-based assessment method | Balance the use of AI with human expertise Promote collaborative research practices to maintain creativity and critical thinking. |
| **Academic Integrity and Authenticity** | Use AI tools to detect AI-generated content in student submissions to uphold academic integrity. | Develop mechanisms to ensure authenticity in AI-driven assessments. Detect AI-generated submissions. | Implement robust plagiarism detection tools. Establish verification mechanisms to ensure research authenticity. |
| **Infrastructure and Operational Efficiency** | Invest in a reliable and stable network infrastructure to support AI tools in teaching. | Ensure stable network and system accessibility for AI assessment tools. | Provide reliable infrastructure to support AI in research. |

### Policy Recommendations and Future Research Directions

Based on the findings, several policy recommendations emerge. First, institutions should develop comprehensive guidelines for AI integration in teaching, research, and assessment, emphasizing ethical standards and academic integrity. Tailored professional development programs should be implemented to enhance academic staff's familiarity and confidence in using AI tools effectively. Moreover, investment in infrastructure and support systems is essential to ensure equitable access to AI technologies, thereby minimizing potential biases in educational outcomes.

For future research, longitudinal studies could examine how attitudes toward AI evolve, particularly as exposure increases and institutional policies mature. Further studies could explore discipline-specific needs and challenges in AI integration, as adoption and impacts may vary across academic fields.

### Value of the Theoretical Framework

Applying the Complex Adaptive Systems (CAS) theory and the Technology Acceptance Model (TAM) provided a robust foundation for understanding the dynamic, interactive, and adaptive processes involved in AI adoption in higher education. CAS illuminated the non-linear, evolving nature of institutional adaptation to AI technologies, while TAM offered insights into how individual perceptions of usefulness and ease of use influence acceptance. These dual frameworks enriched the analysis by linking micro-level individual attitudes with macro-level institutional dynamics.

## CONCLUSION

This research underscores a positive reception towards integrating AI into higher education, highlighting its potential in teaching, assessment, and research. Stakeholders, including students and academic staff, recognise the importance of considering various factors for effective and fair integration. While AI offers efficiency, accuracy, and accessibility benefits, it is emphasised that human involvement remains essential. Despite AI's capacity for personalised learning, instant

 

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feedback, and streamlined grading, human educators and researchers bring indispensable qualities like nuanced understanding, empathy, and contextual interpretation. Effective teaching, comprehensive assessment, and ethical research demand a balance between leveraging AI's capabilities and preserving human judgment and intervention.

Institutions must navigate the integration of AI with sensitivity, understanding that while it accelerates processes like data analysis and hypothesis generation, human creativity, intuition, and domain expertise remain vital. Collaborative efforts that blend AI's strengths with human intelligence can optimise educational outcomes while addressing ethical considerations and ensuring transparency. By striking this balance, academic institutions can provide holistic support and engagement to learners while upholding the integrity of educational practices in a technologically advancing landscape.

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**Declaration of Interest Statement**

The authors report there are no competing interests to declare.

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