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Artificial Intelligence Powered Assessment in Mathematics: Teachers' Awareness and Utilisation in Nigeria

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Abstract

This study examined mathematics teachers' awareness and utilisation of AI-powered assessment, focusing on the relationship between awareness and utilisation, as well as gender differences. A descriptive cross-sectional survey design was adopted. Participants comprised 178 respondents purposively selected from all mathematics teachers in Ijebu Ode Local Government Area, Ogun State, Nigeria. Data were collected using the Artificial Intelligence in Mathematics Assessment Questionnaire (AIMAQ) and analysed using mean, correlation, and *t*-test. Findings revealed high awareness of AI-powered assessment but low utilisation. A strong significant positive relationship existed between awareness and utilisation. Significant gender differences were also found in awareness and utilisation, with male teachers reporting higher mean scores. The study recommends practical professional development and gender-sensitive support to enhance effective adoption of AI-powered assessment in mathematics classrooms.

Keywords: *Artificial intelligence, AI awareness, AI utilisation, Mathematics assessment, Gender differences*

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INTRODUCTION

Every nation desires social, economic, and political development, and education has been regarded as the tool to achieve these national development goals. According to the Federal Republic of Nigeria (FRN, 2014), through the National Policy on Education, education is an aggregate tool of empowerment for people with low incomes and the socially marginalised groups; it is also an effective means of developing the full capacities and potentials of human resources, as well as developing a competent workforce through the acquisition of practical life skills relevant to the world of work, as a veritable means of developing sound intelligent learning societies, fit for and relevant to the 21st century. The extent of the citizenry's attainment of the laudable objectives and the quality of their attainment can only be measured through the assessment methods employed by the teachers. The policy also stated that the purpose of the assessment is to measure students' abilities accurately. The Organisation for Economic Co-operation and Development (2023) argued that the crux of student assessment is to focus on the most important aspects of education, centring on each student's learning progress and outcomes. It is to determine what students know and can do, and to help students advance in their learning and make informed decisions on their next steps. Menéndez et al. (2019) also described assessment as practical activities carried out daily in the school system by the teachers to guide instructional delivery and systematically identify learners' needs. According to the authors, the activities are important for improving learning quality, recognising students' strengths and difficulties, and enhancing teaching practices.

As in any other subject, assessment is one of the most salient aspects of mathematics education, and its main purpose is to foster a classroom environment where students perceive it as a source of motivation or inspiration rather than punishment or criticism. It goes beyond merely assigning grades or judging performance. When implemented effectively, it can promote curiosity, engagement, self-efficacy, and a sustained drive for improvement. In mathematics education, assessment refers to the systematic process of gathering, interpreting, and using evidence of students' mathematical knowledge, understanding, skills, and attitudes to inform instructional decisions, monitor progress, and improve learning outcomes (Nortvedt & Buchholtz, 2018). It plays a crucial role in students' learning and development in mathematics, primarily because feedback from assessments can significantly influence students' behaviour, attitudes, and overall engagement, either positively or negatively.

Mathematics, by its nature, requires constant assessment of learners' knowledge and understanding, given its cumulative structure and global relevance. It is widely regarded as a compulsory subject in many educational systems around the world, for instance, in Nigeria, a credit pass in mathematics has traditionally been a core requirement for admission into higher institutions, highlighting its importance in students' academic progression (Ezimadu et al., 2024; Gada & Muhammed, 2025; Ituma et al., 2025). However, when assessment is poorly designed or ineffectively implemented, it can produce negative consequences for learners, such as mathematics anxiety, which, in turn, can hinder students' confidence and reduce their willingness to participate in classroom activities. Ineffective assessment practices may discourage deep learning, promote rote memorisation, and limit students' ability to develop critical thinking and problem-solving skills. Therefore, the manner in which assessment is conducted in mathematics classrooms is crucial, as it can either enhance meaningful learning and engagement or create barriers that impede students' academic growth. In Nigeria, continuous assessment is the predominant method for evaluating students' learning in mathematics and other subjects, using quizzes, assignments, tests, and classroom activities (Babatimehin et al., 2025).

This approach replaced the earlier "one-shot" examination system, which relied solely on end-of-term assessments and often promoted examination malpractice (Awofala & Veronica, 2013; Yashim & Jibrim, 2020). Introduced through the National Policy on Education in 1977, continuous assessment was designed to provide a more comprehensive and holistic evaluation of students' cognitive, affective, and psychomotor development (Ayodele, 2015; Babatimehin et al., 2025). However, despite its intended benefits, its implementation has been constrained by several challenges, including large class sizes, increased teacher workload, difficulties in record-keeping, poor handling of scores and feedback to students, lack of standardisation, concerns about reliability, subjectivity, time constraints, and inconsistent grading (Akoroda & Ugboh, 2015; Umeji, 2025). These challenges are not unique to Nigeria, as similar assessment issues have been reported in schools across other African countries (Mohammedseid, 2018; Dagnachew & Sewagegn, 2020; Senouci, 2022). Integrating technological tools, such as artificial intelligence–powered assessment, has the potential to tackle these challenges by enabling individualised feedback tailored to each learner's needs while promoting objective, impartial assessment processes.

The Nigerian government has already set a clear agenda to digitise the education sector by stating that Information and Communication Technology (ICT) will be incorporated into all tiers of education (FRN, 2014). These and other transformations, such as the introduction of the Digitised National Education Management Information System (DNEMIS) by the Federal Government of Nigeria in 2026 and the launching of OgunLEARN and the "Digital Literacy for All (DL4ALL)" initiative, which aims to achieve 95% digital literacy among citizens by 2030, point to the provision of infrastructure to enable teachers to incorporate digital assessment. Therefore, encouraging teachers to adopt AI-powered assessment tools in mathematics classrooms aligns with this vision.

As education stands on the brink of a digital revolution, the importance of navigating this new landscape effectively has never been greater (Srivastava, 2023). The widespread presence of technology has led to the emergence of interactive AI assistants such as ChatGPT, Gemini, Magicschool AI, Khamingo, ALEKS, Knewton, Gradescope, Quizizz, as well as Online platforms, Virtual classrooms, and Digital resources. Artificial Intelligence, a field within computer science dedicated to creating machines that can learn and solve problems, mimic human intelligence, including natural language understanding, pattern recognition, and data-driven decision-making, has established a distinct role in the realm of education (Kaur, 2021; Owan et al., 2023; Ayeni et al., 2024).

With the integration of artificial intelligence, teachers can now automate assessment and grading, provide personalised feedback, generate standardised questions, and enhance instructional delivery (Vinothkumar & Saratha, 2024). These tools are readily accessible on smartphones, tablets, and laptops, enabling teachers to generate questions and conduct effective assessments in real time regardless of class size, while reducing the burden of manual grading and feedback. Despite the potential of artificial intelligence to address many assessment challenges, its adoption in mathematics classrooms remains uncertain and uneven, particularly in developing contexts such as Nigeria. Although much literature exists on AI-powered assessment globally (Owan et al., 2023; Morris et al., 2024; Clark et al., 2025; Fartușnic et al., 2025), existing studies in Nigeria have largely focused on its integration into instructional practices, as well as teachers' and students' awareness, perceptions, and general usage (Hassan & Harande, 2025; Okafor & Anyanwu, 2025; Olarewaju et al., 2025). However, comparatively limited attention has been given to its specific application in automating assessment processes in mathematics classrooms in Nigeria.

In a patriarchal system such as Nigeria, gender appears to be particularly significant among various factors that may influence teachers' awareness and utilisation of AI-powered assessment tools in mathematics classrooms. This is because both mathematics and technology domains have traditionally been perceived as male-dominated fields, a perception reinforced in many African societies, including Nigeria, where males are often expected to assume more technical and demanding roles. As a result, within Nigerian schools, subjects such as mathematics are more frequently assigned to male teachers (Ajai & Imoko, 2014). Gender refers to the socially constructed roles, behaviours, expressions, and identities that a society considers appropriate for men, women, and other gender identities. It is distinct from biological sex, which refers to the physical and physiological characteristics (such as chromosomes, hormones, and reproductive organs) typically associated with being male or female. The literature on gender and the adoption of artificial intelligence in the classroom presents diverse views and findings. Some studies indicate that gender significantly influences the adoption of AI technologies, with males generally demonstrating more positive attitudes, higher self-efficacy, and greater intention to use AI tools than females (Møgelvang et al., 2024; Grassini et al., 2025; Matobobo, 2026). Conversely, other studies report no significant gender differences, suggesting that factors such as institutional support, training, and perceived usefulness play a more critical role in determining AI adoption among educators (Viberg et al., 2023; Iddrisu et al., 2025). These varying findings indicate that the role of gender in AI classroom adoption remains inconclusive and calls for further investigation. Hence, gender is selected for investigation in this study to determine how it affects teachers' awareness of Artificial Intelligence for assessment in the mathematics classroom.

The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) serves as the theoretical foundation for this study. The theory posits that performance expectancy, effort expectancy, social influence, and facilitating conditions determine individuals' behavioural intention and actual use of technology. In practical terms, UTAUT suggests that when teachers are deciding whether or not to adopt technology, in this case AI-powered assessment tools, they consciously or unconsciously consider whether the tool will enhance their effectiveness and make their work faster (performance expectancy), whether it is easy to use (effort expectancy), whether it is supported or used by colleagues and relevant authorities (social influence), and whether the necessary resources and support are available for its use (facilitating conditions). These constructs may positively or negatively influence mathematics teachers' awareness and utilisation of AI-powered assessment. For example, teachers who perceive AI-powered assessment tools as easy to use are more likely to seek out information about them, thereby increasing their awareness. Similarly, social influence, such as encouragement from school leadership or colleagues, can expose teachers to these tools and motivate initial exploration. Facilitating conditions, including access to training, internet connectivity, and institutional support, may enhance both awareness and actual usage.

Conversely, limited resources, low perceived usefulness, or lack of support may hinder awareness and reduce utilisation. In many cases, teachers may lack the necessary knowledge, skills, or institutional support required to integrate artificial intelligence into their assessment practices. Yet, there are persistent challenges of workload, inefficient feedback mechanisms, and assessment inconsistencies, which may continue to hinder effective mathematics teaching and learning. This situation creates a gap between the potential benefits of artificial intelligence and its actual application in mathematics classroom assessment. Therefore, it becomes necessary to explore teachers' levels of awareness and utilisation of artificial intelligence-powered mathematics assessment, as well as differences in awareness and utilisation by gender. The study addressed the following research questions: (RQ1) the level of awareness of AI-powered assessment among mathematics teachers and (RQ2) the extent of mathematics teachers' utilisation of AI tools for assessment processes.

METHODS

Research Design

The study adopted a descriptive cross-sectional survey research design. This design allows researchers to collect data from respondents at a single point in time without manipulating the variables of interest (Thomas, 2020). According to Hunziker and Blankenagel (2024), a cross-sectional design helps researchers conduct cross-case analysis

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of their data. It also helps to generalise relationships between different elements and their criteria. The beauty of the design is that researchers can establish general models that connect several elements under the specified conditions. Hence, this design is appropriate for this study.

Population

The target population comprised all mathematics teachers in public and private primary and secondary schools in Ijebu-Ode Local Government Area of Ogun State, South-West, Nigeria.

Sample and Sampling Techniques

The sample comprised 178 mathematics teachers from both primary and secondary schools in Ijebu-Ode Local Government Area of Ogun State, purposively selected based on their subject specialisation and active involvement in teaching mathematics. In Nigerian primary schools, teachers are assigned to teach all the subjects in their class regardless of their professional qualifications. However, some, due to their years of experience in teaching mathematics at that level, have been designated as mathematics teachers. These types of teachers were included after identifying mathematics as their teaching subject and confirming active classroom engagement in mathematics instruction at the time of data collection.

Instrumentation

The instrument employed for the study was the 20-item researcher-developed Artificial Intelligence in Mathematics Assessment Questionnaire (AIMAQ). The instrument has 3 sections. Section A collected respondents' demographic data, while Section B measured teachers' awareness of artificial intelligence-powered assessment in mathematics classrooms. Section C measured teachers' utilisation of AI assessment during mathematics instruction. The respondents comprised 47.2% male and 52.8% female teachers. A four-point Likert scale followed each item in sections B and C: strongly agree (4), agree (3), disagree (2), and strongly disagree (1). To establish the face and content validity, the instrument was reviewed by specialists in mathematics education and test construction at Olabisi Onabanjo University, Ago-Iwoye, Nigeria. The experts evaluated the items for relevance, clarity, and alignment with the study variables, and their suggestions and recommendations were incorporated to improve the instrument's adequacy in measuring teachers' awareness and utilisation of AI-powered mathematics assessment. The instrument's reliability was determined by administering it to 20 mathematics teachers in Ijebu-North Local Government, with 10 from primary and 10 from secondary schools. The respondents' scores were subjected to Cronbach's alpha, yielding a reliability coefficient of .92, indicating acceptable internal consistency among the items.

Procedure for Data Collection

Before data collection, permission was obtained from the relevant school authorities. The instrument was administered to participants in person and online via a Google Form link sent to the email and WhatsApp groups of mathematics teachers. The participants were informed that their responses would not be judged as right or wrong and that they could choose not to participate if they wished, i.e., their involvement was voluntary and unrelated to their academic work.

Method of Data Analysis

The collected data were analysed using descriptive statistics, including frequencies, means, and standard deviations. Inferential statistics, including t-tests and correlations, were also employed to test the formulated hypotheses. The data analysis was conducted using the Statistical Packages for Social Sciences (SPSS) version 27. The criterion mean of 2.5 was used as the decision threshold. Any mean score below 2.5 is adjudged to be low awareness, while a mean score above this threshold is regarded as high awareness. The cut-off point is derived from the midpoint of the four-point Likert scale.

Hypothesis

The following null hypotheses were tested in this study at a 5% level of significance:

H_{01}**:** There is no significant relationship between mathematics teachers' awareness and utilisation of AI-powered assessment.

H_{02}**:** There is no significant difference in AI-powered assessment awareness between male and female mathematics teachers.

H_{03}**:** There is no significant difference in the utilisation of AI-powered assessment between male and female mathematics teachers.

RESULTS AND DISCUSSION

Results

The findings of the study are presented in this section according to the research questions and hypotheses formulated to examine mathematics teachers' awareness and utilisation of AI-powered assessment.

RQ1**:** Are mathematics teachers generally aware of AI-powered assessment?

Table 1 presents the descriptive analysis of mathematics teachers' awareness of AI-powered assessment. The cut-off point for determining the level of awareness was set at 2.50, derived from the midpoint of the four-point Likert scale. Based on this criterion, items with mean scores of 2.50 or higher were classified as indicating high awareness, while those with mean scores below 2.50 were classified as indicating low awareness.

The results showed that mathematics teachers reported a high level of awareness of AI tools used in education, as reflected in Item 1 (M = 3.55, 88.75%). Similarly, Items 2 (M = 3.06, 76.50%), 3 (M = 3.36, 84.00%), 5 (M = 2.82, 70.50%), and 8 (M = 3.18, 79.50%) recorded mean scores above the criterion mean, indicating high awareness of the use of AI in grading mathematics assignments, generating test items, and providing automated feedback on students' mathematics work. In addition, Item 4 (M = 2.64, 66.00%) showed that respondents reported exposure to training or workshops related to AI in assessment, which was also classified as high awareness. However, Items 6, 7, 9, and 10 recorded mean scores below the criterion mean of 2.50, indicating low awareness of specific assessment tools such as Gradescope (M = 2.32, 58.00%), Quizizz (M = 2.32, 58.00%), ALEKS (M = 2.34, 58.50%), and Socrative (M = 2.37, 59.25%), respectively. The grand mean score for awareness is 2.80, indicating that, in general, mathematics teachers demonstrated a high level of awareness of AI-powered assessment.

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Table 1. Descriptive Analysis of Mathematics Teachers' Awareness of AI-powered Assessment.

S/N	Items	Mean	Percentage	Category
1	I am aware of Artificial Intelligence (AI) tools used in education.	3.55	88.75%	High
2	I am aware that AI can automatically grade mathematics assignments.	3.06	76.50%	High
3	I have heard of AI tools that generate mathematics test items automatically.	3.36	84.00%	High
4	I have not been exposed to any training or workshop related to AI in assessment.	2.64	66.00%	High
5	I understand how AI tools work in automating mathematics assessment.	2.82	70.50%	High
6	I am aware of a tool called Gradescope that can assist with math grading	2.32	58.00%	Low
7	I know Quizizz as an AI assessment and feedback tool for math learning	2.32	58.00%	Low
8	I know that AI tools can provide automated feedback on students' mathematics work	3.18	79.50%	High
9	I am aware that ALEKS uses AI to assess students' math skills adaptively	2.34	58.50%	Low
10	I know about tools like Socrative for AI-driven assessments	2.37	59.25%	Low

(Cut-off = 2.50, 63%)

RQ2**:** Are mathematics teachers utilising AI tools for assessment processes?

Table 2 presents the descriptive analysis of mathematics teachers' utilisation of AI-powered assessment. The cut-off point of 2.50 was obtained by calculating the midpoint of the 4-point Likert scale. This implies that points above 2.50 were categorised as high utilisation, while points below 2.50 were categorised as low utilisation.

Table 2. Descriptive Analysis of Mathematics Teachers' Utilisation of AI-powered Assessment.

S/N	Items	Mean	Percentage	Category
1	I have used AI to grade mathematics assignments	2.55	63.75%	High
2	I have used AI to create mathematics test questions	2.67	66.75%	High
3	I regularly use AI as part of my mathematics assessment process	2.53	63.25%	High
4	I feel confident using AI in assessing students' mathematics work	2.57	64.25%	High
5	I encourage other teachers to explore AI tools for assessment purposes	2.74	68.50%	High
6	I have introduced AI tools like ChatGPT or Khanmigo to my students	2.44	61.00%	Low
7	I have tried using Gradescope to score math responses automatically	2.15	53.75%	Low
8	I have used ALEKS or Mathia for individualised student assessments	2.19	54.75%	Low
9	I have used Socrative to assess math understanding in real-time	2.20	55.00%	Low
10	I analyse students' performance using insights generated by AI tools	2.44	61.00%	Low

(Cut-off = 2.50, 63%)

The results showed that Item 1 (M = 2.55, 63.75%), Item 2 (M = 2.67, 66.75%), Item 3 (M = 2.53, 63.25%), Item 4 (M = 2.57, 64.25%), and Item 5 (M = 2.74, 68.50%) recorded mean scores above the criterion mean, indicating high utilisation of AI for grading mathematics assignments, creating mathematics test questions, integrating AI into mathematics assessment processes, using AI confidently in assessing students' mathematics work, and encouraging other teachers to explore AI tools for assessment purposes. However, items 6, 7, 8, 9, and 10 recorded mean scores below the criterion mean, indicating low utilisation. Specifically, Item 7 (M = 2.15, 53.75%) indicated low utilisation of Gradescope for scoring mathematics responses, and Item 8 (M = 2.19, 54.75%) showed low utilisation of ALEKS or MATHia for individualised student assessment. In contrast, Item 9 (M = 2.20, 55.00%) indicated low utilisation of Socrative for real-time mathematics assessment. Overall, five out of the ten items were rated above the criterion mean and classified as high utilisation. In comparison, five items were rated below the criterion mean and classified as low utilisation. The grand mean score for utilisation is 2.45, indicating that, in general, mathematics teachers demonstrated a low level of AI utilisation for assessment.

To determine whether a significant relationship exists between mathematics teachers' awareness and utilisation of AI-powered assessment, the following null hypothesis was tested:

H_{01}**:** There is no significant relationship between mathematics teachers' awareness and utilisation of AI-powered assessment.

Table 3. Pearson Correlation Analysis of Mathematics Teachers' Awareness and Utilisation of AI-Powered Assessment

	Awareness	**Utilisation**
Awareness	1	.70**
p		.00
N	178	178
Utilisation	.70**	1
p	.00	
N	178	178

** $p < 0.05$

Table 3 presents the Pearson product-moment correlation analysis of the relationship between AI-powered assessment awareness and utilisation among mathematics teachers. The result reveals a strong positive relationship between mathematics teachers' awareness and utilisation of AI-powered assessment (r = 0.70, p = 0.00). This indicates that increases in awareness are associated with corresponding increases in utilisation among respondents. Since $p < 0.05$, the null hypothesis stating that there is no significant relationship between mathematics teachers' awareness and utilisation of AI-powered assessment is rejected.

The study further tested whether teachers' awareness of AI-powered assessment is significantly influenced by gender. The null hypothesis stated that:

H_{02}**:** There is no significant difference in the awareness of AI-powered assessment among male and female mathematics teachers.

Table 4. *t*-test Analysis of Mathematics Teachers' Awareness of AI-powered Assessment by Gender.

Gender	N	Mean	Std. Deviation	*t*	*p*
Male	84	28.31	4.45	2.25	.03*
Female	94	26.81	4.45		

$p < 0.05$

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Presented in Table 4 is the independent sample *t*-test analysis of the difference in awareness of AI-powered assessment between male and female mathematics teachers. The result showed that male mathematics teachers (M = 28.31, SD = 4.45, n = 84) had a higher mean awareness score than their female teachers (M = 26.81, SD = 4.45, n = 94). The result of Levene's test for equality of variances was not significant (F = 0.03, p = 0.86), indicating that the assumption of homogeneity of variance was met. Therefore, the equal-variance assumption was adopted for interpretation. The Independent-samples t-test revealed a significant difference in AI-powered assessment awareness between male and female mathematics teachers, $t(176) = 2.25$, $p = 0.03$. MD = 1.50, with a 95% confidence interval ranging from .18 to 2.82. Since $p < 0.05$, the null hypothesis that there is no significant difference in AI-powered assessment awareness between male and female mathematics teachers is rejected.

To examine whether there is a significant gender difference in the utilisation of AI-powered assessment among mathematics teachers, the following null hypothesis was tested:

***H_{03}*:** There is no significant difference in utilisation of AI-powered assessment between male and female mathematics teachers.

Table 5. *t*-test Analysis of Mathematics Teachers' Utilisation of AI-powered Assessment by Gender.

Gender	N	Mean	Std. Deviation	*t*	*p*
Male	84	25.13	4.89	2.01	.04*
Female	94	23.44	6.21		

p <0.05

Table 5 presents the *t*-test analysis of mathematics teachers' utilisation of AI-powered assessment by gender. The result showed that male mathematics teachers (M = 25.13, SD = 4.89, N = 84) recorded higher mean utilisation of AI-powered assessment than female teachers (M = 23.44, SD = 6.21, N = 94). Independent sample *t*-test revealed a significant difference in the utilisation of AI-powered assessment between male and female mathematics teachers, $t(173.29) = 2.01$, $p = .04$. The mean difference between the two groups is 1.70, with a 95% confidence interval ranging from 0.05 to 3.34. Since $p < 0.05$, the null hypothesis that there is no significant difference in the utilisation of AI-powered assessment between male and female mathematics teachers is rejected.

Discussion

This study examined the awareness and utilisation of AI-powered assessment among mathematics teachers in Ogun State, South-West, Nigeria, focusing on relationships and differences in awareness and utilisation based on gender. Findings of this study provide important insights into the emerging role of artificial intelligence in mathematics assessment within the Nigerian educational context. The findings reveal a high level of awareness among Nigerian primary and secondary mathematics teachers regarding AI-powered assessment automation, with a grand mean (2.8) exceeding the threshold (2.5). This outcome supports international scholarship that awareness is pivotal for the adoption of technology, in line with models such as the Technology Acceptance Model (Davis, 1989) and the Diffusion of Innovations theory (Rogers, 1983), in which knowledge and perceived usefulness precede meaningful integration. This teacher's high awareness of AI-powered assessment automation suggests their readiness for structured professional development focused on the pedagogical integration of the tools into their instructional delivery, with a focus on ethical responsibility and data literacy, which the United Nations Educational, Scientific, and Cultural Organisation (UNESCO, 2021) regarded as key

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competencies for implementing AI in education rather than merely on tool familiarity.

From a global perspective, the findings reveal that the gap in AI engagement in education between developed countries and low-resource nations such as Nigeria is narrowing. Therefore, these findings indicate that the global digital divide is better perceived as an implementation divide rather than a knowledge divide. The demonstrated awareness among Nigerian teachers challenges assumptions of technological lag in Sub-Saharan Africa and underscores the globalisation of AI discourse in educational systems. For the international research community, this study reinforces calls for context-sensitive, equity-driven AI implementation frameworks that recognise diverse infrastructural realities while leveraging teachers' emerging readiness and professional agency.

However, the findings revealed a low level of use of the AI assessment tool by the teachers. This awareness–use dichotomy has been well documented in technology adoption literature. For instance, both the Technology Acceptance Model (Davis, 1989) and the Diffusion of Innovations theory (Rogers, 1983) emphasise that awareness alone does not guarantee implementation because actual use is shaped by perceived ease of use, institutional support, infrastructure, and alignment with pedagogical goals. Previous studies on AI in education have similarly revealed that teachers' familiarity with the AI tools does not make its integration into classroom practice seamless, due to limited technical capacity, inadequate professional development, ethical concerns, and a lack of contextualised guidance (Holmes et al., 2022). In mathematics education specifically, it has been reported that the effective use of automated feedback and assessment systems requires both technical knowledge and pedagogical content knowledge, enabling teachers to interpret AI-generated outputs meaningfully (Zawacki-Richter et al., 2019). The low utilisation observed in this study, therefore, suggests structural and capacity-related barriers rather than resistance or a lack of interest.

For educational practice in Nigeria, these findings call for a shift from AI education awareness campaigns to deliberate, sustained, practice-embedded professional development, improved digital infrastructure, and a clear policy framework targeted at addressing ethical and data governance concerns. The education systems should prioritise implementation models that merge technical training with collaborative endeavours. These efforts may assist teachers in low-resourced nations to utilise AI tools aligned with curriculum objectives. These findings, in the global context, underscore gaps in equitable AI integration, supporting UNESCO's (2021) warning that, without deliberate capacity-building, AI may worsen existing global educational inequalities. Thus, these findings point to the fact that pathways to AI adoption in under-resourced nations are non-linear and call for global AI implementation frameworks that consider contextual factors, infrastructure investment, and teacher professional development to translate technological innovation into meaningful transformation rather than just an awareness drive. In addition, awareness was found to have a strong positive relationship with utilisation, while gender significantly differentiated both awareness and utilisation.

The findings show that the digitisation of education in Nigeria is at a transformative moment. Concurring with previous studies (Samaila et al., 2024; Olarewaju et al., 2025), mathematics teachers demonstrated a high level of awareness of AI-powered assessment, including its capacity to automate grading, generate test items, and provide feedback (Ade-Ibijola et al., 2025; Jukiewicz & Wyrwa, 2026). This suggests that AI has achieved conceptual visibility within the Nigerian education space, likely facilitated by the widespread availability of AI-enabled tools on smartphones and other internet-connected devices, as well as national and subnational digital reform efforts such as the National EdTech Strategy and state-level initiatives like Ogun Learn. Importantly, the strong positive relationship between awareness and utilisation reinforces established technology adoption theories (Davis, 1989; Rogers, 1983), which have shown that knowledge and perceived usefulness are precursors to technology implementation. However, despite this readiness, overall utilisation remains comparatively low, indicating that Nigeria may be transitioning from cognitive acceptance to the more demanding stages of pedagogical integration. Ertmer and Ottenbreit-Leftwich (2010) described the gap as the "second-order" barriers to technology integration, including beliefs, confidence, contextual constraints, and institutional capacity, which often persist even after awareness has been achieved.

The finding that gender significantly differentiates both awareness and utilisation introduces an important equity dimension to AI integration. The literature on digital technologies has already documented gender differences in access, confidence, and participation in technology-mediated environments, particularly in developing contexts (UNESCO, 2021). If gender differences shape AI engagement among mathematics teachers, then digitisation reforms must be intentionally inclusive to prevent the reproduction of structural inequalities within emerging AI ecosystems. Globally, these findings contribute a nuanced perspective from Sub-Saharan Africa to the growing literature on AI in education, which has been disproportionately concentrated in high-income contexts (Zawacki-Richter et al., 2019). By demonstrating high awareness, a strong awareness–utilisation linkage, and gender-based variation within a rapidly digitising African education system, this study challenges digital divide narratives. It highlights the complex, non-linear nature of AI adoption. For the international community, Nigeria's experience illustrates that policy-driven digital exposure can effectively build cognitive readiness, but sustained professional development, infrastructure support, and equity-sensitive implementation strategies are essential to translate awareness into transformative classroom practice.

CONCLUSION AND SUGGESTIONS

This study investigated the awareness and utilisation of AI-powered assessment among primary and secondary school mathematics teachers in Ijebu Ode Local Government Area of Ogun State, Nigeria. The findings indicate that while teachers demonstrate high awareness of AI applications in assessment, including automated grading, feedback generation, and test item construction, actual utilisation remains comparatively low. A strong positive relationship between awareness and utilisation suggests that cognitive readiness is an important precursor to classroom implementation. However, the persistence of low usage levels signals systemic, pedagogical, or capacity-related barriers that constrain translation of awareness into practice. The study further revealed significant gender differences in both awareness and utilisation, with male teachers reporting higher levels than their female counterparts. Both findings portray a system at a transitional stage of digital integration, indicating that AI has achieved conceptual visibility among mathematics teachers, yet meaningful pedagogical adoption is still emerging. It is evident from these findings on the awareness–utilisation gap and the moderating role of gender that the study contributes context-specific evidence from sub-Saharan Africa, such as Nigeria, to the broader global discourse on equitable and sustainable AI integration in education.

The implications for policy and practice are clear. It underscores the need for awareness-building initiatives to evolve into sustained, practice-embedded professional development that enables teachers to apply AI tools in authentic assessment contexts. Training should emphasise pedagogical alignment, ethical use, and data literacy, ensuring that AI enhances rather than replaces professional judgment. In addition, institutional support structures such as reliable digital infrastructure, access to tools, peer collaboration, and leadership commitment are essential to move teachers from exposure to effective implementation. Specifically, the observed gender gaps call for gender-responsive capacity-building strategies, including targeted mentoring, inclusive digital training models, and deliberate efforts to address structural barriers that may limit female teachers' participation in technology-mediated innovation.

This study has its limitations. These include data collection from mathematics teachers within a single Local Government Area in Ogun State; therefore, the findings cannot be generalised to all regions of Nigeria or other national contexts without caution. Variations in infrastructure, policy implementation, and socio-cultural dynamics across states may yield different patterns of awareness and utilisation. In addition, the study focused primarily on gender as a differentiating variable. Future research should adopt broader analytical frameworks that examine additional predictors such as age, years of teaching experience, ICT competence, school type (public/private), leadership support, and access to digital infrastructure. Mixed-methods or longitudinal designs would also provide deeper insight into how awareness evolves into sustained utilisation over time. This expands the study across multiple states, and conducting cross-national comparisons within Africa would further strengthen the understanding of AI adoption pathways and enhance the international relevance of this line of inquiry.

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