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AI LITERACY AND TEST ITEM CONSTRUCTION COMPETENCE AMONG SECONDARY SCHOOL TEACHERS IN CROSS RIVER STATE

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ABSTRACT

This study examined the relationship between AI literacy and test item construction competence among secondary school teachers in Cross River State, Nigeria. Four objectives and five hypotheses guided the study. A cross-sectional correlational survey design was adopted. The population comprised 4,003 teachers in 290 public secondary schools across the three education zones in Cross River State. A sample of 421 teachers was determined using Cochran's finite population formula and selected through stratified proportionate and systematic sampling techniques. Data were collected using the Artificial Intelligence Literacy and Test Item Construction Competence Questionnaire (AILTICQ). The instrument was face- and content-validated by experts in Educational Measurement and Educational Technology. At the same time, reliability coefficients of 0.91 and 0.88 were obtained for the AI Literacy Scale and Test Item Construction Competence Scale, respectively, using Cronbach's alpha. Data collection was carried out with the assistance of trained research assistants. Descriptive statistics, Pearson Product-Moment Correlation, and hierarchical multiple regression were used for data analysis at the 0.05 level of significance. The findings revealed moderate levels of AI literacy and test item construction competence among teachers. AI literacy had a significant positive relationship with test item construction competence and significantly predicted competence even after controlling for subject specialisation and prior exposure to AI tools. The study concluded that stronger AI literacy may improve the quality of classroom assessments. It was recommended that teachers receive regular practical training in AI literacy and assessment.

Keywords: Test item construction, AI literacy, classroom assessment, teacher competence, secondary school teachers.

INTRODUCTION

Artificial intelligence (AI) is steadily changing how educational assessment is conducted, from automated marking of extended responses to the generation and alignment of examination questions with curriculum goals (Morris et al., 2025; Owan et al., 2023). Large language models and other generative tools can now produce different types of test items and feedback at scale. However, evidence indicates that AI-generated content does not always align with accuracy, fairness, or curriculum expectations, so careful human checking and validation are still necessary (Maity & Deroy, 2024; Nikolovski et al., 2025; Omopekunola & Kardanova, 2024). In this human–AI co-production situation, teachers are increasingly expected to review, adjust, and validate AI-supported assessment materials as part of their professional responsibilities (Yan et al., 2024).

This development has highlighted AI literacy as a set of interconnected abilities, including awareness of AI systems, ethical reasoning, critical evaluation of outputs, and informed classroom use (Bohari et al., 2025). Concerns about the responsible and ethical use of generative AI tools in educational settings have also continued to attract growing scholarly attention (Ofem et al., 2025). Prior studies suggest that while many teachers demonstrate motivation and ethical awareness, their actual understanding of, and confident use of, AI tools remain limited (Le et al., 2026). In addition, AI literacy is increasingly understood as a developing competence in which awareness supports ethical judgment, evaluation, and practical use (Al-Abdullatif, 2025). Recent predictive studies further suggest that awareness and perception may significantly influence preparedness for AI use across professional and educational settings (Dan et al., 2026). These issues raise concerns about how ready teachers are to serve as responsible guides in the use of AI in education (Bali et al., 2024; Daher, 2025).

In classroom assessment practice, findings consistently point out weaknesses in how teachers construct test items. Many teachers still design items that focus on lower-order thinking and face difficulties with content coverage, option writing, and overall test quality (Kissi et al., 2023). Evidence from Nigeria and similar settings also indicates low to moderate competence in linking items to cognitive levels, using test blueprints, and constructing valid multiple-choice questions (Ehigbor & Osumah, 2023; Simon et al., 2024). Even where training is available, improved knowledge does not always translate into effective classroom practice (Agama & Agboro, 2025; Bucio & Baguio, 2025). This situation points to a persistent gap between what teachers know and what they actually apply in assessment.

The arrival of generative AI adds another layer to these challenges. Research indicates that large language models can sometimes produce assessment items that resemble human work (Maity & Deroy, 2024; Omopekunola & Kardanova, 2024). However, many of these items still require major

revision due to misalignment with the objectives, unclear wording, and an unsuitable level of difficulty (Nikolovski et al., 2025; Yan et al., 2024). Even AI-based scoring systems still depend on human judgment to ensure fairness and clear interpretation (Morris et al., 2025). For this reason, teachers are now involved not only in creating assessments but also in reviewing and refining AI-generated content, which makes AI literacy increasingly important for assessment quality. Recent discussions further point to the growing relevance of AI tools in educational measurement, classroom assessment, and feedback systems (Owan et al., 2023).

In Sub-Saharan Africa, there is growing interest in AI tools, although several structural and capacity challenges still exist. Regional evidence points to training opportunities, institutional readiness, and digital skills as key factors influencing AI adoption (Bali et al., 2024). In Nigeria, teachers' use of AI tools is influenced by perceived usefulness, ease of use, and confidence with technology (Ayanwale et al., 2025). Similar patterns of AI acceptance and use have also been reported among Nigerian higher education learners (Owan et al., 2025). Studies within Nigerian educational settings also indicate growing behavioural acceptance of generative AI technologies among learners and educational users (Mohammed et al., 2026). However, these existing investigations focus more on adoption and less on how AI-related skills connect to classroom assessment practices.

Assessment findings in Nigeria and similar settings continue to highlight weaknesses in test-construction skills, particularly in blueprint use, cognitive alignment, and item quality (Agama & Agboro, 2025; Ehigbor & Osumah, 2023; Simon et al., 2024). In addition, emerging discussions separate AI-related competencies from general digital literacy (Bali et al., 2024). Even so, there is still limited empirical work on how teachers' AI literacy relates to their ability to construct test items, particularly in secondary schools in Cross River State. Although global work on AI in education is expanding, much of it still centres on general digital skills, student AI literacy, and technology adoption rather than classroom assessment practice (Bohari et al., 2025; Daher, 2025). Similarly, research on test item construction has mostly focused on traditional assessment literacy without considering AI-related skills (Agama & Agboro, 2025; Kissi et al., 2023; Ehigbor & Osumah, 2023). In Nigeria, including Cross River State, there remains limited empirical evidence on the relationship between AI literacy and test-item construction competence among secondary school teachers (Ayanwale et al., 2025; Bali et al., 2024).

Background characteristics such as teachers' subject specialisation and prior exposure to AI tools may also influence competence in classroom assessment practices. Previous studies further indicate that AI-related behaviours and technology use may vary across demographic and contextual groups within educational settings (Mohammed et al., 2026). Teachers in science, technology, and computer-related subject areas may be more familiar with digital technologies and

AI-supported instructional applications than teachers in other disciplines. Similarly, teachers with previous exposure to AI tools may demonstrate stronger confidence in reviewing, adapting, and using AI-supported assessment materials in classroom practice. These background characteristics are therefore treated as contextual control variables in the present study to account for potential differences in teachers' competence in constructing classroom test items. Given these concerns, this study aims to examine the relationship between AI literacy and test item construction competence among secondary school teachers in Cross River State, Nigeria. Specifically, the study intends to:

1. Determine the level of AI literacy among secondary school teachers in Cross River State across awareness, ethical reasoning, critical evaluation, and use.
2. Assess teachers' competence in constructing classroom test items with respect to cognitive demand and quality criteria;
3. examine the relationship between AI literacy and test item construction competence among secondary school teachers; and
4. Determine whether subject specialisation and prior exposure to AI tools account for differences in teachers' test item construction competence.

Conceptual Framework

This study is grounded in contemporary teacher competence models that combine Technological Pedagogical Content Knowledge (TPACK) with emerging AI literacy frameworks. While TPACK focuses on integrating technology, pedagogy, and content knowledge, recent discussions extend it by treating AI literacy as a separate yet connected component of teacher competence (Aulia et al., 2025). In this study, AI literacy is described as a multidimensional competence that includes awareness of AI systems, understanding of how they work, ethical reasoning, critical evaluation of outputs, and informed use in teaching situations (Al-Abdullatif, 2025; Bohari et al., 2025). Test item construction competence refers to teachers' ability to design assessment items that are cognitively demanding, valid, reliable, clear, and aligned with learning objectives and test blueprints (Agama & Agboro, 2025; Bucio & Baguio, 2025).

Within this framework, AI literacy serves as the explanatory variable influencing how teachers carry out classroom assessment tasks, while test item construction competence represents the outcome variable. Teachers with stronger AI literacy are expected to evaluate AI-generated assessment materials more effectively, make informed instructional decisions, and produce higher-quality classroom test items. The framework also recognises subject specialisation and prior

exposure to AI tools as contextual control variables that may influence teachers' competence in constructing classroom test items. Teachers in science, technology, and computer-related disciplines may be more familiar with AI systems and digital technologies than teachers in other subject areas. Similarly, teachers with previous exposure to AI tools may demonstrate stronger confidence, evaluative ability, and practical engagement with AI-supported educational applications.

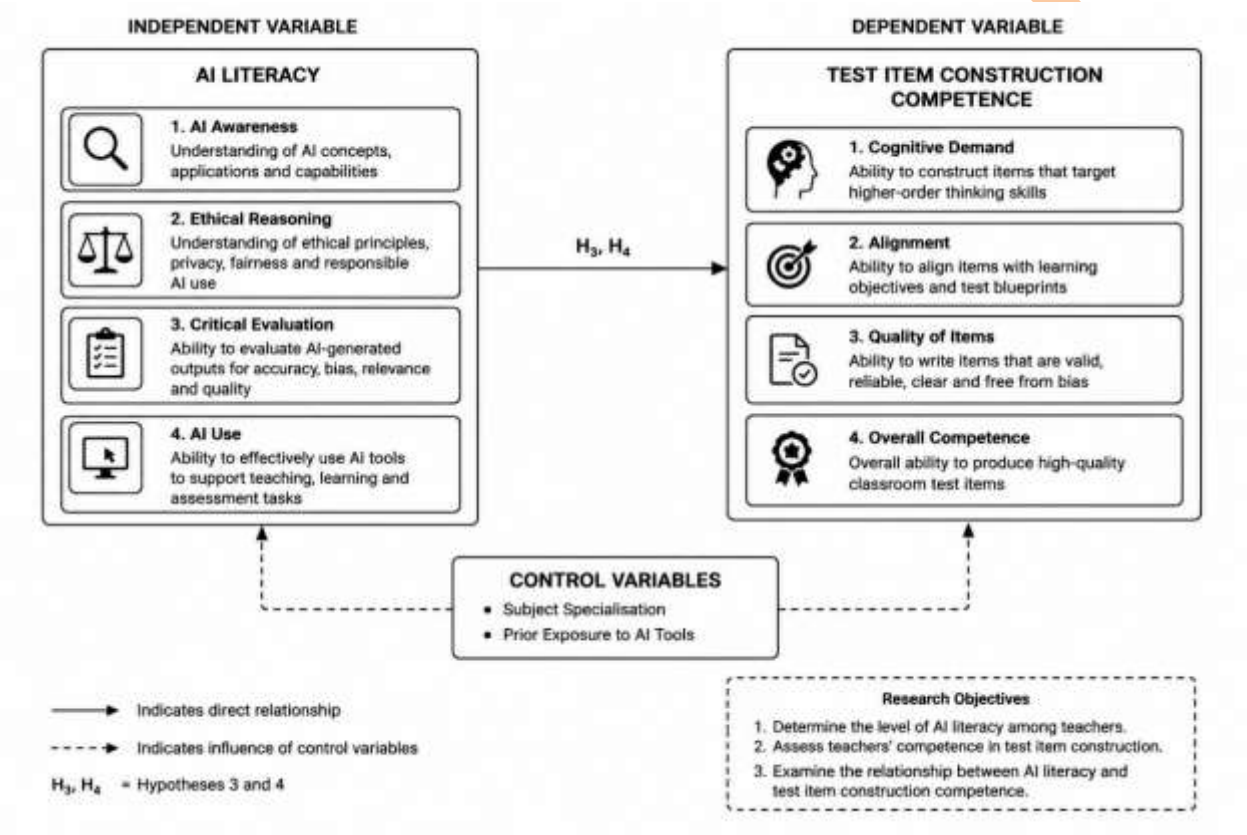

Figure 1. Conceptual framework of the relationship between ai literacy and test item construction competence among secondary school teachers

The conceptual framework posits that AI literacy is positively related to teachers' competence in constructing classroom test items. Specifically, teachers with stronger awareness, ethical reasoning, evaluative competence, and practical use of AI tools are expected to demonstrate better competence in developing classroom assessment items that satisfy accepted quality standards. The

framework further assumes that subject specialisation and prior exposure to AI tools may contribute to variation in teachers' competence in test-item construction. Overall, the framework suggests that improved AI literacy may contribute to better classroom assessment practices among secondary school teachers in Cross River State.

Hypotheses

Based on the conceptual framework and reviewed literature, the following hypotheses are stated:

1. Secondary school teachers in Cross River State will show moderate levels of AI literacy across awareness, ethical reasoning, critical evaluation, and use.
2. Secondary school teachers will report moderate competence in test item construction, especially in designing items that reflect higher-order thinking and meet quality standards.
3. There is a statistically significant positive relationship between teachers' AI literacy and their test item construction competence.
4. AI literacy significantly predicts test item construction competence among secondary school teachers.
5. Subject specialisation and prior exposure to AI tools significantly contribute to variations in teachers' test item construction competence

METHODOLOGY

Research Design

This study adopted a cross-sectional correlational survey design. The design was considered appropriate because the study examined the relationship between AI literacy and test item construction competence among secondary school teachers without manipulating any of the study variables. Cross-sectional correlational designs are widely used in contemporary AI literacy and teacher competence research because they enable the examination of naturally occurring relationships among professional, technological, and instructional variables within educational settings (Al-Abdullatif, 2024; Chiu et al., 2024; Sperling et al., 2024). The correlational approach was particularly suitable because the study focused on determining the extent to which teachers' AI literacy predicts competence in classroom test item construction among secondary school teachers in Cross River State, Nigeria, while accounting for the possible influence of subject specialisation and prior exposure to AI tools on teachers' test item construction competence. Recent studies on AI literacy and teacher competence similarly employ relational and predictive

survey approaches to examine the influence of AI-related competencies on instructional practices and professional behaviours (Al-Abdullatif, 2025; Casal-Otero et al., 2023).

Study Participants

The study population comprised all teachers in public secondary schools in Cross River State, Nigeria. According to records obtained from the Cross River State Secondary Education Board, 4,003 teachers were serving across 290 public secondary schools in the state's three education zones. The population distribution is presented in Table 1.

Table 1: Population distribution of teachers in public secondary schools in Cross River State

Education Zone	Number of Schools	Male	Female	Total
Calabar Zone	92	657	1,036	1,693
Ikom Zone	111	817	435	1,252
Ogoja Zone	87	738	320	1,058
Total	290	2,212	1,791	4,003

Source: Cross River State Secondary Education Board

The sample size for the study was determined using Cochran's (1977) finite population formula with a 95% confidence level and a 5% margin of error. The use of Cochran's formula is consistent with large-scale educational survey studies and recent AI literacy investigations involving teacher populations (Ng et al., 2023; Sperling et al., 2024). The computation yielded a minimum sample size of 351 teachers. However, to mitigate potential effects of non-response, incomplete questionnaire returns, and participant attrition, the sample size was increased by 20%, consistent with recommendations in quantitative educational survey research (Casal-Otero et al., 2023). The attrition adjustment yielded an additional 70 participants, resulting in an adjusted sample size of 421 teachers. Accordingly, a final sample size of 421 teachers was used for the study.

A stratified, proportionate, and systematic sampling procedure was adopted to ensure adequate representation of teachers across education zones and categories of subject specialisation and prior exposure to AI tools, which were included as contextual control variables in predicting test item

construction competence. In the first stage, the population was stratified into the three education zones in Cross River State: Calabar, Ikom, and Ogoja. Stratification was considered necessary because the education zones differ in school distribution, teacher population, and access to educational technologies. Similar stratified procedures are widely applied in AI literacy and teacher competence studies to improve representativeness across educational contexts (Ng et al., 2023; Sperling et al., 2024). At the second stage, proportionate sampling was used to distribute the sample across the three education zones according to teacher population size using proportionate allocation procedures. Consequently, 178 teachers were selected from the Calabar Education Zone, 132 from the Ikom Education Zone, and 111 from the Ogoja Education Zone.

At the third stage, systematic sampling was used to select teachers from sampled public secondary schools within each education zone. Lists of teachers obtained from school administrators served as sampling frames. Information on teachers' subject areas and prior exposure to AI tools was also collected to ensure adequate representation of the control variables across the sample. Sampling intervals were determined by dividing the teacher population in each zone by the required sample size for that zone. Thereafter, every k-th teacher was selected, starting from a random starting point. Systematic sampling is commonly employed in large-scale educational surveys because it improves sampling efficiency while reducing selection bias (Casal-Otero et al., 2023). Only teachers actively involved in classroom teaching and assessment activities at the time of the study were included in the sample.

Instrument and Measures

Data for the study were collected using a structured questionnaire titled "Artificial Intelligence Literacy and Test Item Construction Competence Questionnaire" (AILTICQ). The instrument was designed to measure the study's major variables. It consisted of three sections: demographic and control-variable information, the Artificial Intelligence Literacy Scale (AILS), and the Test Item Construction Competence Scale (TICCS). All substantive items in the instrument were measured on a four-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (4).

Section A obtained demographic and background information from respondents, including sex, years of teaching experience, subject specialisation, and prior exposure to AI tools. Subject specialisation and prior exposure to AI tools were specifically included as control variables because previous studies suggest that teachers' disciplinary backgrounds and previous interaction with AI technologies may influence teachers' competence in classroom assessment practices and the use of AI-supported instructional applications (Ayanwale et al., 2025; Bali et al., 2024). Subject specialisation was measured by asking teachers to indicate their primary teaching subject area. Responses were grouped into four categories: Science/Technology, Social Sciences,

Arts/Humanities, and Vocational/Commercial subjects. Prior exposure to AI tools was measured through self-reported experience with AI-based educational technologies, including ChatGPT, automated assessment tools, AI-supported lesson-planning tools, and generative AI applications. Respondents indicated their level of prior exposure using three categories: No Exposure, Limited Exposure, and Moderate/High Exposure. These variables were coded and included as control variables in the hierarchical regression analysis to account for potential differences in teachers' competence in test-item construction.

Section B measured teachers' AI literacy using items adapted from contemporary AI literacy frameworks and teacher AI competence models. The scale was primarily developed from the works of Al-Abdullatif (2025), Chiu et al. (2024), Daher (2025), Ng et al. (2023), and Sperling et al. (2024), which conceptualise AI literacy as a multidimensional competence involving awareness, ethical reasoning, evaluation, and practical application. The section assessed teachers' awareness of AI systems, understanding of AI applications in education, ethical reasoning regarding AI use, critical evaluation of AI-generated outputs, and practical use of AI tools in instructional and assessment activities. This structure aligns strongly with contemporary AI literacy models that treat AI competence as extending beyond technological familiarity to include ethical judgment, reflective evaluation, and informed pedagogical use (Al-Abdullatif, 2025; Chiu et al., 2024). The section consisted of 24 items designed to evaluate the extent to which teachers possessed the knowledge, evaluative competence, and practical skills required for responsible AI use in educational settings.

Section C measured teachers' competence in test item construction using items adapted from classroom assessment, educational measurement, and teacher competence literature. The scale assessed competence in test blueprint use, cognitive alignment of assessment tasks, clarity of item wording, construction of plausible distractors, validity of test items, fairness, and the development of higher-order thinking questions. Although the section focused specifically on classroom test construction competence, its development followed accepted educational measurement procedures used in teacher competence and assessment studies (Al-Abdullatif & Al-Abdullatif, 2019). The section consisted of 20 items designed to evaluate teachers' competence in developing classroom test items that satisfy accepted quality standards in educational assessment. The multidimensional structure of the instrument aligns with recent AI literacy research, which increasingly treats AI literacy as a combination of conceptual understanding, ethical awareness, evaluative competence, and instructional application rather than mere technological familiarity (Casal-Otero et al., 2023; Chiu et al., 2024; Sperling et al., 2024).

Validity and Reliability

The instrument underwent face and content validation by three experts in Educational Measurement and Evaluation and Educational Technology at a public university in Nigeria. The experts examined the instrument for clarity, relevance, adequacy of content coverage, appropriateness of item structure, suitability of language, and alignment with the study objectives, measurement structure, and hypotheses. Expert validation procedures are widely recommended in AI literacy scale development and educational survey research to improve construct representation and item clarity (Chiu et al., 2024; Sperling et al., 2024). Their observations and recommendations guided the modification, refinement, and restructuring of the instrument prior to its final administration.

To establish the instrument's reliability, a trial test was conducted with 50 teachers from public secondary schools outside the sampled schools but within Cross River State. Data obtained from the trial test were analysed using Cronbach's alpha to assess internal consistency. Cronbach's alpha remains one of the most widely used reliability estimation procedures in AI literacy and educational competence research (Al-Abdullatif, 2025; Casal-Otero et al., 2023). The reliability coefficient obtained for the Artificial Intelligence Literacy Scale was 0.91, while the Test Item Construction Competence Scale yielded a reliability coefficient of 0.88. These coefficients indicated satisfactory internal consistency and confirmed the instrument's suitability for the study. Reliability coefficients above 0.80 are generally considered acceptable in educational and behavioural research (Chiu et al., 2024; Sperling et al., 2024).

Ethical Considerations and Data Collection

Approval to conduct the study was obtained from the Cross River State Secondary Education Board and principals of participating secondary schools. Participants were informed about the purpose of the study and assured that participation was voluntary. They were also assured of confidentiality, anonymity, and that the information supplied would be used strictly for academic purposes. Informed consent was obtained from all participants before the instrument was administered. These procedures align with ethical practices commonly reported in recent AI literacy and teacher technology studies (Al-Abdullatif, 2025; Sperling et al., 2024).

The researcher personally administered the questionnaires with the assistance of three trained research assistants. Permission was obtained from school administrators before the instrument was administered. The purpose of the study and instructions for completing the questionnaire were explained to respondents before the questionnaire was administered. Copies of the questionnaire were retrieved immediately after completion to reduce the possibility of non-response and instrument loss.

Data Analysis Procedures

Data collected for the study were coded and analysed using the Statistical Package for the Social Sciences (SPSS), version 27. Descriptive statistics, including frequency counts, percentages, mean scores, and standard deviations, were used to summarise respondents' demographic characteristics and to determine the levels of AI literacy and test-item construction competence among teachers. Descriptive statistics were also used to summarise the distribution of subject specialisation and prior exposure to AI tools among respondents.

Pearson Product-Moment Correlation analysis was used to examine the relationship between AI literacy and test-item construction competence among secondary school teachers. Prior to hierarchical regression analysis, the categorical control variables, namely subject specialisation and prior exposure to AI tools, were transformed into dummy variables for statistical analysis. Appropriate reference categories were selected to estimate the unique contribution of each category in the regression model.

Hierarchical multiple regression analysis was further employed to determine the predictive influence of AI literacy on test item construction competence while accounting for the influence of subject specialisation and prior exposure to AI tools. In the first regression model, subject specialisation and prior exposure to AI tools were entered as control variables to account for possible background differences among teachers. In the second model, overall AI literacy was entered to determine its additional contribution to teachers' test item construction competence beyond the effects of the control variables. The use of hierarchical regression was considered appropriate because it enabled the study to determine whether AI literacy significantly predicts test item construction competence after controlling for contextual teacher characteristics. All hypotheses were tested at the 0.05 level of significance.

RESULTS

Level of AI Literacy among Secondary School Teachers

The first objective of the study sought to determine the level of AI literacy among secondary school teachers in Cross River State across awareness, ethical reasoning, critical evaluation, and practical use of AI tools. Mean and standard deviation statistics were computed to determine teachers' levels of AI literacy. The interpretation of mean scores was based on the four-point response scale as follows: 1.00–1.49 = Very Low; 1.50–2.49 = Low; 2.50–3.49 = Moderate; and 3.50–4.00 = High.

Results presented in Table 2 indicate that secondary school teachers in Cross River State demonstrated a moderate overall level of AI literacy (M = 2.78, SD = 0.49). Ethical reasoning

about AI use recorded the highest mean score (M = 3.02, SD = 0.55), followed closely by awareness of AI systems (M = 2.96, SD = 0.58). Teachers also demonstrated a moderate level of competence in critically evaluating AI-generated outputs (M = 2.71, SD = 0.63). However, practical use of AI tools recorded the lowest mean score (M = 2.43, SD = 0.71), indicating comparatively limited practical engagement with AI applications in instructional and assessment activities. Overall, the findings suggest that while teachers possess moderate awareness and evaluative understanding of AI systems, their practical classroom application of AI technologies remains relatively low.

Table 2: Descriptive statistics for AI literacy among secondary school teachers (N = 421)

AI Literacy Dimension	M	SD	Interpretation
Awareness of AI systems	2.96	0.58	Moderate
Ethical reasoning about AI use	3.02	0.55	Moderate
Critical evaluation of AI-generated outputs	2.71	0.63	Moderate
Practical use of AI tools	2.43	0.71	Low
Overall AI Literacy	2.78	0.49	Moderate

Competence in Test Item Construction

The second objective of the study sought to assess teachers' competence in constructing classroom test items with respect to cognitive demand and quality criteria. Results presented in Table 3 indicate that teachers demonstrated a moderate level of overall competence in constructing classroom test items (M = 2.59, SD = 0.47). Teachers performed relatively better in clarity and wording of test items (M = 2.87, SD = 0.57) as well as validity and fairness considerations (M = 2.76, SD = 0.59). Moderate competence was also observed in cognitive alignment of assessment items (M = 2.54, SD = 0.62). However, lower mean scores were observed for higher-order item construction (M = 2.38, SD = 0.66) and distractor construction (M = 2.41, SD = 0.61), indicating weaknesses in the development of cognitively demanding questions and technically sound multiple-choice items. The findings generally suggest that although teachers possess moderate assessment competence, important limitations still exist in the development of high-quality classroom assessments.

Table 3: Descriptive statistics for test item construction competence among school teachers

Competence Dimension	M	SD	Interpretation
Cognitive alignment of test items	2.54	0.62	Moderate
Construction of higher-order items	2.38	0.66	Low
Clarity and wording of test items	2.87	0.57	Moderate
Distractor construction	2.41	0.61	Low
Validity and fairness of test items	2.76	0.59	Moderate
Overall Test Item Construction Competence	2.59	0.47	Moderate

Relationship between AI Literacy and Test Item Construction Competence

The third objective of the study was to examine the relationship between AI literacy and test-item construction competence among secondary school teachers in Cross River State. Results presented in Table 4 indicate a statistically significant positive relationship between AI literacy and test item construction competence among secondary school teachers, $r(419) = .58$, $p < .001$. The magnitude of the correlation indicates a moderate-to-strong positive association between the two variables. This finding suggests that teachers with higher levels of AI literacy are more likely to demonstrate greater competence in constructing classroom test items.

Table 4: Means, standard deviations, and correlations among study variables (N = 421)

Variables	M	SD	1	2
1. AI Literacy	2.78	0.49	—	

2. Test Item Construction Competence	2.59	0.47	.58**	—

Note. ** = p < .05.

Predictive influence of AI literacy on test item construction competence

Hierarchical multiple regression analysis was conducted to determine whether AI literacy significantly predicts test item construction competence after controlling for subject specialisation and prior exposure to AI tools. Results presented in Table 5 indicate that the control variables entered in Model 1 accounted for 8% of the variance in test item construction competence (R^2 = .08), $F(2, 418) = 17.94$, $p < .001$. Prior exposure to AI tools emerged as the stronger control predictor, whereas subject specialisation made a smaller but statistically significant contribution. Following the inclusion of overall AI literacy in Model 2, the explained variance increased substantially to 40% (R^2 = .40), $\Delta R^2 = .32$, $F(3, 417) = 69.81$, $p < .001$. This finding indicates that AI literacy accounted for an additional 32% of the variance in teachers' test-item construction competence, beyond the effects of subject specialisation and prior exposure to AI tools. Thus, AI literacy was a strong positive predictor of test item construction competence ($\beta = .59$, $p < .001$). The finding suggests that teachers with higher levels of AI literacy are more likely to demonstrate greater competence in constructing classroom test items, even after controlling for contextual teacher characteristics.

Table 5: Hierarchical Multiple regression predicting test item construction competence (N = 421)

Variables	B	SE B	β	t	p
Model 1					
Subject specialisation	0.08	0.03	0.13	2.81	.005
Prior exposure to AI tools	0.17	0.04	0.22	4.37	.000
Model 2					
Subject specialisation	0.04	0.03	0.07	1.69	.092
Prior exposure to AI tools	0.09	0.03	0.12	2.88	.004

Overall AI literacy	0.56	0.05	0.59	11.84	.000
Model Summary					
Model	R	R^2	ΔR^2	F	p
Model 1	0.28	0.08	—	17.94	.000
Model 2	0.63	0.4	0.32	69.81	.000

Contribution of Control Variables to Test Item Construction Competence

Results from the hierarchical regression analysis presented in Table 5 indicate that subject specialisation and prior exposure to AI tools jointly accounted for 8% of the variance in test item construction competence in Model 1 ($R^2 = .08$; $F(2, 418) = 17.94$, $p < .001$). Prior exposure to AI tools emerged as the stronger control predictor ($\beta = .22$, $p < .001$), whereas subject specialisation also made a statistically significant contribution ($\beta = .13$, $p = .005$). However, after the introduction of overall AI literacy in Model 2, the predictive contribution of subject specialisation reduced and became statistically non-significant ($\beta = .07$, $p = .092$), whereas prior exposure to AI tools remained statistically significant though weaker in magnitude ($\beta = .12$, $p = .004$). These findings suggest that prior exposure to AI tools may contribute to teachers' competence in constructing classroom test items, although AI literacy remained the strongest predictor in the model.

DISCUSSION OF FINDINGS

The findings of the study indicate that secondary school teachers in Cross River State demonstrated a moderate level of AI literacy across awareness, ethical reasoning, critical evaluation, and use of AI tools. The relatively stronger ethical awareness observed among teachers may reflect growing concerns about responsible AI use and the academic implications of generative AI technologies within educational environments (Ofem et al., 2025). However, practical use of AI applications recorded the lowest level among the AI literacy dimensions. This finding suggests that although teachers are increasingly aware of AI technologies and their educational implications, many still lack sufficient practical engagement with AI-supported instructional and assessment tools. Similar patterns of uneven AI engagement and practical use have also been observed in Nigerian educational settings, where users demonstrate growing acceptance of AI technologies but varying levels of sustained educational application (Owan et al., 2025). The result may be linked to limited institutional support, inadequate professional training opportunities, inconsistent access to digital infrastructure, and uncertainty about the educational applications of AI tools in secondary school

settings. The finding aligns with recent studies, which indicate that teachers often possess conceptual awareness of AI but demonstrate comparatively lower confidence and practical competence in applying AI tools within classroom practice (Al-Abdullatif, 2025; Le et al., 2026).

The study also found that teachers demonstrated a moderate level of competence in constructing classroom test items. However, lower competence was observed in constructing higher-order items and in distractor development. This suggests that while many teachers may possess basic assessment skills, important limitations still exist in designing cognitively demanding assessment items that effectively measure higher-order thinking. The finding may reflect long-standing weaknesses in assessment literacy training, limited exposure to advanced test-construction procedures, and a continued emphasis on lower-order classroom assessments. The result is consistent with previous studies reporting that teachers often experience difficulties in cognitive alignment, blueprint use, distractor construction, and the development of technically sound assessment items (Ehigbor & Osumah, 2023; Kissi et al., 2023).

The findings further revealed a statistically significant positive relationship between AI literacy and test item construction competence among secondary school teachers. This suggests that teachers with greater awareness, evaluative competence, ethical reasoning, and practical understanding of AI tools are more likely to demonstrate greater competence in classroom assessment practices. The finding may be explained by the fact that AI literacy encourages reflective evaluation of instructional materials, critical review of generated outputs, and more informed decision-making during classroom assessment design. This may be because stronger awareness and evaluative understanding of AI systems often improve preparedness and confidence in technology-supported professional tasks (Dan et al., 2026). Teachers with stronger AI literacy may therefore be better positioned to review, adapt, and improve both teacher-generated and AI-supported assessment materials. The finding supports emerging arguments that AI literacy is increasingly becoming part of broader professional competence in teaching and assessment practice as AI tools become more integrated into educational measurement and classroom assessment processes (Bohari et al., 2025; Chiu et al., 2024; Owan et al., 2023).

The hierarchical regression findings showed that AI literacy significantly predicted teachers' competence in constructing classroom test items even after controlling for subject specialisation and prior exposure to AI tools. AI literacy emerged as the strongest predictor in the regression model and accounted for substantial additional variance in test item construction competence beyond the effects of the control variables. The finding is consistent with predictive studies suggesting that AI-related awareness and evaluative competence may significantly influence preparedness and performance in technology-supported activities (Dan et al., 2026). This finding suggests that AI literacy contributes independently to teachers' classroom assessment competence

rather than merely reflecting differences associated with disciplinary background or previous exposure to AI technologies. The finding may indicate that teachers who possess stronger AI-related evaluative and practical competencies are better able to organise assessment tasks, evaluate question quality, align items with objectives, and refine assessment materials effectively. The result supports recent discussions that AI literacy should increasingly be treated as a professional competence relevant to instructional quality and assessment practice rather than simply a technological skill (Al-Abdullatif, 2024; Daher, 2025).

The findings also showed that prior exposure to AI tools contributed significantly to teachers' competence in test item construction, although its predictive influence diminished once AI literacy was included in the regression model. This suggests that exposure alone may not improve classroom assessment competence unless accompanied by a stronger evaluative understanding and the responsible use of AI systems. In contrast, the predictive contribution of subject specialisation became statistically non-significant after the inclusion of AI literacy, suggesting that differences associated with disciplinary background may largely operate through variations in teachers' AI-related competence. This pattern aligns with previous findings indicating that contextual and demographic characteristics may influence AI-related behaviour and technology engagement within educational settings (Mohammed et al., 2026). Collectively, the findings suggest that strengthening teachers' AI literacy may contribute meaningfully to improving classroom assessment quality among secondary school teachers in Cross River State.

CONCLUSION

This study examined the relationship between AI literacy and test item construction competence among secondary school teachers in Cross River State, Nigeria. The findings showed that teachers demonstrated moderate levels of AI literacy and moderate competence in classroom test item construction. However, weaknesses were observed in the practical use of AI tools, higher-order item construction, and distractor development. The study further established a significant positive relationship between AI literacy and test item construction competence, with AI literacy emerging as a strong predictor of teachers' competence in constructing classroom test items even after controlling for subject specialisation and prior exposure to AI tools. The findings suggest that teachers with stronger AI-related awareness, evaluative competence, and practical understanding are better positioned to design and refine high-quality classroom assessments. The study contributes to emerging discussions on AI literacy as a professional competence relevant not only to technology adoption but also to the quality of classroom assessment. Although the study was conducted among secondary school teachers in Cross River State, the findings may also be useful in other educational contexts where teachers are increasingly expected to engage with AI-supported instructional and assessment practices. The results may therefore guide teacher

education programmes, educational technology training initiatives, and assessment improvement efforts in similar developing educational settings.

RECOMMENDATIONS

1. Educational authorities and teacher development agencies should organise regular practical training programmes on the instructional and assessment use of AI tools in order to improve teachers' practical AI competence beyond general awareness and ethical understanding.

2. Teacher education institutions and school administrators should strengthen assessment literacy training, particularly in higher-order item construction, distractor development, and cognitive alignment of classroom assessments.

3. Professional development programmes for teachers should integrate AI literacy into classroom assessment training because stronger AI literacy appears to be associated with improved competence in constructing classroom test items.

4. Policymakers and educational stakeholders should incorporate AI literacy components into teacher professional standards and continuous professional development frameworks since AI literacy significantly predicts teachers' competence in classroom assessment practices.

5. Schools and educational agencies should improve teachers' access to AI-supported educational technologies and guided exposure opportunities because prior exposure to AI tools appears to contribute positively to teachers' competence in constructing classroom test items.

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