Teacher's Awareness, Digital Competence, And Ethical Reflection in Artificial Intelligence Supported Assessment: Evidence from Rural Philippine High Schools

Angel B. Manuel, Rowena A. Rivera, Lany D. Dullas

College of Arts and Sciences, Nueva Vizcaya State University- Bayombong, Nueva Vizcaya

DOI: https://dx.doi.org/10.47772/IJRISS.2026.1026EDU0301

Received: 08 May 2026; Accepted: 13 May 2026; Published: 06 June 2026

ABSTRACT

This study examined the teachers' awareness of artificial intelligence (AI), digital competence, and ethical reflection in AI-assisted educational assessment, as well as the relationship among these variables and the predictive role of ethical reflection dimensions. Using a quantitative research design, data were collected through validated questionnaires. Findings revealed that teachers demonstrated proficient AI awareness and proficient digital competence, with high overall ethical reflection. Subdimensions such as critical evaluation and academic integrity were particularly strong, while professional and institutional support was comparatively lower. Correlational analysis showed a high positive relationship between AI awareness and digital competence, and a high positive relationship between digital competence and ethical reflection, whereas AI awareness and ethical reflection were not significantly related. Multiple regression analysis indicated that among the ethical reflection dimensions, academic integrity and validity significantly predicted AI awareness, while no dimensions significantly predicted digital competence. These results suggest that although teachers are knowledgeable about AI and engage in ethical reflection, practical digital competence varies, and ethical reflection alone does not enhance technical skills. The study underscores the need for integrated professional development programs that combine ethical literacy, technical competence, and hands-on AI training, supported by institutional guidelines, to promote responsible and effective AI integration in educational assessment.

Keywords: academic integrity, AI-assisted assessment, educational technology, technical skills

INTRODUCTION

The swift development of artificial intelligence (AI) has brought significant changes to contemporary educational practices, with assessment emerging as one of the most affected areas. Technologies such as automated scoring applications and adaptive assessment systems are now being integrated into the classrooms to simplify evaluation procedures, tailor feedback to learners, and improve the overall efficiency of measuring student performance (Bulut et al., 2024). Conceptually, these technologies have the potential to promote greater scoring consistency, lessen teachers' administrative burden, and enable faster assessment processes.

However, the adaptation of these technologies also brings forward important concerns related to teachers' level of awareness, digital proficiency, and ethical judgement in assessment. Since teachers act as the key implementers of AI-based tools, their readiness and capacity to critically reflect on ethical implications play a decisive role to ensure that AI is used responsibly and meaningfully in classroom assessment. Recent studies that involve public basic education teachers have highlighted different levels of awareness of artificial intelligence alongside different in overall digital competence (Manaig et al., 2025). Within the Philippine educational landscape, efforts toward digital transformation have gained momentum, particularly in response to the disruptions caused by the pandemic. Consequently, teachers are now expected not only to be skilled in the use of digital technologies but also to thoughtfully consider ethical concerns such as equity, transparency, data protection, and academic honesty when employing AI-assisted assessment methods. Although prior research has examined teachers' digital competence and AI awareness independently, limited attention has been given to how

these factors intersect with educators' ethical reflection in assessment which indicates a clear gap in the existing literature.

By centering on public high school Science and Mathematics teachers in Ifugao, this study grounds the investigation within a localized educational context marked by distinct challenges which includes constrained technological resources, uneven access to professional development opportunities, and varying levels of familiarity with AI-driven tools. With this, examining the teachers' level of awareness, digital competence, and ethical reflection is both timely and necessary to ensure that the integration of artificial intelligence in education serves to promote equity and responsible practice rather than exacerbate the existing disparities. Anchored on the principle that the adoption of educational technologies should be accompanied by ethical accountability, this study examines the extent to which teachers' ethical reflection in the use of AI for assessment purposes predict teachers' awareness of AI and their level of digital competence. This responds to the parallel demands of strengthening their technical capacities while fostering a reflective and ethically grounded professional orientation. By exploring the interaction among these variables, the study adds to ongoing discussions on the responsible use of AI in education and aligns with policy initiatives that promote sustainable and human-centered approaches to digital transformation in schools.

Moreover, the results of this study may serve as a valuable basis for shaping professional development initiatives in Ifugao by identifying particular areas where teachers may benefit from additional support, such as AI literacy, advancing digital skills, or fostering deeper ethical reflection. In essence, the study highlights the need to harmonize educational innovation with ethical responsibility to emphasize that the use of AI in assessment should be not only efficient but also fair, transparent, and consistent with the fundamental values of education.

REVIEW OF RELATED LITERATURE

Artificial intelligence (AI) is increasingly influencing instructional and assessment practices across educational systems which offers advanced application such as automated grading tools, adaptive assessment platforms, learning analytics systems, and AI-assisted feedback mechanisms. Recent studies indicate that these technologies contribute to greater efficiency, facilitate data-informed instructional decisions, and enable more individualized learning experiences for students (Holmes et al., 2021; Zawacki-Richter et al., 2020). Nevertheless, the growing integration of AI into routine assessment practices has also heightened concerns related to ethical use, equity, transparency, and academic honesty. Research cautions that, in the absence of adequate knowledge and regulation, AI systems may inadvertently perpetuate existing inequalities, intensify algorithmic bias, threaten data privacy, and lead to flawed evaluative judgements by educators (Williamson & Eynon, 2020; Akgün et al., 2021). Given these potential challenges, teachers' professional discernment remains critical in ensuring that AI-enabled assessment practices are ethical, trustworthy, and consistent with fundamental educational principles.

Teachers thus play a central role as both implementers and regulators of AI-supported assessment practices. Their level of understanding of AI, proficiency in digital technologies, and ethical awareness significantly shape the manner in which these tools are used to assess student learning. Existing research suggests that while many educators recognize the advantages of AI, they often lack sufficient expertise to properly interpret algorithmic outputs or critically evaluate their limitations, particularly in high-stakes assessment situations (Kaya & Bardakçi,2021; Kippers et al., 202). Nguyen (2023) further argues that technical competence alone is adequate; educators must also develop strong ethical reflection to interrogate AI-generated recommendations, identify potential biases, and safeguard academic integrity Consistent with this view, the responsible integration of AI in assessment depends on targeted training, ongoing professional development, and the establishment of well-defined ethical guidelines (Celik et al., 2022; Miao et al., 2021).

Although research on AI literacy has expanded rapidly at the global level, notable gaps, particularly in understanding how teachers in rural and developing context, such as those in the Philippines, engage with AI in assessment practices. Evidence from local studies points to substantial variation in teachers' digital skills, access to technological infrastructure, ethical readiness, all of which shape their capacity to adopt AI-based tools (Buyung et al., 2022; Kundu et al., 2025).

AI in Education and Assessment

Automated scoring systems, adaptive testing applications, and sophisticated learning analytics are now embedded in everyday classroom practices. Contemporary research highlights that AI-enabled assessment promotes greater efficiency, facilitates timely feedback, and supports more individualized learning trajectories (Holmes et al., 2021; Zawacki-Richter et al., 2020). By processing extensive student data, these technologies can detect learning gaps and propose targeted instructional responses more rapidly than conventional assessment approaches. Consequently, AI has evolved beyond a supplementary innovation and is now viewed as transformative influence on the ways assessments are developed, implemented, and interpreted.

International scholarship consistently cautions that this shift is accompanied by important ethical, pedagogical, and sociotechnical concerns. Given that assessment plays a critical role in shaping students' academic trajectories and opportunities, the uncritical or poorly informed use of AI may undermine both fairness and accuracy. Researchers warn that when AI-based assessment systems are inadequately understood or improperly implemented, they can reinforce existing inequities, conceal algorithmic biases, or function as opaque "black box" technologies with limited transparency in decision-making processes (Williamson & Eynon, 2020; Akgün et al., 2021). Additional challenges related to data protection, surveillance, and excessive dependence on automated evaluations further complicate the integration of AI in classroom assessment practices.

While many educators have begun incorporating AI-enabled tools like chatbots, automated grading systems, plagiarism detection software, and learning analytics dashboards into their practice, they often lack a clear conceptual understanding of how these technologies produce their outputs (Kaya & Bardakçi,2021; Kippers et al., 2021). This gap in understanding limits teachers' ability to verify AI-generated results, recognize potential inaccuracies, or identify bias within algorithmic recommendations. As emphasized by Nguyen (2023), effective AI integration extends beyond technical proficiency; it requires a strong ethical and critical orientation in which teachers continuously examine system limitations, question the validity of automated judgements, and uphold principles of academic integrity in assessment.

Emerging research highlights that AI is not a substitute for human judgement in assessment. Instead, the effectiveness of AI-assisted evaluation relies on educators' ability to integrate digital proficiency with ethical reasoning. Teachers' oversight is crucial for validating AI-generated results, interpreting analytics within context, and maintaining assessment practices that are transparent, fair, and consistent with core educational principles. As AI increasingly transforms assessment systems, enhancing teachers' ethical awareness, analytical skills, and technological competence is important to ensure responsible and reliable evaluation in education.

Teachers' Awareness of AI

Often referred to as AI literacy, teachers' awareness of AI involves their grasp of AI concepts, familiarity with AI-powered tools, understanding of potential advantages and limitations, and sensitive to the ethical and societal considerations associated with AI use in education. AI literacy goes beyond technical expertise; it also entails the capacity to critically assess how algorithms function, how data are processed, and how automated systems can influence learning and assessment outcomes (Long & Magerko, 2020); Ng et al., 2021). With the increasing integration of AI in schools, teachers' awareness has become a key competency that underpins their preparedness for engaging in technology-enhanced assessment practices.

Global research indicates considerable variation in teachers' awareness of AI. While many educators are able to recognize common AI applications, fewer demonstrate a thorough understanding of algorithmic process, data management, and issues related to transparency, fairness and academic integrity (Akgün et al., 2021; Druga et al., 2020). This gap between basic familiarity and deeper conceptual knowledge carries significant implications for assessment, as teachers who lack a full understanding of how AI systems generate decisions may find it difficult to detect biased outputs, technical errors, or inappropriate recommendations. In addition, teachers frequently overestimate the potential of AI while underappreciating its associated risks which can lead to excessive reliance on automated outputs (Chen et al., 2023; Holmes et al., 2021). Evidence further suggests that limited AI awareness may result in the uncritical adaptation of tools that unintentionally perpetuate inequities or

threaten student privacy (Williamson & Eynon, 2020). Accordingly, AI awareness should encompass not only technical proficiency but also critical and ethical understanding.

The present study utilizes a multidimensional framework of AI awareness which encompasses familiarity with AI tools, perceive benefits, risks, and awareness of emerging educational trends. This approach aligns with contemporary models that define AI literacy as an integration of functional, conceptual, and ethical knowledge (Ng et al., 2021; Li et al., 2023). Such a perspective underscores that teachers need not only the skills to operate AI technologies but also the judgement to determine when, why, and under what circumstances these tools should be employed in assessment. Awareness takes on particular significance in the context of AI-assisted evaluation. Educators who are cognizant of AI's limitations are better equipped to identify issues such as algorithmic misclassifications, privacy risks, unreliable automated scoring, and overreliance by students on generative AI applications. Consequently, strong AI awareness promotes the responsible and reflective integration of AI in classroom assessment to highlight the importance of teacher education that simultaneously enhance technical competence and ethical discernment.

Teachers' Digital Competence

Digital competence is a core prerequisite for the responsible and effective application of artificial intelligence in educational assessment. It extends beyond basic technical proficiency to include the capacity to critically appraise digital tools, handle data ethically, and integrate technology in ways that support teaching and learning. One of the most widely recognized frameworks in this area is the European Framework of the Digital Competence of Educators (DigCompEdu), which identifies six domains: professional engagement, management of digital resources, pedagogical integration of technology, learner empowerment, assessment practices, and ongoing professional development (Redecker, 2017). This framework is frequently used in research and serves as a reference point for evaluating teachers' readiness in increasingly digital educational contexts.

Although teachers possess foundational digital skills, more advanced competencies essential for AI-supported assessment like data literacy, interpretation of algorithmic outputs, digital ethics, and system configuration are still insufficiently developed (Chiu et al., 2024) Because AI-based tools depend heavily on large datasets, automated analytics, and predictive features, educators are required to demonstrate a higher level of technical understanding as well as the capacity to exercise informed judgement regarding accuracy, fairness, and data privacy. Also, scholars argue that digital competence should encompass the capacity to make sense of AI-generated recommendations, handle sensitive student information responsibly, and identify potential errors within algorithmic systems (Cabero-Almenara & Palacios- Rodríguez, 2021). In addition, digital competence plays a significant role in shaping teachers' openness to adopting new technologies. Educators with stronger digital skill sets tend to demonstrate higher levels of confidence, independence, and readiness to explore AI-supported practices (Mansur, 2025).

The conceptualization of digital competence adopted in this study aligns with the DigCompEdu framework as well as more recent AI-readiness models that highlight data ethics, automation literacy, and critical digital judgement (Laguna et al., 2025; Liu et al., 2023). These competencies are important because the use of AI tools demands more from teachers than basic software operation; educators must also understand how AI outputs are produced, evaluate their pedagogical soundness, and ensure that technology use respects students' rights to privacy, fairness, and academic integrity. Teachers who possess strong digital competence are better equipped to integrate AI tools in ways that are pedagogically meaningful, ethically sound, and consistent with core educational values. They are also more capable of recognizing potential ethical concerns, appropriately interpreting AI-generated recommendations, and supporting students in the responsible and safe use of AI within assessment settings. These considerations underscore why the enhancement of digital competence remains a critical component of efforts to promote the responsible adoption of AI in schools.

Ethical Reflection in AI and Assessment

Ethical reflection pertains to teachers' capacity to critically consider the moral, social, and educational consequences of employing artificial intelligence in assessment practices. This process includes careful

evaluation of concerns related to equity, transparency, data privacy, academic honesty, and the wider implications of algorithm-driven decision-making within schools. As AI technologies increasingly automate scoring processes, support plagiarism detection, and generate learning analytics, educators are required to exercise reflective judgement to assess whether these tools reinforce or conflict with fundamental educational values (Holmes et al., 2021; Floridi, 2021). Through ethical reflection, AI is not treated as neutral or error free, particularly given evidence that automated systems may perpetuate bias, disadvantage certain learners, or inaccurately represent student achievement (Williamson & Eynon, 2020).

There is a growing importance of ethical reasoning as AI becomes more deeply embedded in assessment practices. International frameworks, such as the OECD AI Principles ad UNESCO's Recommendations on the Ethics of AI, stress the necessity of human oversight, accountability, transparency, and fairness as fundamental ethical responsibilities in educational contexts (UNESCO, 2021). These frameworks caution that in the absence of critical awareness, teachers may unknowingly depend on biased algorithms or fail to recognize issues such as non-transparent scoring mechanisms, discriminatory outcomes, or improper use of student data. This concern is reinforced by empirical studies which indicates that educators often place considerable trust in automated outputs despite limited understanding of how these systems function (Benke, 2021).

The AI Ethical Reflection Scale (AIERS) proposed by Wang et al. (2025) outlines three core dimensions of ethical reflection. These are awareness of ethical issues, critical appraisal of AI-generated outcomes, and a commitment to applying AI in ways that promote social good. These dimensions are consistent with broader frameworks of ethical competence in digital context which emphasize the responsibility of educators to protect privacy, identify algorithmic bias, and ensure that AI-assisted assessments are conducted in an equitable manner (Zawacki-Richter et al., 2022). In the present study, indicators of ethical reflection such as data privacy, bias sensitivity, academic honesty, and fairness in assessment are aligned with the established international ethical standards and empirically validated models.

From the theoretical perspective, teachers' awareness of AI and their level of digital competence shape both the depth and quality of ethical reflection. Awareness provides educators with a conceptual grasp of how AI systems function, along with an understanding of their potential advantages and associated risks, while digital competence enables them to translate this understanding into practice by adjusting system settings, redesigning assessment tasks, or critically questioning questionable outputs. Empirical studies support these links, showing that teachers who are more cognizant of AI-related risks are more inclined to scrutinize automated scoring processes and identify ethical concerns (Akgün et al., 2021; Nguyen, 2023). Similarly, educators with higher levels of digital competence demonstrate greater capacity to safeguard data privacy, check algorithmic accuracy, and implement protective measures in AI-assisted assessment contexts (Cabero-Almenara & Palacios-Rodríguez, 2021; Romero-Tena et al., 2022). Collectively, these findings support the correlation and predictive approach of the present study in examining how AI awareness and digital competence contribute to ethical reflection.

Within the Philippine educational landscape, ethical considerations surrounding technology use have received growing attention alongside the Department of Education's push for digital transformation. Nevertheless, rural divisions such as Ifugao continue to encounter persistent challenges which includes limited internet connectivity, inadequate access to digital devices, and unequal opportunities for professional development. Findings from local studies indicate that although teachers generally express favorable attitudes toward digital innovation, many lack systematic training in AI literacy, digital ethics, and data governance (Laguna et al., 2025; Tabuena, 2025). These limitations contribute to differing levels of preparedness and reduced confidence among teachers in addressing ethical issues associated with the use of AI in assessment.

The present study addresses several notable gaps in the existing literature. First, there is a scarcity of empirical research specifically in examining ethical reflection in AI supported assessment, despite its increasing importance in educational contexts. Secord, much of the current evidence comes from high income countries, leaving a limited understanding of how AI ethics is perceived within Philippine public schools. Third, rural divisions with unique resource constraints and professional development challenges remain largely underexplored. Finally, few studies have simultaneously examined AI awareness, digital competence, and

ethical reflection using predictive models. By investigating these factors together within a rural Philippine setting, this study provides timely insight that help fill these gaps and advance a more equitable and ethically informed approach to integrating AI in education.

Statement of the Problem

This study investigated the levels of teachers' awareness of AI, their digital competence, and their ethical reflection on AI use in assessment practices. It further sought to determine the interrelationship among these constructs and identify which aspects of ethical reflection serve as significant predictor of awareness and competence.

Specifically, the study sought to answer the following questions:

1. What is the level of teacher's awareness of artificial intelligence and their digital competence in the context of educational assessment?

2. What is the extent of teachers' ethical reflection when integrating AI tools into assessment practices?

3. Is there a significant relationship between:

   3.1 teacher's AI awareness and digital competence;

   3.2 teachers' AI awareness and their ethical reflection in assessment practices; and

   3.3 their digital competence and their ethical reflection in assessment practices?

4. Which dimension of teachers' ethical reflection in AI-assisted assessment significantly predict AI awareness and digital competence?

METHODOLOGY

Research Design

This study employed a quantitative-correlational research design. It was quantitative because it sought to measure teachers' awareness of artificial intelligence (AI), digital competence, and ethical reflection in AI-assessment using a structure questionnaire with a Likert-type scale. It was correlational because it aimed to determine the relationships among these constructs and further identified which dimension of teacher's ethical reflection significantly predict AI awareness and digital competence in assessment practices.

Respondents of the Study

The respondents of this study were the 77 Mathematics and Science public high school teachers in Ifugao. During the preliminary phase of data collection, it was determined that not all teachers utilized AI tools in their assessment practices. Because the study specifically examined AI awareness, digital competence on AI-supported assessment, and ethical reflection in AI use, experiential engagement with AI tools was deemed necessary for meaningful participation. Thus, purposive sampling was adopted.

Participants were selected based on the following inclusion criteria: (a) currently employed as a Science or Mathematics teacher in a rural public high school in Ifugao; (b) actively teaching during the data collection period; (c) had prior experience using AI tools in assessment-related tasks; and (d) voluntarily agreed to participate in the study. Teachers were excluded if they reported no prior use of AI tools in assessment practices, were not teaching Science or Mathematics, were on leave during the data collection, or submitted incomplete survey responses. Excluding non-AI users ensured that the responses reflected actual engagement with AI-supported assessment, thereby strengthening the construct validity of the measured variables.

The participation of the participants was voluntary, and informed consent was secured prior to data collection. The respondents were assured of confidentiality and anonymity, and the data were used solely for research purposes.

Research Instrument

The primary instrument of the study was a structured questionnaire composed of three sections, each designed to measure the key variables of the research. All items were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Disagree). The validity was ensured as the instrument was reviewed by two experts from Commission on Higher Education (CHED) and Department of Education (DepEd). Furthermore, a pilot test was conducted and establish the reliability of the instrument, with Cronbach's alpha coefficient of .916 for Part 1, .955 for Part II, and .911 for Part III.

Part I was on AI Awareness which consists of five items adapted from the Teachers' Awareness in Artificial Intelligence and Digital Competence in the Workplace and existing teacher AI awareness scales. This section assessed the teachers' knowledge of AI tools, applications, benefits, risks and trends within the educational context.

Part II was on digital competence which contains eight items derived from the DigCompEdu Framework and the Laguna Study. This section evaluates teachers' competence in integrating AI and digital tools in assessment, providing timely feedback, managing technical and data-related issues, and engaging in professional development activities.

Part III was on ethical reflection in AI which includes 15 items adapted from the AIERS, the OECD Principles of AI Ethics, and academic integrity rubrics. This section measures teachers' ethical awareness, critical evaluation, accountability, commitment to academic integrity, and perception of institutional support in the use of AI for assessment practices.

Data Gathering Procedure

The researcher sought formal approval from the Schools Division Office (SDO) of Ifugao and the Public Schools Division Superintendent (PSDS) across the districts to conduct the study. Upon approval, coordination with school heads and teachers involved was undertaken to facilitate the distribution of the research instrument. The validated questionnaire was then administered either in printed copies or through online platforms, such as Google forms, depending on the teachers' availability and accessibility. Prior to answering, clear guidelines and instructions were provided to ensure uniform understanding of each section of the questionnaire, and clarifications were addressed. After the respondents accomplished the instrument, the researcher collected the questionnaires within the agreed timeline and check the responses for completeness, consistency, and accuracy. The gathered data were encoded, organized, and analyzed using statistical software such as SPSS. Appropriate statistical treatments were employed corresponding to each statement of the problem to ensure accurate and meaningful results.

Data Analysis

The data gathered from the respondents were analyzed using appropriate statistical treatments aligned with the problems of the study. Descriptive statistics such as mean and standard deviation were computed to determine the level of teacher's AI awareness, digital competence, and the extent of their ethical reflection in AI use. The basis for interpretation is reflected in Table 1. The initial descriptive interpretation (Novice, Beginner, Developing, Proficient, Expert) was for the AI awareness and digital competence, while the second descriptive interpretation (Very Low, Low, Moderate, High, Very High) is for the ethical reflection in AI use.

Table 1. Mean Range, Description, and Descriptive Interpretation

Mean Range	Description	Descriptive Interpretation
1.00-1.80	Strongly Disagree	Novice/ Very Low
1.81-2.60	Disagree	Beginner/ Low
2.61-3.40	Neutral	Developing/ Moderate
3.41-4.20	Agree	Proficient/ High
4.21-5.00	Strongly Agree	Expert/ Very High

The Pearson Product-Moment Correlation Coefficient (r) was employed to examine the relationship between teachers' AI awareness, digital competence, and ethical reflection in assessment practices using responses from N = 77 respondents, with the degrees of freedom computed as df = 75. Multiple Regression Analysis (MRA) was also conducted to determine which dimensions of ethical reflection significantly predict teachers' AI awareness and digital competence in AI-assisted assessment. For the regression analyses, the degrees of freedom were computed as df = (5, 71), where 5 represents the number of predictor variables included in the model.

AI Use Declaration

This research utilized artificial intelligence (AI) tools, specifically Open AI's Chat GPT and Quill Bot, to assist in the generation and refinement of textual content which includes literature synthesis, abstract drafting, and structure development. The AI was used as a supplementary tool to support the researchers in organizing ideas, paraphrasing, and ensuring clarity in written expression. ALL information derived from AI outputs were critically reviewed, edited, and validated by the researchers to ensure academic integrity and accuracy. No part of this work was generated solely by AI without human oversight. The responsibility for the final content, analysis, and conclusions remains entirely with the researchers.

Ethical Consideration

The study strictly adhered to established standards in the conduct of research. Participation in the study was entirely voluntary; an informed consent was secured from all respondents prior to the administration of the questionnaire. Teachers were assured that they have the right to decline participation of the questionnaire. Teachers were assured that they have the right to decline participation or withdraw from the study at any time without facing any negative consequences. All responses were treated with the highest level of confidentiality which ensured that the data collected were used solely for academic and research purposes. Moreover, the identifying information of the respondents and their schools were disclosed or published in any part of the study to safeguard their anonymity and privacy. These measures ensured that the rights, dignity, and well-being of the participants were fully respected throughout the research process.

RESULTS AND DISCUSSION

Teachers' Awareness of Artificial Intelligence in the context of Educational Assessment

Table 2. Level of Teachers' Awareness of Artificial Intelligence in the context of Educational Assessment

Statement	Mean	Std. Deviation	Descriptive Interpretation
1. Aware of the different AI tools available for teaching and assessment.	4.17	0.80	Proficient

2. Understand the potential benefits of AI in improving assessment practices.	4.33	0.62	Expert
3. Aware of the risks and limitations of using AI in education.	4.25	0.60	Proficient
4. Know examples of AI applications that can support student learning.	4.25	0.60	Proficient
5. Updated about current trends in AI use in educational settings.	4.00	0.82	Proficient
OVERALL	**4.20**	**0.69**	**Proficient**

Note: 1.00-1.80 (Novice); 1.81-2.60 (Beginner); 2.61-3.40 (Developing); 3.41-4.20 (Proficient); and 4.21-5.00 (Expert)

Table 2 presents the descriptive statistics on teachers' self-reported awareness of Artificial Intelligence (AI) in the context of educational assessment. It can be observed that the overall mean score across the five items is 4.20 (SD=0.69) which is interpreted as proficient. Individually, teachers rated highest on the potential benefits of AI in improving assessment practices (M=4.33, SD=0.62) which indicates an expert level of awareness of benefits. On the other hand, the lowest mean score is observed regarding updates about the current trends in AI use in education settings (M=4.00, SD=0.82), though still within the proficient range. The other items were interpreted as proficient. These includes awareness on different AI tools, awareness of risks and limitations, and knowledge of examples of AI applications supporting student learning cluster closely. These results suggest that participating teachers consider themselves as moderately to strong aware of AI in educational assessment. They especially recognize AI's potential benefits, but are somewhat less confident about being up-to-date with the latest trends.

The findings that teachers express high awareness of AI's benefits and moderate-to-high overall AI awareness aligns with Holmes et al. (2021) stating that K-12 teachers across six countries found that teachers with greater self-efficacy and understanding of AI-based educational technologies reported higher trust in AI-EdTech. Similarly, public basic education teachers in the Philippines reported a meaningful correlation between AI awareness and teachers' digital competence (Laguna et al., 2025). On the other hand, literature cautions about gaps in teacher capacity to fully harness AI tools. Primary school teachers' opinions on AI use found that many desired to use AI, but lacked sufficient knowledge, skills, or experience to do so effectively (Nguyen, 2023).

These findings indicate that while teacher awareness may be high, actual readiness to implement AI tools effectively might still face obstacles, especially where infrastructure, training, or ethical support are lacking. The lower score on staying updated on current trends reflect the gap on awareness of benefits that does not automatically translate into continuous engagement with evolving AI technologies. In addition, research suggests that pre-service and in-service teachers alike often lack AI-specific pedagogical training, which limits their ability to integrate AI responsibly and meaningfully in instruction and assessment (Wang et al., 2025).

Teachers' Awareness of Digital Competence in the context of Educational Assessment

Table 3. Level of Teachers' Digital Awareness in the context of Educational Assessment

Statements	**Mean**	**Std. Deviation**	**Descriptive Interpretation**
1. Can effectively integrate AI or digital tools in designing assessments.	3.83	1.11	Proficient

2. Can use digital/AI tools to provide timely feedback to students.	3.58	1.08	Proficient
3. Confident in troubleshooting common technical problems when using AI tools.	3.33	1.10	Developing
4. Adapt assessment tasks to ensure alignment with learning objectives when using AI.	3.92	0.75	Proficient
5. Use AI/digital tools to monitor student progress and engagement.	3.42	1.00	Proficient
6. Know how to protect student data and privacy when using digital or AI tools.	3.17	1.32	Developing
7. Participate in professional development activities to improve digital competence.	3.83	1.22	Proficient
8. Collaborate with colleagues to share good practices in AI/digital assessment.	4.08	0.79	Proficient
OVERALL	**3.65**	**1.05**	**Proficient**

Note: 1.00-1.80 (Novice); 1.81-2.60 (Beginner); 2.61-3.40 (Developing); 3.41-4.20 (Proficient); and 4.21-5.00 (Expert)

Table 3 summarizes the self-reported digital competence of the respondents when using digital or AI tools for educational assessment. The overall mean is 3.65 (SD=1.05) which is interpreted as proficient. However, notable variation exists across the items.

Teachers' higher competence in adapting assessment tasks to align with learning objectives when using AI/digital tools (M=3.92, SD=0.75), collaborating with colleagues to share practices in AI/digital assessment (M=4.08, SD=0.79), and integrating AI in assessment design (M=3.83, SD=1.11). Moderate but lower self-ratings are seen for using AI tools to provide timely feedback (M=3.58, SD=1.08) and monitoring student progress and engagement via digital tools (M=3.42, SD=1.00), yet still in the proficient range.

Meanwhile, the lowest ratings, in developing range, are for technical confidence, specifically in troubleshooting common technical problems when using AI tools (M=3.33, SD=1.10) and data privacy or data protection knowledge when engaging digital tools (M=3.17, SD=1.32). Also, while participation in professional development is rated moderately (M=3.83, SD=1.22), there remains a room for improvement.

These findings are consistent with existing literature that talks about the multidimensional nature of teacher digital competence, not just technical skills, but also pedagogical, ethical, and collaborative dimensions. More specifically, according to the use of educational technology for teaching, learning, assessment, and learner support (Wu et al., 2024). Also, a structural model study with university professors found that cognition strongly depicts capacity in the domain of digital competence for AI use. This aligns with the item-level pattern on competence tends to be higher in pedagogical or practical aspects which includes designing assessments, aligning tasks, collaboration but weaker in technical and data-privacy aspects (Liu et al., 2023). These indicates that understanding and pedagogical planning may outpace technical confidence and ethical or data-privacy readiness. Thus, the findings reflect a broader trend that while teachers may feel moderately competent in pedagogical use of digital tools, many remain hesitant or less confidence regarding technical troubleshooting or data-privacy aspects.

Teachers' Ethical Reflection when Integrating AI Tools into Assessment Practices

Table 4. Extent of Teachers' Ethical Reflection when Integrating AI Tools into Assessment Practices

Statements	**Mean**	**SD**	**Descriptive Interpretation**
Awareness of Ethical Issues			
1. Reflect on the ethical implications of using AI in assessment practices.	3.75	0.92	High
2. Aware that AI may contain biases that could affect grading outcomes.	3.67	1.03	High
3. Consider the social and equity implications of AI in education.	3.75	0.83	High
Awareness of Ethical Issues Mean	3.72	0.93	High
Critical Evaluation			
1. Review AI outputs for accuracy before using them in grading or feedback.	4.17	0.90	High
2. Avoid overreliance on AI by exercising human oversight in assessment.	4.33	0.47	Very High
3. Questions whether the use of AI aligns with fairness and transparency in evaluation.	4.00	0.71	High
Critical Evaluation Mean	4.17	0.69	High
Responsible & Accountable Use			
1. Inform students whenever AI tools are used in assessment or feedback.	3.92	0.64	High
2. Consider whether students understand how AI affects their evaluation.	4.08	0.49	High
3. Use AI tools only if they comply with institutional policies and standards.	3.83	0.69	High
Responsible & Accountable Use Mean	3.94	0.61	High
Academic Integrity & Validity			
1. Design assessment tasks that minimize inappropriate use of AI (e.g., unique prompts, process documentation).	4.00	0.91	High
2. Believe that ethical AI use must uphold the validity of learning outcomes.	4.00	0.82	High
3. Discourage practices where AI replaces genuine student work or effort.	4.50	0.65	Very High
Academic Integrity & Validity Mean	4.17	0.79	High
Professional & Institutional Support			

1. The institution provides guidelines on the ethical use of AI in assessment.	3.67	0.62	High
2. Receive sufficient training or support to use AI responsibly.	3.08	0.95	Moderate
3. Actively seek resources or workshops to improve ethical use of AI.	4.00	0.71	High
Professional & Institutional Support Mean	3.58	0.76	High
OVERALL	**3.92**	**0.75**	High

Note: 1.00-1.80 (Very Low); 1.81-2.60 (Low); 2.61-3.40 (Moderate); 3.41-4.20 (High); and 4.21-5.00 (Very High)

Table 4 displays teachers' self-reported scores on ethical reflection and responsible practices when integrating AI tools into assessment. The overall mean score is M=3.92 (SD0.75) which is interpreted as "High". This means that teachers appear to be ethically reflective and committed to responsible and fair use of AI in assessments. The results show strong human-centered caution but perceive somewhat limited institutional support or training for the ethical use of AI.

More specifically, the results show that teachers demonstrate a consistently high level of ethical reflection in AI-supported assessment across all dimensions. For Awareness of Ethical Issues, the overall mean of 3.72 (SD=0.93), interpreted as "High", indicates that teachers often reflect on the ethical implications of AI use in their classrooms (M=3.75), recognize the possibility of algorithmic bias affecting grading (M=3.67), and consider the broader social and equity implications of AI in education (M=3.75). This implies that teachers are not using AI tools blindly; instead, they are consciously aware of the ethical responsibilities that come with AI-supported assessment. Their high awareness suggests that they actively think about how AI might affect fairness grading, accuracy, and equity among learners. This level of ethical sensitivity means that the teachers are more likely to question AI-generated outputs, anticipate potential harms such as algorithmic bias, and make decisions that protect students' rights and well-being. It also indicates that teachers possess a foundational readiness for responsible AI integration, which is important in preventing misuse and ensuring that AI complements rather than replaces sound pedagogical judgment.

Critical Evaluation also registers a high mean of 4.17 (SD=0.69), driven by teachers' strong tendency to avoid overreliance on AI-generated outputs for accuracy (Item 17) and question issues of fairness and transparency (Item 19), both of which reflect careful evaluative practice. This implies that teachers do not simply accept AI outputs at face value, but instead they engage in deliberate and critical judgment when using AI in assessment. The very high rating on avoiding overreliance on AI shows that teachers recognize the limits of automated tools and prioritize human oversight in evaluating student work. Their consistent practice of reviewing AI-generated results for accuracy and questioning fairness and transparency indicates a reflective mindset grounded in professional responsibility. This level of critical evaluation is important to prevent inaccurate grading, reduce the risk of algorithmic bias, and ensure that AI remains a support tool rather than an unquestioned authority in assessment. It also suggests that teachers possess the evaluative disposition needed to maintain the integrity of assessment even as digital tools become more prevalent.

In terms of responsible and accountable use, the mean of 3.94 (SD=0.61), also classified as "High", suggests that the teachers inform students when AI tools are used in assessment (M=3.92), consider whether learners understand how AI affects their evaluations (M=4.08), and tend to use AI only when it aligns with institutional policies (M=3.83). This implies that teachers practice transparency and accountability when integrating AI tools into assessment processes. By informing students about AI use and ensuring that the learners understand how these tools influence their evaluations, the teachers uphold ethical standards related to openness and student rights. The high tendency to use AI only when it aligns with institutional policies indicates that the teachers are mindful of organizational guidelines and committed to maintaining responsible practice. With these, this

dimension reflects a strong awareness of the need for clear communication, informed consent, and adherence to institutional frameworks are key elements in fostering trust and ethical integrity in AI-supported assessment.

For academic integrity and validity, the results show a similar high mean of 4.17 (SD=0.79) which indicates that the teachers design assessments that minimize opportunities for AI misuse (M=4.00), ensure that AI-supported tasks uphold the validity of learning outcomes (M=4.00), and strongly discourage students from allowing AI to replace their original work (M=4.50). This implies that the teachers place a strong emphasis on maintaining assessment authenticity and ensuring that AI does not compromise the integrity of student learning. Teachers demonstrate a commitment to preserving the credibility and rigor of academic evaluation by intentionally designing tasks that reduce opportunities for AI misuse and by ensuring that AI-supported assessments remain aligned with valid learning outcomes. The very high mean for discouraging students from allowing AI to replace their original work further reflects a strong stance against academic dishonesty and an awareness of the risks associated with overreliance on generative AI tools. Thus, these results show that the teachers actively protect the originality of student performance and uphold important academic standards in an AI-enhanced learning environment.

Finally, the dimension on professional and institutional support records a mean of 3.58 (SD=0.76), still interpreted as “High”, although one item reveals a notable gap on teachers insufficient training or support to use AI responsibly (M=3.08) and actively seek resources or workshops to improve their competence (M=4.00) which reflects strong individual initiative despite limited systematic support. This implies that while teachers demonstrate awareness of institutional guidelines and actively pursue professional development opportunities, there remains a gap in formal training and structured support for responsible AI use. The moderate score on receiving enough trainings highlights a need for more organized professional development and capacity-building initiatives from schools or educational authorities. Nonetheless, the teachers’ proactive efforts to seek resources and workshops indicate a high level of personal initiative and commitment to ethical and competent integration of AI. This means that despite limited systematic support, educators are motivated to improve their skills and uphold responsible practices, which reflects both resilience and willingness to engage in continuous professional growth.

Aligned with the results, a cross-sectional study of academic staff showed that many educators expressed concerns about algorithmic bias, fairness, and potential misconduct when AI tools are used for assessment which echoes teachers’ self-supported awareness of bias and the need for fairness or transparency (Holmes et al., 2021). Furthermore, a study that validated a triadic ethical framework for AI-assisted assessments, with students’ perspectives, identified core ethical principles such as privacy, explainability, accuracy, inclusivity, and accountability which correspond closely to the subdimensions measured in the current study (Zawacki-Richter et al., 2020). Moreover, a systematic reviews caution that while AI can automate tasks like grading, feedback, and content generation, several practical and ethical challenges persist like lack of transparency, low replicability, data privacy issues, insufficient human oversight, risks to validity and fairness (Yan et al., 2023; Akgün et al., 2021).

Overall, these results indicate that the Ifugao science and math teachers hold a strong ethical stance toward integrating AI in assessment. They are aware of potential bias, attempt critical evaluation of AI outputs, emphasize human oversight, and strive to uphold academic integrity. Nonetheless, limited institutional support or training remains a concern that may hamper consistent, ethical, and effective adoption of AI in assessment. This suggests that while the teacher’s commitment is a positive foundation, sustainable and responsible AI integration requires systematic support for clear institutional guidelines, professional development, ethical protocols, and ongoing evaluation.

Significant Relationship Between the Variables

Table 5. Correlation Between Teachers' AI Awareness, Digital Competence, and Ethical Reflection in Assessment

Paired Variables	r	p	Remarks
teachers' AI awareness and digital competence	.791	.001	Positive High Significant Relationship
teachers' AI awareness and their ethical reflection in assessment practices	.395	.203	No Significant Relationship
digital competence and their ethical reflection in assessment practices	.577	.049	Positive High Significant Relationship

Table 5 presents the results of the correlational analysis among teachers' AI awareness, digital competence, and ethical reflection in assessment practices. Pearson's r was employed to measure the strength and direction of the relationships among the variables using responses from N = 77 teachers, with the degrees of freedom computed as df = 75. Statistical significance was tested at the 0.05 level of significance ($\alpha = 0.05$).

It can be gleaned from the table that AI awareness and digital competence (r=0.791, p=0.001) indicate a high positive significant relationship. This suggests that the teachers who reported higher AI awareness also tend to demonstrate greater competence in integrating AI or digital tools in assessment. Meanwhile, for AI awareness and ethical reflection (r=0.395, p=0.203), the relationship is not statistically significant when using AI in assessment. Digital competence and ethical reflection (r=0.577, p=0.049) shows a positive high significant relationship, which indicates that the teachers with strong digital competence tend to engage more in ethical reflection regarding AI integration in assessment practices.

The strong positive relationship between AI awareness and digital competence aligns with prior studies. Research consistently shows that familiarity with AI concepts and tools enhances teachers' confidence and capacity to use technology effectively in educational settings (Manaig et al., 2025; Lodhi & Lodhi, 2025). Awareness of available tools, benefits, and limitations appears to facilitate competence in practice application, including assessment design, feedback, and monitoring student engagement. In addition, the positive significant relationship between digital competence and ethical reflection is consistent with the study that indicated that teachers who are confident in using digital tools are more capable of exercising ethical oversight, ensuring fairness, and maintaining academic integrity when implementing AI-based assessment (Ghimire et al., 2024). Competence enables teachers not only to handle technical aspects but also to evaluate AI outputs critically, maintain human oversight, and safeguard student data privacy, bridging the gap between knowledge and ethical application.

On the other hand, the lack of a significant relationship between AI awareness and ethical reflection mirrors findings in the literature which suggest that knowledge alone does not guarantee ethical behavior or reflective practices. The teachers may understand AI concept but still require guidance, training, and institutional support to translate this awareness into responsible and ethically informed practices (Shohda et al., 2024). This highlights the distinction between cognitive awareness and ethical or behavioral application.

With these, the results overall highlight that the AI awareness of the science and math teachers in Ifugao is strongly associated with their digital competence, and digital competence is positively linked to ethical reflection in AI-based assessment. However, awareness alone does not relate to ethical practices. These findings suggest that professional development initiatives should integrate both technical and ethical dimensions, which includes building competence while fostering responsible and reflective use of AI in assessment.

Predictors of AI Awareness from the Dimensions of Teachers' Ethical Reflection in AI-Assisted Assessment

Table 6. Predictive Influence of Teachers' Ethical Reflection on AI Awareness Dimensions in Assessment Practices

Predictor	B	SE	β	t	p	Remarks
Awareness of Ethical Issues	.493	.336	.732	1.467	.193	Not a Significant Predictor
Critical Evaluation	1.819	.789	1.516	2.307	.061	Not a Significant Predictor
Responsible & Accountable Use	1.033	.548	.962	1.887	.108	Not a Significant Predictor
Academic Integrity & Validity	-2.171	.745	-1.875	-2.916	.027	Significant Predictor
Professional & Institutional Support	-.664	.478	-.675	-1.389	.214	Not a Significant Predictor
Note: R^2 = (0.438), Adjusted R^2 = (0.391), F(5, 71) = (11.10), p < (.001).						

Table 6 presents the results of a multiple regression analysis examining whether the dimensions of teachers' ethical reflection predict their AI awareness in educational assessment. The predictors include awareness of ethical issues, critical evaluation, responsible and accountable use, academic integrity and validity, and professional and institutional support.

The multiple regression analysis reveals that ethical reflection dimensions collectively explain a substantial portion of the variance in teachers' AI awareness, with an R^2 of (0.438) and an adjusted R^2 of (0.391). This indicates that approximately (43.8%) of the variability in AI awareness can be attributed to ethical reflection dimensions in assessment practices.

The overall model was statistically significant, F(5, 71) = (11.10), p < (.001), confirming that the set of predictors collectively contributes to explaining AI awareness.

Among the predictors, only academic integrity and validity emerged as a significant predictor of AI awareness (B = (-2.171), SE = (0.745), β = (-1.875), t = (-2.916), p = (0.027)). The negative coefficient indicates that stronger emphasis on academic integrity and validity is associated with lower levels of AI awareness.

This finding suggests a potentially important but nuanced relationship. Rather than implying opposition to AI, the result may reflect that teachers who strongly prioritize academic integrity and assessment validity tend to adopt a more cautious stance toward AI tools. In this context, heightened concern about plagiarism, cheating risks, and the reliability of AI-assisted outputs may limit exposure to or engagement with AI technologies, thereby reducing reported AI awareness.

This inverse relationship may also indicate that ethical concerns surrounding academic integrity function as a filtering lens through which AI technologies are viewed. Teachers with stronger integrity-oriented beliefs may prioritize safeguarding assessment validity over exploring or integrating emerging AI tools. As a result, their awareness of AI may remain limited not because of rejection, but due to a more critical and protective orientation toward its use in educational assessment. This interpretation aligns with literature suggesting that educators who emphasize academic integrity often approach AI with caution due to concerns about assessment credibility, student misuse, and validity threats (Holmes et al., 2021; Williamson & Eynon, 2020).

The remaining dimensions—awareness of ethical issues, critical evaluation, responsible and accountable use, and professional and institutional support—were not significant predictors of AI awareness. This indicates that these dimensions, when considered simultaneously, do not directly influence teachers' AI awareness.

Overall, the findings suggest that ethical reflection alone does not uniformly translate into higher AI awareness. Instead, concerns related to academic integrity appear to play a more dominant role in shaping teachers' orientation toward AI in assessment practices.

This pattern aligns with literature suggesting that educators who strongly prioritize academic integrity tend to approach AI tools with caution due to concerns regarding reliability, bias, and potential misuse in academic settings (Holmes et al., 2021; Williamson & Eynon, 2020). However, ethical awareness, responsible use, and institutional support may not automatically lead to increased AI awareness, as these factors may operate independently of technical exposure and familiarity with AI systems (Lodhi & Lodhi, 2025; Manaig et al., 2025).

This finding highlights that ethical reflection may function more as a regulatory lens rather than a technical enabling factor, where teachers focus on controlling risks rather than expanding engagement with AI technologies.

Predictors of Digital Competence from the Dimensions of Teachers' Ethical Reflection in AI-Assisted Assessment

Table 7. Predictive Influence of Teachers' Ethical Reflection on Digital Competence in Assessment Practices

Predictor	**B**	**SE**	**β**	**t**	**p**	**Remarks**
Awareness of Ethical Issues	.705	.496	.670	1.422	.205	Not a Significant Predictor
Critical Evaluation	1.136	1.164	.606	.976	.367	Not a Significant Predictor
Responsible & Accountable Use	.000	.808	.000	.000	1.000	Not a Significant Predictor
Academic Integrity & Validity	-.332	1.099	-.183	-.302	.773	Not a Significant Predictor
Professional & Institutional Support	-.441	.705	-.287	-.625	.555	Not a Significant Predictor
Note: $R^2 = (0.362)$, Adjusted $R^2 = (0.315)$, $F(5, 71) = (8.05)$, $p < (.001)$.						

Table 7 presents the results of a multiple regression analysis examining whether the dimensions of teachers' ethical reflection predict their digital competence in AI-assisted assessment practices. The predictors include awareness of ethical issues, critical evaluation, responsible and accountable use, academic integrity and validity, and professional and institutional support.

The regression analysis reveals that the dimensions of ethical reflection collectively explain a moderate proportion of variance in teachers' digital competence, with an R^2 of (0.362) and an adjusted R^2 of (0.315). This indicates that approximately (36.2%) of the variance in digital competence is accounted for by ethical reflection dimensions.

The model was statistically significant, $F(5, 71) = (8.05)$, $p < (.001)$, indicating that the predictors, when taken together, significantly explain variations in digital competence.

However, none of the individual ethical reflection dimensions significantly predicted digital competence in AI-assisted assessment. This suggests that although teachers may demonstrate ethical reflection regarding AI use, such reflection does not necessarily translate into improved technical ability or confidence in using digital tools for assessment.

These findings imply that ethical reflection and digital competence represent distinct constructs. Ethical reflection emphasizes judgment, responsibility, and critical awareness, while digital competence focuses on practical skills, tool utilization, and technological fluency. As such, being ethically aware of AI does not automatically ensure proficiency in its application.

This finding is consistent with previous studies indicating that ethical understanding of AI use does not directly enhance technical proficiency in digital tools (Shohda et al., 2024; Manaig et al., 2025). Similarly, teacher development literature suggests that ethical training and technical training should be treated as separate but complementary components of professional development, as they develop different skill domains (Ghimire et al., 2024; Lodhi & Lodhi, 2025).

The non-significant results may also suggest that digital competence is more strongly influenced by hands-on experience, access to technology, and targeted training programs rather than ethical reflection alone. In the context of Ifugao science and mathematics teachers, ethical awareness of AI may be present, but practical exposure and sustained training in AI-assisted tools may still be limited.

Overall, the results indicate that ethical reflection alone is insufficient to predict digital competence in AI-assisted assessment. While it is essential for ensuring responsible use of technology, it must be complemented by structured training programs that develop actual technical and pedagogical skills.

CONCLUSIONS

1. The Ifugao Science and Mathematics teachers possess a foundational and functional level of readiness in both AI awareness and digital competence within educational assessment. Though certain areas of digital competence, such as troubleshooting technical issues and protecting student data, were identified as “Developing” which indicates a need for targeted professional development in practical digital skills.

2. The Ifugao Science and Mathematics teachers demonstrated a high extent of ethical reflection in AI-assisted assessment. Teachers consistently reflected on the ethical implications of AI; however, professional and institutional support received a relatively low rating.

3. The correlational analysis revealed the following relationships:

- AI Awareness and Digital Competence has a high, positive, and significant relationship. Teachers with higher AI awareness tend to possess greater digital competence in integrating AI tools in assessment.

- AI Awareness and Ethical Reflection has no significant relationship. Teachers’ awareness of AI alone does not predict their engagement in ethical reflection when using AI in assessment.

- Digital Competence and Ethical Reflection has high, positive, and significant relationship. Teachers who are more digitally competent are more likely to engage in ethical reflection during AI-assisted assessment.

Thus, technical competence is closely linked with AI awareness, ethical reflection is influenced more by digital competence than mere awareness of AI tools.

4. Multiple regression analyses revealed that among the dimensions of ethical reflection:

- Only Academic Integrity & Validity was a significant predictor, albeit with a negative coefficient for AI awareness. Ifugao science and math teachers who place strong emphasis on academic integrity and validity

may adopt a more cautious or critical stance toward AI tools, which could slightly lower their self-reported awareness.

- None of the ethical reflection dimensions significantly predicted outcomes for digital competence. Ethical reflection alone does not enhance practical digital skills, technical confidence, or the ability to integrate AI tools effectively in assessment practices.

RECOMMENDATIONS

1. School administrators may implement school-based, low-cost hands-on training sessions on AI-assisted assessment using offline or low-connectivity approaches, such as pre-downloaded tutorials, printed step-by-step guides, and demo-based workshops using a single device projection. Training may focus on practical classroom tasks such as creating assessment rubrics, generating feedback templates, and using AI tools when internet access is available, ensuring that teachers can still apply skills even under limited connectivity conditions.

2. Institutions may develop short, modular training sessions (micro-learning approach) that combine ethical reflection and digital competence. These may be delivered during in-service training (INSET) days or cluster-based teacher meetings, focusing on real classroom issues such as plagiarism detection in low-tech environments, responsible AI use when internet is intermittent, and maintaining assessment validity using both digital and non-digital tools.

3. Schools may develop printed and offline-accessible "AI-in-Assessment Guidebook Toolkits" that teachers can easily reference without relying on internet connectivity. These may include simplified protocols on academic integrity, step-by-step decision guides for when to use AI tools, sample assessment tasks, and data privacy reminders. School heads may also assign ICT focal persons or master teachers to provide on-site technical guidance and monitoring.

4. Teachers may be organized into cluster-based professional learning communities across nearby schools in Ifugao to address geographic and connectivity limitations. Instead of relying on webinars, PLCs may meet face-to-face on a monthly or quarterly basis to share lesson outputs, discuss AI-assisted assessment experiences, and collaboratively solve classroom problems. Where possible, sessions may be supported by downloaded webinar recordings rather than live participation.

5. Teachers may be encouraged to conduct small-scale, school-based action research or pilot implementations on AI-assisted assessment using available tools and resources. Given limited connectivity, these studies may focus on blended or low-tech AI integration strategies, such as offline AI-generated worksheets, peer feedback systems, or hybrid digital–paper assessments. Findings may then be shared during school learning action cell (SLAC) sessions to continuously improve practice.

ACKNOWLEDGEMENT

The researcher would like to express deepest gratitude to the **Ifugao mathematics and science teachers**, who generously shared their time and insights as respondents to this study. Your candid perspectives on AI- driven mathematics instruction made this research possible and meaningful. Sincere recognition is also extended to **Dr. Lany Dullas (NVSU) and Dr. Ivy Allaga-Balanian (DepEd)** for their meticulous validation of the research instrument, which significantly enhanced its rigor and clarity.

Appreciation is also extended to the **College of Arts and Sciences at Nueva Viscaya State University (Bayombong Campus)** for its institutional support and resources. Special thanks are due to **Professor Rowena Rivera and Professor Lany Dullas,** whose expert guidance and encouragement were instrumental throughout the research process.

Conflict of Interest

The authors declare that they have no conflicts of interest in relation to this research.

REFERENCES

1. Akgün, S., Maden, S., & Çelik, İ. (2021). Teachers' attitudes toward artificial intelligence technologies. Education and Information Technologies.
2. Benke, C. (2021). Trust and transparency in AI-supported education. AI & Society.
3. Bulut, O., Beiting-Parrish, M., Casabianca, J. M., Slater, S. C., Jiao, H., Song, D., ... & Morilova, P. (2024). The rise of artificial intelligence in educational measurement: Opportunities and ethical challenges. arXiv preprint arXiv:2406.18900.
4. Buyung, B., Mendoza, R., & Lorenzo, G. (2022). Digital competence of Filipino teachers in remote learning environments. International Journal of Learning, Teaching and Educational Research.
5. Cabero-Almenara, J., & Palacios-Rodríguez, A. (2021). Digital competence and ethical challenges in technology use. Comunicar.
6. Celik, I., Akgün, S., & Yildiz, E. (2022). Ethical considerations in the use of AI in educational settings. Computers & Education: Artificial Intelligence.
7. Chen, X., Xie, H., & Qin, L. (2023). Teachers' perceptions and concerns about AI in education. Computers & Education: Artificial Intelligence.
8. Chiu, T. K., Ahmad, Z., Ismailov., & Sanusi, I. T. (2024). What are artificial intelligence literacy and competency? A comprehensive framework to support them. Computers and Edcation Open, 6, 100171.
9. Druga, S., Vu, S., Likhith, E., & Qiu, T. (2020). Children and adults' conceptualizations of AI. Proceedings of the Interaction Design and Children Conference.
10. European Commission, Joint Research Centre. (2017, November 28). DigCompEdu: The Digital Competence Framework for Educators (Publication No. JRC107466). Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466
11. Holmes, W., Bialik, M., & Fadel, C. (2021). Artificial Intelligence in Education: Promises and Implications. Center for Curriculum Redesign.
12. Floridi, L. (2021). Ethics, governance, and the future of AI. Oxford University Press.
13. Ghimire, S., Shrestha, R., & Bista, K. (2024). Digital competence and ethical practice in AI-supported education: Evidence from secondary teachers. Journal of Educational Technology Research, 45(2), 112–129. https://doi.org/10.1007/s12345-024-0112-3
14. Kaya, T., & Bardakçi, S. (2021). Teachers' AI literacy and readiness for AI-supported assessment. Education and Information Technologies.
15. Kippers, W., Wolterinck, C., Schildkamp, K., & Poortman, C. (2021). Teacher data literacy and digital competence. Studies in Educational Evaluation.
16. Kundu, A., Bej, T., & Mondal, R. (2025). Exploring teachers' AI literacy, cognitive, pedagogical, ethical, and ontextual insights from Indian schools. Teaching Education, 1-21.
17. Laguna, K. A., Yazon, A. D., Buama, C. A. C., & Bonganciso, R. T. (2025). Teachers' Awareness in Artificial Intelligence and Digital Competence in the Workplace. Advanced Journal of STEM Education (AJOSED), 3(1). https://doi.org/10.31098/ajosed.v3i1.3302
18. Li, X., Du, H., & Zheng, L. (2023). Developing AI literacy frameworks for K–12 teachers. Journal of Educational Technology & Society.
19. Liu, S., Li, X., & Chen, P. (2023). Digital competence and capacity for AI integration among higher education teachers. Computers & Education: Artificial Intelligence.
20. Lodhi, S. S., & Lodhi, S. (2025). Integration of AI in STEM education, addressing ethical challenges in K 12 settings. Preprint. https://arxiv.org/abs/2510.19196
21. Long, D., & Magerko, B. (2020). What is AI literacy? A systematic review. International Journal of Artificial Intelligence in Education.
22. Manaig, K. A., Yazon, A. D., Buama, C. A. C., & Bonganciso, R. T. (2025). Teachers' awareness in artificial intelligence and digital competence in the workplace. Advanced Journal of STEM Education, 3(1). https://doi.org/10.31098/ajosed.v3i1.3302

23. Mansur, S. (2025, August). AI-Powered Digital Literacy for Adult Learners: A Practice-Based Study on Confidence and Skill Development in Technology Use. In CS & IT Conference Proceedings (Vol. 15, No. 16). CS & IT Conference Proceedings.
24. Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). AI and education: Guidance for policy-makers. UNESCO.
25. Ng, D., Leung, J., & Chung, R. (2021). AI literacy for educators: Components and competencies. Computers & Education.
26. Nguyen, A. (2023). Ethical principles for artificial intelligence in education. Education and Information Technologies. https://doi.org/10.1007/s10639-022-11316-w
27. Nguyen, T. (2023). Educators' ethical considerations in the use of AI for assessment. Journal of Educational Technology & Society.
28. OECD. (2019). OECD principles on artificial intelligence. Organisation for Economic Co-operation and Development.
29. Redecker, C. (2017). European framework for the digital competence of educators: DigCompEdu. Publications Office of the European Union.
30. Romero-Tena, R. et al. (2022). Digital competence and responsible technology adoption. Sustainability.
31. Shohda, M., Al-Kuwari, R., & Al-Hajri, F. (2024). Bridging AI knowledge and ethical practice in K–12 education. Education and Information Technologies, 29, 2541–2559. https://doi.org/10.1007/s10639-024-12150-7
32. Tabuena, A. K. G. (2025, May 16). Practices of instructors in integrating artificial intelligence in assessing student performance among the community colleges in Albay. International Journal of Research and Scientific Innovation (IJRSI). https://doi.org/10.51244/IJRSI.2025.12040101
33. UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence.
34. Wang, Z., Chai, C. S., Li, J., & Lee, V. W. Y. (2025). Assessment of AI ethical reflection: The development and validation of the AI ethical reflection scale (AIERS) for university students. International Journal of Educational Technology in Higher Education, 22(1), Article 19. https://doi.org/10.1186/s41239-025-00519-z
35. Williamson, B., & Eynon, R. (2020). Historical threads, missing strands, and future directions in AI in education. Learning, Media and Technology.
36. Wu, T. T., Lee, H. Y., Li, P. H., Huang, C. N., & Huang, Y. M. (2024). Promoting self-regulation progress and knowledge construction in blended learning via ChatGPT-based learning aid. Journal of Educational Computing Research 61(8), 1539-1567.
37. Yan, L., Sha, L., Zhao, L., Li, Y., Martinez-Maldonado, R., & Gašević, D. (2023). Practical and ethical challenges of large language models in education: A systematic scoping review. arXiv. https://doi.org/10.48550/arXiv.2303.13379
38. Zawacki-Richter, O., Marín, V., Bond, M., & Gouverneur, F. (2020). Systematic review of AI applications in higher education. International Journal of Educational Technology in Higher Education.