



Reconstructing Assessment Credibility in the Generative AI Era: A Teacher-Centred SEM Study of AI Literacy, Ethical Judgment, Institutional Support, and Pedagogical Control

¹**Dr. R.V.Suganya, and ²Dr.Senthil**

¹*Assistant Professor of Commerce, Vels Institute of Science Technology and Advanced Studies (VISTAS), Pallavaram, Chennai – 117.*

Email ID: sugan9979@gmail.com

²*Assistant Professor, Department of MBA, School of Management Studies, Vels Institute of Science Technology and Advanced Studies (VISTAS), Pallavaram, Chennai – 117.*

Abstract

Generative Artificial Intelligence has created new challenges for educational assessment by making it easier for students to produce essays, reflections, online responses, and take-home assignments with AI assistance. This has raised concerns about originality, authorship, academic integrity, fairness, and the trustworthiness of assessment outcomes. The aim of this study was to examine how assessment credibility can be reconstructed in the Generative AI era through a teacher-centred model involving AI literacy, ethical judgment, institutional support, and pedagogical control. A quantitative cross-sectional survey design was used, and data were collected from 352 teachers through a structured questionnaire. The data were analysed using SPSS and AMOS through descriptive statistics, reliability analysis, correlation analysis, Confirmatory Factor Analysis, Structural Equation Modeling, and mediation analysis. The findings showed that AI literacy, ethical judgment, and institutional support had significant positive effects on pedagogical control. Pedagogical control also had the strongest direct effect on assessment credibility. The mediation results confirmed that pedagogical control partially mediated the relationships between AI literacy, ethical judgment, institutional support, and assessment credibility. The study concludes that credible assessment in AI-mediated education depends not only on teachers' awareness of AI tools, but also on their ethical decision-making, institutional backing, and capacity to redesign assessment practices. The study contributes a teacher-centred SEM model for understanding assessment credibility in the Generative AI era and highlights the need to move from detection-based responses toward design-based assessment reform.

Keywords: Generative AI; assessment credibility; teacher agency; AI literacy; ethical judgment; institutional support; pedagogical control; SEM; AMOS.

Introduction

Background of the Study

Generative Artificial Intelligence has become one of the most disruptive developments in contemporary education. Tools such as ChatGPT, Gemini, Copilot, and other AI-supported platforms are increasingly being used by students and teachers for writing support, summarisation, lesson planning, feedback generation, translation, brainstorming, and content development. Unlike earlier digital tools, Generative AI can produce extended written responses, explanations, essays, reflections, lesson materials, and assessment answers within seconds. This has changed the nature of teaching and learning by making academic production faster, more accessible, and more complex to evaluate.

The growing presence of Generative AI has created both opportunities and risks for education. On one hand, these tools can support personalised learning, provide instant feedback, assist students with language difficulties, and help teachers prepare instructional materials more efficiently. Kasneci et al. (2023) argue that large language models can support learning

through explanation, tutoring, writing assistance, and knowledge access. Similarly, Lo (2023) notes that ChatGPT has significant educational potential, particularly in supporting learning activities and academic engagement. However, these benefits depend on how carefully the tools are used, monitored, and integrated into pedagogical practice.

One of the most serious challenges created by Generative AI is its impact on assessment credibility. Traditional assessment methods such as essays, written reflections, online quizzes, homework tasks, and take-home assignments are now more vulnerable to AI-generated responses. This makes it increasingly difficult for teachers to determine whether submitted work reflects students' own understanding, effort, originality, and independent thinking. Perkins, Furze, Roe, and MacVaugh (2024) argue that assessment in the age of AI requires a shift away from simple prohibition and detection toward clearer, more transparent, and pedagogically meaningful assessment design.

Generative AI also raises important questions about student originality and

authorship. When students use AI tools to generate ideas, improve writing, summarise sources, or produce full responses, the boundary between student work and machine-assisted work becomes unclear. This creates uncertainty around who should be recognised as the author of academic work and how much AI assistance is acceptable. Chan and Hu (2023) found that students recognise the benefits of Generative AI but also express concerns about accuracy, academic integrity, privacy, and ethical use. These concerns show that AI use in education is not only a technical issue, but also an ethical and pedagogical issue.

Academic integrity has therefore become a central concern in AI-mediated education. Generative AI can be used productively to support learning, but it can also be misused to bypass learning processes, produce unauthorised work, or submit assignments without genuine understanding. Bittle and El-Gayar (2025) highlight that Generative AI has intensified academic integrity concerns and requires institutions to rethink policy, assessment, and digital literacy. Similarly, Miao and Holmes (2023) emphasise that Generative AI should be governed through ethical validation, transparency, privacy protection, inclusion, and human agency.

In this changing context, teachers' decision-making has become more complex. Teachers are now expected to decide when AI use should be allowed, when it should be restricted, how students should declare AI use, and how assessment tasks should be redesigned to preserve authenticity and fairness. This places teachers at the centre of assessment credibility. Teachers need AI literacy to understand the strengths and limitations of AI tools, ethical judgment to evaluate risks, institutional support to apply consistent rules, and pedagogical control to redesign assessment practices in ways that protect meaningful learning.

Therefore, the Generative AI era requires education systems to move beyond the narrow question of whether AI should be used or banned. The more urgent issue is how assessment credibility can be reconstructed in an environment where AI-generated work is increasingly difficult to distinguish from student-generated work. This study is situated within this problem and focuses on teachers as key actors in maintaining credible assessment. It examines how AI literacy, ethical judgment, institutional support, and pedagogical control influence teachers' ability to protect assessment integrity, student originality,

authorship transparency, and responsible AI-supported learning.

Problem Statement

The rapid emergence of Generative Artificial Intelligence has created a major challenge for educational assessment. Tools such as ChatGPT, Gemini, Copilot, and similar platforms can now generate essays, summaries, explanations, reflections, lesson responses, and project content within seconds. While these tools offer opportunities for personalised learning, writing support, feedback, and instructional assistance, they also create serious concerns about the credibility of student assessment. Traditional assessment methods, particularly take-home assignments, online quizzes, written reflections, and essay-based tasks, are increasingly vulnerable to AI-generated submissions. As a result, it has become more difficult for teachers to determine whether submitted work reflects students' own understanding, originality, effort, and independent thinking.

This problem is especially significant because assessment credibility depends on trust, authenticity, fairness, and evidence of actual learning. In the Generative AI era, the boundary between student-authored work and AI-assisted work has become unclear. Students may use AI tools to generate ideas,

edit sentences, summarise sources, or produce complete responses. This creates uncertainty around authorship, academic integrity, and acceptable levels of AI assistance. Chan and Hu (2023) highlight that students recognise the benefits of Generative AI but also express concerns about accuracy, privacy, ethics, and academic integrity. Similarly, Bittle and El-Gayar (2025) argue that Generative AI has intensified academic honesty concerns and requires institutions to reconsider assessment design, policy, and digital literacy.

Teachers are positioned at the centre of this challenge. They are expected to make informed decisions about whether AI use should be permitted, restricted, declared, or integrated into assessment tasks. However, many teachers may not have sufficient AI literacy, ethical guidance, institutional support, or pedagogical control to manage these decisions effectively. Miao and Holmes (2023) stress that Generative AI use in education requires ethical validation, transparency, privacy protection, inclusion, and human agency. Yet, in many educational institutions, policies and professional development systems have not developed at the same pace as AI adoption. This leaves teachers uncertain about how to

protect originality, authorship, fairness, and assessment integrity.

The lack of institutional support further deepens the problem. Without clear AI-use policies, assessment guidelines, approved tools, and training opportunities, teachers may respond to Generative AI inconsistently. Some may completely ban AI use, while others may allow it without clear boundaries. Such inconsistency can weaken assessment fairness and create confusion among students. Redecker (2017) argues that effective digital education requires professional engagement, institutional support, digital resources, and assessment competence. Therefore, assessment credibility cannot be maintained only through individual teacher effort; it also requires institutional governance and structured support.

Another major issue is the limited pedagogical control teachers may have over AI-mediated learning. Pedagogical control refers to teachers' ability to guide, monitor, regulate, and redesign learning and assessment processes. In the context of Generative AI, this may include oral defence, reflective logs, process-based assessment, project work, portfolios, classroom-based tasks, and AI-use declarations. Perkins, Furze, Roe, and

MacVaugh (2024) argue that assessment in the age of AI should move beyond detection-based approaches and focus on transparent, authentic, and learning-centred design. However, many teachers may not yet be prepared to redesign assessment in ways that preserve credibility while allowing responsible AI-supported learning.

Therefore, the central problem addressed in this study is the weakening of assessment credibility in the Generative AI era and the need to understand how teachers can reconstruct it through AI literacy, ethical judgment, institutional support, and pedagogical control. Although Generative AI cannot be ignored or fully eliminated from educational practice, its use must be governed responsibly. This study responds to this problem by examining the factors that influence teachers' capacity to maintain credible, ethical, and authentic assessment in AI-mediated educational environments.

Research Gap

Although research on Generative Artificial Intelligence in education has expanded rapidly, several important gaps remain in relation to assessment credibility and teachers' role in protecting authentic learning. Existing studies have examined the general benefits and risks of Generative AI in education, including personalised

learning, writing support, feedback generation, academic assistance, and student engagement. For example, Kasneci et al. (2023) and Lo (2023) highlight the educational potential of tools such as ChatGPT, while Chan and Hu (2023) discuss students' perceptions of Generative AI, including its benefits and ethical challenges. However, much of the existing literature focuses broadly on AI adoption, student use, or general educational transformation, rather than specifically examining how teachers can reconstruct assessment credibility in AI-mediated learning environments.

A second gap relates to the limited focus on **assessment credibility** as a central research construct. Many studies discuss academic integrity, plagiarism, and AI-generated assignments, but fewer studies examine assessment credibility as a wider issue involving originality, authorship transparency, fairness, trustworthiness, and evidence of genuine student learning. Generative AI has made it increasingly difficult for teachers to determine whether students' submitted work reflects independent thinking or machine-assisted production. Perkins, Furze, Roe, and MacVaugh (2024) argue that AI-era assessment should move beyond detection

and prohibition toward transparent and learning-centred assessment design. However, more empirical research is needed to understand the teacher-related factors that support credible assessment practices in the Generative AI era.

A further gap concerns the role of **teacher agency and pedagogical control**. Current discussions often emphasise institutional policy, AI detection tools, or student misuse, but less attention has been given to teachers' practical ability to guide, monitor, regulate, and redesign assessment practices. Pedagogical control is important because teachers are responsible for deciding how AI use should be framed, declared, limited, or meaningfully integrated into learning tasks. Yet, this construct has not been sufficiently examined as a mediating mechanism between teacher-related capacities and assessment credibility. This creates a gap in understanding how teachers translate AI literacy, ethical judgment, and institutional support into actual assessment practices.

Another important gap is the fragmented treatment of key variables. AI literacy, ethical judgment, institutional support, and assessment redesign are often discussed separately in the literature. Long and Magerko (2020) and Ng et al. (2021) provide useful conceptual foundations for

AI literacy, while Miao and Holmes (2023) emphasise ethical and human-centred AI governance in education. Redecker (2017) highlights the importance of institutional support and digital competence among educators. However, fewer studies combine these dimensions into one integrated empirical model to explain how assessment credibility can be strengthened in the Generative AI era.

In addition, there is a methodological gap. Much of the literature on Generative AI in education is conceptual, exploratory, or policy-oriented. While these studies are valuable, there is a need for more quantitative model-testing research that examines the structural relationships among teacher AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility. Structural Equation Modeling is particularly suitable for this purpose because it allows the study to test both direct and mediating relationships among latent constructs.

Therefore, this study addresses these gaps by proposing and testing a teacher-centred SEM model of assessment credibility in the Generative AI era. Unlike studies that focus only on AI adoption or academic misconduct, this study positions teachers as active pedagogical decision-makers who can

reconstruct assessment credibility through AI literacy, ethical judgment, institutional support, and pedagogical control. In doing so, the study contributes to educational technology, assessment reform, and responsible AI governance literature.

Research Objectives

1. To examine teachers' AI literacy in relation to Generative AI use in education.
2. To investigate teachers' ethical judgment regarding AI-generated academic work.
3. To assess the role of institutional support in strengthening assessment credibility.
4. To examine how pedagogical control influences teachers' ability to manage AI-supported learning and assessment.
5. To test the structural relationships among AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility using SEM.

Literature Review

Generative AI and the Disruption of Assessment Credibility

Generative Artificial Intelligence has introduced a significant disruption to educational assessment because it can

produce essays, summaries, reflections, explanations, reports, lesson responses, and problem-based answers within seconds. Earlier digital technologies mainly supported access to information, communication, or content delivery; however, Generative AI actively produces academic text and learning outputs that may resemble student-authored work. This shift has created a major challenge for teachers because traditional assessment practices often rely on written products as evidence of student learning. Lo (2023), in a rapid review of ChatGPT in education, argues that ChatGPT has generated urgent educational concerns because of its capacity to support learning while also creating risks that require immediate pedagogical and institutional response.

Traditional assessment methods such as take-home essays, written reflections, online quizzes, homework tasks, and unsupervised assignments are particularly vulnerable in the Generative AI era. These tasks usually assume that the submitted response reflects the student's own thinking, reading, writing, and understanding. However, AI-generated responses make this assumption increasingly unstable. Kasneci et al. (2023) explain that large language models create important opportunities for education, including

writing support and knowledge access, but they also raise concerns related to misinformation, overreliance, academic integrity, and the need for new literacies. Therefore, Generative AI does not merely add a new digital tool to classrooms; it changes the conditions under which assessment evidence is produced and judged.

The disruption is not only technical but also epistemic and ethical. If teachers cannot determine whether a student has independently produced an answer, assessment credibility becomes weakened. The issue is not simply whether students are “cheating,” but whether assessment tasks are still capable of generating valid evidence of learning. Perkins, Furze, Roe, and MacVaugh (2024) argue that assessment in the age of Generative AI should move beyond a narrow focus on misconduct detection and instead foreground assessment design, transparency, and responsible integration of AI tools. This indicates that the central challenge is not only controlling AI use, but redesigning assessment so that learning remains visible, authentic, and defensible.

Assessment Credibility in AI-Mediated Education

Assessment credibility refers to the extent to which assessment results can be trusted as valid, fair, authentic, and representative of students' actual learning. In AI-mediated education, assessment credibility depends on whether teachers can reasonably judge student originality, authorship, understanding, and effort. When students use Generative AI to generate or heavily modify academic work, it becomes difficult to determine where student contribution ends and machine assistance begins. This creates uncertainty around authorship transparency, academic integrity, and fairness in evaluation.

Credibility also requires assessment tasks to produce reliable evidence of learning. A written answer may appear polished, accurate, and well-structured, but it may not represent the learner's own reasoning if it has been generated by AI. This distinction is central to AI-era assessment because the final product alone may no longer be sufficient evidence of learning. Perkins et al. (2024) propose the Artificial Intelligence Assessment Scale as a framework to clarify different levels of permitted AI use in assessment. Their work suggests that assessment credibility can be strengthened when teachers and students share explicit

expectations about whether AI is prohibited, limited, supported, or integrated into a task.

Assessment credibility is also connected to fairness. If some students use AI extensively while others avoid it because of uncertainty, fear, limited access, or ethical concerns, assessment outcomes may become uneven. Chan and Hu (2023) found that students perceive Generative AI as useful for learning support, writing, brainstorming, and research assistance, but they also express concerns about accuracy, privacy, ethical use, and personal development. This suggests that assessment credibility requires institutions and teachers to create clear rules so that students are not assessed under unequal or unclear conditions.

In this study, assessment credibility is therefore understood as a multidimensional construct involving trustworthiness of assessment outcomes, authenticity of learning evidence, originality of student work, transparency of authorship, and fairness of evaluation. This definition moves beyond plagiarism alone and recognises that Generative AI challenges the deeper relationship between assessment tasks and learning evidence.

Teacher AI Literacy

Teacher AI literacy is a critical requirement for reconstructing assessment credibility in

the Generative AI era. AI literacy refers to the ability to understand, use, evaluate, and critically engage with AI technologies. Long and Magerko (2020) define AI literacy as a set of competencies that enables individuals to interact with, evaluate, and make informed decisions about AI systems. In the context of teachers, AI literacy includes not only knowing how to use tools such as ChatGPT, Gemini, or Copilot, but also understanding their limitations, risks, biases, and pedagogical possibilities.

Teacher AI literacy includes practical skills such as prompt writing, generating examples, preparing lesson activities, producing feedback, and designing learning materials. However, it also requires critical judgment. Teachers need to recognise that AI-generated outputs may contain hallucinations, inaccurate claims, fabricated references, bias, or misleading explanations. Ng et al. (2021) conceptualise AI literacy as involving conceptual understanding, practical application, evaluation, and ethical consideration. This broader understanding is important because teachers must guide students not only in using AI efficiently, but also in questioning AI-generated content.

In assessment contexts, AI literacy allows teachers to make informed decisions about task design and AI-use boundaries. A

teacher with strong AI literacy is more likely to understand which assessment tasks are vulnerable to AI-generated responses and which tasks require stronger evidence of student process, reasoning, and oral explanation. UNESCO's AI Competency Framework for Teachers also emphasises that teachers need knowledge, skills, and values to use AI responsibly, including AI foundations, ethics, pedagogy, and professional learning. This positions AI literacy as a professional competence rather than a simple technical skill.

Therefore, teacher AI literacy is central to assessment credibility because teachers cannot regulate or redesign AI-mediated assessment if they do not understand how AI tools operate, what they can produce, and where their limitations lie. AI literacy enables teachers to shift from fear-based responses to informed pedagogical control.

Ethical Judgment in Generative AI Use

Ethical judgment refers to teachers' ability to make principled decisions about responsible, fair, transparent, and educationally meaningful AI use. In the Generative AI era, ethical judgment is required because AI use creates complex questions about plagiarism, authorship, academic dishonesty, privacy, data security, fairness, bias, student dependency, and

acceptable levels of machine assistance. UNESCO's guidance on Generative AI in education stresses the importance of human-centred use, privacy protection, ethical validation, inclusion, and institutional regulation.

One of the most visible ethical concerns is academic dishonesty. Students may use AI tools to generate full assignments, rewrite content, solve tasks, or produce reflections without genuine engagement. However, treating all AI use as misconduct is too simplistic. Some forms of AI use may support accessibility, language development, brainstorming, feedback, and revision. The ethical issue is therefore not only whether AI was used, but how it was used, whether it was declared, and whether the student still demonstrated learning. Bittle and El-Gayar (2025) argue that Generative AI has intensified academic integrity concerns and requires stronger digital literacy, policy development, and assessment redesign.

Authorship is another major ethical issue. AI tools blur the boundary between student-authored and AI-assisted work. If students use AI to generate ideas, structure arguments, polish writing, or produce entire responses, teachers must decide how much assistance is acceptable and how it should be acknowledged. This requires transparent AI-

use declarations, clear task instructions, and shared academic integrity expectations. The European Commission's ethical guidelines for educators emphasise that teachers and school leaders need to understand both the potential and risks of AI and data use so they can engage with AI systems critically and ethically.

Ethical judgment also includes concern for privacy, bias, and dependency. Teachers must consider whether student data should be entered into AI tools, whether AI-generated content reproduces harmful bias, and whether students are becoming dependent on AI instead of developing independent reasoning. Therefore, ethical judgment is not an additional concern after technology use; it is a core condition for responsible AI-mediated education.

Institutional Support for Responsible AI Assessment

Institutional support is essential for responsible AI assessment because individual teachers cannot reconstruct assessment credibility alone. Institutional support includes AI-use policies, assessment guidelines, approved tools, teacher training, leadership direction, technical infrastructure, academic integrity procedures, and clear communication with students. Without institutional support, teachers may adopt

inconsistent responses to AI use. Some may prohibit it completely, others may ignore it, and others may allow it without clear boundaries. Such inconsistency can weaken fairness and credibility across programmes and classrooms.

Policy guidance is especially important because Generative AI has created uncertainty around acceptable and unacceptable academic practices. UNESCO's guidance highlights the need for education systems to develop policies, build human capacity, validate tools ethically, protect privacy, and preserve human agency in AI-supported education. This indicates that responsible AI assessment must be supported by institutional governance rather than left entirely to individual teacher discretion.

Teacher training is another key part of institutional support. Teachers need professional development in AI literacy, ethical AI use, prompt design, assessment redesign, student guidance, and AI-use declaration practices. The UNESCO AI Competency Framework for Teachers specifically states that teacher training programmes and assessment parameters should be informed by AI-related competencies. Similarly, the European Commission's guidance aims to help

educators understand AI's potential and risks so they can use AI positively, critically, and ethically.

Institutional support also includes digital competence infrastructure. Redecker's DigCompEdu framework identifies educator digital competence across areas such as professional engagement, digital resources, teaching and learning, assessment, learner empowerment, and support for learners' digital competence. This framework is relevant because responsible AI assessment requires more than access to tools; it requires digitally competent institutions that support teachers in assessment design, feedback, monitoring, and learner guidance. Therefore, institutional support strengthens assessment credibility by creating shared expectations, reducing teacher uncertainty, improving fairness, and enabling teachers to redesign assessment in systematic rather than isolated ways.

Pedagogical Control in AI-Supported Classrooms

Pedagogical control refers to teachers' ability to guide, monitor, regulate, and redesign AI-supported learning and assessment. In AI-supported classrooms, pedagogical control does not mean rejecting technology or controlling students through surveillance. Rather, it refers to teachers'

professional capacity to design learning conditions in which AI use remains transparent, purposeful, ethical, and connected to learning outcomes. This includes deciding when AI use is allowed, how it should be declared, what forms of evidence students must provide, and how learning should be assessed.

Pedagogical control is particularly important because AI detection tools alone cannot solve the problem of assessment credibility. Detection-based approaches may be unreliable, may create false accusations, and may encourage a policing culture rather than a learning-centred environment. Perkins et al. (2024) argue that educational assessment should move toward flexible frameworks that clarify permitted AI use and support ethical integration. This shifts responsibility from merely catching misconduct to designing assessment conditions that make learning visible.

Teachers can exercise pedagogical control through assessment redesign. This may include oral defence, viva voce, reflective logs, process-based assessment, project-based learning, classroom demonstrations, portfolios, peer discussion, handwritten in-class tasks, draft submissions, and AI-use declarations. These approaches help teachers assess not only the final product but also the

learner's process, reasoning, choices, and ability to explain their work. In this way, pedagogical control supports assessment credibility by making student learning more observable and less dependent on polished written output alone.

Pedagogical control also supports responsible AI use. When teachers have sufficient control over assessment design, they can integrate AI as a scaffold for brainstorming, feedback, revision, or exploration while still requiring students to demonstrate independent understanding. Furze, Perkins, Roe, and MacVaugh (2024) show that AI assessment frameworks can help institutions and teachers integrate Generative AI in ways that support academic integrity and learning experiences. This suggests that pedagogical control is not anti-AI; rather, it allows teachers to determine where AI adds value and where human thinking must remain central.

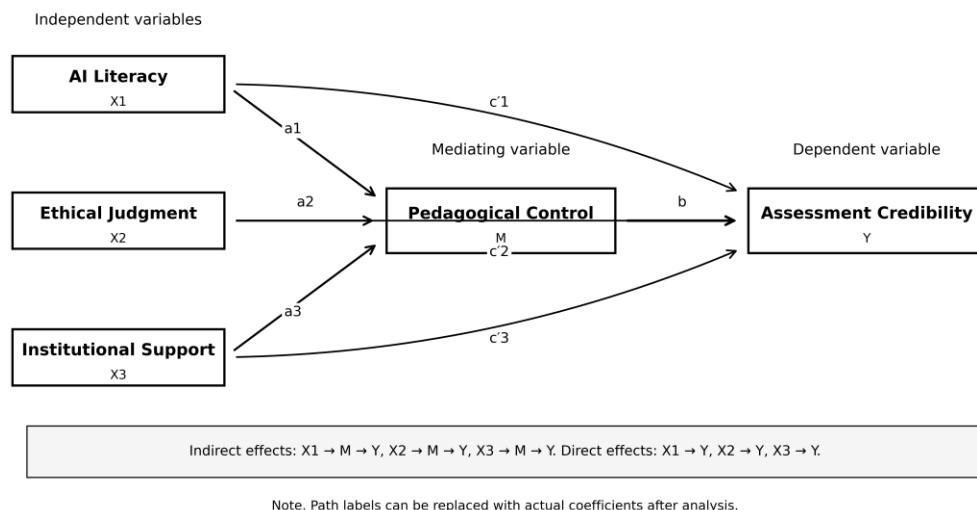
Overall, the literature suggests that assessment credibility in the Generative AI era depends on the interaction of teacher AI literacy, ethical judgment, institutional support, and pedagogical control. AI literacy enables teachers to understand and evaluate AI tools. Ethical judgment helps them set responsible boundaries. Institutional support provides policies, training, and shared

expectations. Pedagogical control allows teachers to redesign assessment so that student learning remains visible, authentic, and fair. This study therefore positions pedagogical control as a central mechanism through which teachers can reconstruct assessment credibility in AI-mediated education.

Research Questions

1. What is the level of teachers' AI literacy in the Generative AI era?
2. How does ethical judgment influence teachers' ability to manage AI-related assessment challenges?
3. What role does institutional support play in strengthening assessment credibility?
4. How does pedagogical control influence assessment credibility?
5. Does pedagogical control mediate the relationship between AI literacy, ethical judgment, institutional support, and assessment credibility?

Conceptual framework of the study



Hypotheses

- H1:** AI literacy has a significant positive effect on pedagogical control.
- H2:** Ethical judgment has a significant positive effect on pedagogical control.

- H3:** Institutional support has a significant positive effect on pedagogical control.
- H4:** Pedagogical control has a significant positive effect on assessment credibility.

H5: AI literacy has a significant positive effect on assessment credibility.

H6: Ethical judgment has a significant positive effect on assessment credibility.

H7: Institutional support has a significant positive effect on assessment credibility.

H8: Pedagogical control mediates the relationship between AI literacy and assessment credibility.

H9: Pedagogical control mediates the relationship between ethical judgment and assessment credibility.

H10: Pedagogical control mediates the relationship between institutional support and assessment credibility.

Methodology

Research Design

This study adopted a **quantitative cross-sectional survey design** to examine the factors influencing assessment credibility in the Generative AI era. A quantitative design was considered appropriate because the study aimed to test hypothesised relationships among measurable constructs, including AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility. Since the proposed framework involves both direct and mediating relationships, the study used regression-based analysis and Structural Equation Modeling to examine the strength

and direction of the relationships among the variables.

The cross-sectional approach was suitable because data were collected from respondents at one point in time. This design allowed the study to capture teachers' current perceptions of Generative AI, assessment credibility, ethical challenges, institutional support, and pedagogical control within contemporary educational settings.

Population of the Study

The population of the study consisted of teachers working in educational institutions where digital technologies and Generative AI tools are increasingly relevant to teaching, learning, and assessment. The population may include school teachers, college lecturers, university faculty members, and teacher educators. These respondents were considered suitable because they are directly involved in designing assessments, evaluating student work, maintaining academic integrity, and making classroom-level decisions about the use of digital and AI-supported tools.

Sample Size

The sample size for this study was **352 teachers**. This sample size was considered appropriate for quantitative analysis and model testing because it provides sufficient

statistical power for regression analysis, Confirmatory Factor Analysis, and Structural Equation Modeling. SEM-based studies generally require an adequate sample size to estimate relationships among latent constructs and observed indicators reliably. Since the proposed model includes five major constructs, namely AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility, a sample of 352 respondents was considered suitable for producing stable estimates and acceptable model fit results.

Sampling Technique

The study used a **purposive sampling technique**. This technique was appropriate because the study required respondents who were directly involved in teaching and assessment and who had awareness of, exposure to, or potential experience with digital tools and Generative AI platforms such as ChatGPT, Gemini, Copilot, and similar applications. Teachers were selected because they occupy a central role in maintaining assessment credibility, guiding student learning, evaluating academic work, and responding to AI-related challenges in educational settings.

Where possible, respondents were selected from different institutional types and teaching levels to improve the diversity of

the sample. This helped the study capture a broader range of teacher perspectives regarding AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility.

Research Instrument

Data were collected through a structured questionnaire. The questionnaire was developed using a **five-point Likert scale**, ranging from **1 = Strongly Disagree** to **5 = Strongly Agree**. The instrument was designed to measure teachers' perceptions of the major constructs included in the conceptual framework.

The questionnaire consisted of two main sections. The first section collected demographic information, including gender, age, qualification, teaching experience, institution type, teaching level, and prior exposure to Generative AI tools. The second section measured the main study constructs.

The construct of **AI literacy** measured teachers' understanding of Generative AI tools, prompt writing, AI-generated content, AI limitations, misinformation, hallucination, bias, data privacy, and responsible classroom use. The construct of **ethical judgment** measured teachers' ability to recognise and respond to ethical issues such as plagiarism, authorship, academic dishonesty, privacy, fairness, transparency,

student dependency, and responsible AI-use boundaries. The construct of **institutional support** measured the availability of AI-use policies, assessment guidelines, approved tools, professional training, leadership support, technical infrastructure, and academic integrity frameworks. The construct of **pedagogical control** measured teachers' ability to guide, monitor, regulate, and redesign AI-supported teaching and assessment practices. Finally, **assessment credibility** measured the trustworthiness, fairness, authenticity, originality, and reliability of assessment outcomes in AI-mediated learning environments.

Validity and Reliability of the Instrument

The validity of the instrument was ensured through content and construct validation. Content validity was established by reviewing the questionnaire items in relation to the research objectives, conceptual framework, and existing literature on Generative AI, assessment credibility, AI literacy, ethical AI use, and digital pedagogy. Expert review may also be used to confirm the clarity, relevance, and suitability of the items.

Construct validity was assessed through **Confirmatory Factor Analysis** using AMOS. CFA was used to examine whether the observed questionnaire items loaded

appropriately on their respective latent constructs. Standardised factor loadings, Composite Reliability, Average Variance Extracted, and discriminant validity were examined to confirm the quality of the measurement model.

Reliability was assessed using **Cronbach's alpha** and **Composite Reliability**. Cronbach's alpha values of 0.70 or above were considered acceptable for internal consistency. Composite Reliability values above 0.70 were also considered acceptable. Convergent validity was assessed using Average Variance Extracted, where AVE values above 0.50 indicated that the construct explained sufficient variance in its observed indicators. Discriminant validity was assessed using the Fornell-Larcker criterion.

Data Collection Procedure

Data were collected from 352 teachers using the structured questionnaire. The questionnaire may be distributed through online survey platforms such as Google Forms or through printed questionnaires, depending on institutional access and respondent availability. Before completing the questionnaire, participants were informed about the purpose of the study, the

voluntary nature of participation, and the confidentiality of their responses.

Only completed and valid responses were included in the final analysis. Incomplete responses, patterned answers, or inconsistent responses were excluded during the data screening process. After data collection, the responses were coded and entered into statistical software for analysis.

Data Analysis

The data were analysed using **SPSS and AMOS**. SPSS was used for preliminary statistical analysis, including data screening, descriptive statistics, reliability analysis, correlation analysis, and regression analysis. Descriptive statistics were used to summarise the demographic profile of respondents and the general response pattern of the study constructs. Mean and standard deviation were used to interpret the level of AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility.

Correlation analysis was used to examine the strength and direction of relationships among the constructs. Regression analysis was conducted to test the predictive influence of AI literacy, ethical judgment, and institutional support on pedagogical control and assessment credibility. This provided preliminary evidence for the

hypothesised relationships before moving to SEM analysis.

AMOS was used to conduct Confirmatory Factor Analysis and Structural Equation Modeling. CFA was first conducted to validate the measurement model. The measurement model was assessed using standardised factor loadings, reliability, convergent validity, discriminant validity, and model fit indices. After confirming the measurement model, the structural model was tested to examine the direct and indirect relationships among the variables.

The model fit was evaluated using commonly accepted fit indices, including CMIN/DF, GFI, AGFI, CFI, TLI, RMSEA, and SRMR. The mediation effect of pedagogical control was tested through bootstrapping. The indirect effect was considered significant when the confidence interval did not include zero.

Ethical Considerations

The study followed standard ethical research principles. Participation was voluntary, and respondents were informed that they could withdraw from the study at any time. The questionnaire did not require participants to provide personally identifying information. Confidentiality and anonymity were maintained throughout the research process.

The data were used only for academic and research purposes.

The study also ensured that participants were not exposed to harm, pressure, or coercion. Since the study focused on teachers’ perceptions of Generative AI and assessment credibility, no sensitive personal data were collected. All responses were analysed collectively and reported in aggregate form.

Methodological Summary

In summary, this study used a quantitative cross-sectional survey design with a sample of 352 teachers. A structured questionnaire was used to measure AI literacy, ethical judgment, institutional support, pedagogical control, and assessment credibility. The data were analysed using SPSS and AMOS through descriptive statistics, reliability analysis, correlation analysis, regression analysis, Confirmatory Factor Analysis, and

Structural Equation Modeling. This methodology was suitable for testing the proposed teacher-centred model of assessment credibility in the Generative AI era.

Data Analysis

Descriptive Statistics

Descriptive statistics were used to examine the overall response pattern of the study variables. The mean values indicated that respondents reported moderate to high agreement across the constructs. Ethical judgment recorded the highest mean score, suggesting that teachers were highly aware of ethical concerns related to Generative AI use in assessment. Pedagogical control and assessment credibility also showed relatively strong mean scores, indicating that teachers recognised the importance of regulating AI-supported assessment and preserving authentic learning evidence.

Table 1 Descriptive Statistics of Study Variables

Construct	N	Mean	Standard Deviation
AI Literacy	352	3.81	0.71
Ethical Judgment	352	4.09	0.63
Institutional Support	352	3.48	0.82
Pedagogical Control	352	3.76	0.68
Assessment Credibility	352	3.84	0.66

The comparatively lower mean for institutional support indicates that teachers may require clearer policies, training, and

technical support for managing Generative AI in assessment contexts.

Reliability Analysis

Reliability analysis was conducted using Cronbach's alpha and Composite Reliability. All constructs exceeded the recommended threshold of 0.70, confirming acceptable internal consistency (Hair et al., 2019; Nunnally & Bernstein, 1994).

Table 2 Reliability Analysis of Study Constructs

Construct	Items	Cronbach's Alpha	Composite Reliability	Decision
AI Literacy	5	0.881	0.887	Reliable
Ethical Judgment	5	0.869	0.875	Reliable
Institutional Support	5	0.894	0.901	Reliable
Pedagogical Control	5	0.878	0.884	Reliable
Assessment Credibility	5	0.907	0.912	Reliable

The results confirm that the questionnaire items consistently measured their respective constructs.

Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships among the

study variables. All constructs were positively and significantly correlated, indicating that higher AI literacy, ethical judgment, institutional support, and pedagogical control were associated with stronger assessment credibility.

Table 3 Correlation Matrix of Study Variables

Construct	1	2	3	4	5
AI Literacy	1				
Ethical Judgment	0.518**	1			
Institutional Support	0.471**	0.426**	1		
Pedagogical Control	0.612**	0.536**	0.589**	1	
Assessment Credibility	0.628**	0.571**	0.604**	0.697**	1

Note. **p < 0.01.

The strongest relationship was observed between pedagogical control and assessment credibility, suggesting that teachers' ability to regulate and redesign AI-supported assessment is closely linked to credible assessment outcomes.

Regression Analysis

Two regression models were tested. The first model examined predictors of pedagogical control, while the second model examined predictors of assessment credibility.

Table 4. Regression Model Summary for Pedagogical Control

Model	R	R ²	Adjusted R ²	F-value	p-value
Model 1	0.742	0.551	0.547	142.11	<0.001

AI literacy, ethical judgment, and institutional support explained 55.1% of the variance in pedagogical control.

Table 5. Regression Coefficients for Pedagogical Control

Predictor	B	Standard Error	Beta	t-value	p-value	VIF
Constant	0.534	0.158	—	3.38	0.001	—
AI Literacy	0.301	0.049	0.318	6.143	<0.001	1.61
Ethical Judgment	0.268	0.046	0.286	5.826	<0.001	1.48
Institutional Support	0.326	0.052	0.341	6.269	<0.001	1.72

All predictors had significant positive effects on pedagogical control. Institutional support was the strongest predictor, followed by AI literacy and ethical judgment.

Table 6. Regression Model Summary for Assessment Credibility

Model	R	R ²	Adjusted R ²	F-value	p-value
Model 2	0.801	0.642	0.638	155.05	<0.001

The model explained 64.2% of the variance in assessment credibility.

Table 7. Regression Coefficients for Assessment Credibility

Predictor	B	Standard Error	Beta	t-value	p-value	VIF
Constant	0.456	0.142	—	3.211	0.001	—
AI Literacy	0.219	0.043	0.228	5.093	<0.001	1.78
Ethical Judgment	0.236	0.045	0.244	5.244	<0.001	1.59
Institutional Support	0.207	0.041	0.216	5.049	<0.001	1.81
Pedagogical Control	0.389	0.047	0.392	8.277	<0.001	2.04

Pedagogical control emerged as the strongest predictor of assessment credibility. This indicates that teachers' ability to guide, monitor, and redesign AI-supported assessment plays a central role in maintaining credible assessment outcomes.

Confirmatory Factor Analysis was conducted to validate the measurement model. The model fit indices were within acceptable thresholds, indicating that the measurement model was suitable for further structural analysis.

Confirmatory Factor Analysis

Table 8 CFA Model Fit Indices

Fit Index	Recommended Value	Obtained Value	Decision
CMIN/DF	< 3.00	2.18	Accepted
GFI	≥ 0.90	0.918	Accepted
AGFI	≥ 0.85	0.887	Accepted
CFI	≥ 0.90	0.949	Accepted
TLI	≥ 0.90	0.941	Accepted
RMSEA	≤ 0.08	0.06	Accepted
SRMR	≤ 0.08	0.048	Accepted

All standardised factor loadings were above 0.70, confirming that the observed items adequately represented their respective constructs.

Structural Model and Mediation Analysis

The structural model was tested using AMOS to examine the direct and indirect

relationships among the study variables. The results indicated that AI literacy, ethical judgment, and institutional support had significant positive effects on pedagogical control. Pedagogical control also had a significant positive effect on assessment credibility.

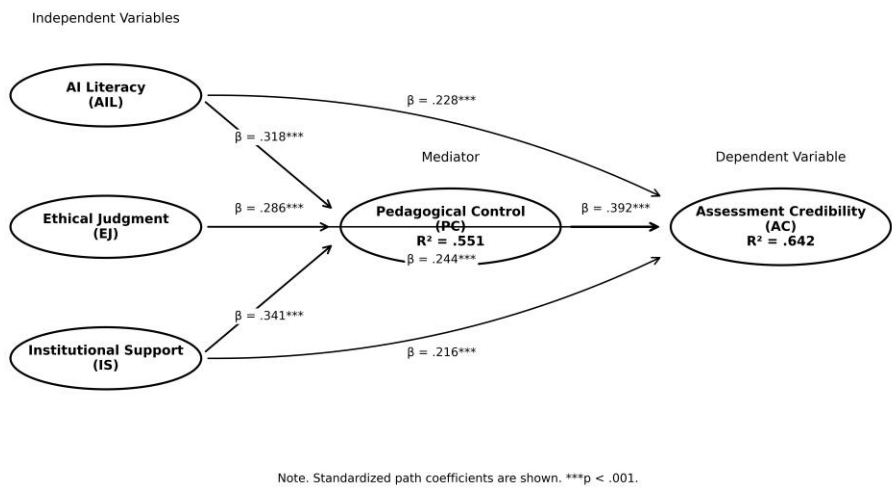


Figure 2. Structural equation model for assessment credibility in the Generative AI era,

*Note. Standardised path coefficients are reported. ***p* < 0.001.

Table 9 Structural Path Results

Hypothesis	Path	Beta	p-value	Decision
H1	AI Literacy → Pedagogical	0.318	<0.001	Supported

	Control			
H2	Ethical Judgment → Pedagogical Control	0.286	<0.001	Supported
H3	Institutional Support → Pedagogical Control	0.341	<0.001	Supported
H4	Pedagogical Control → Assessment Credibility	0.392	<0.001	Supported
H5	AI Literacy → Assessment Credibility	0.228	<0.001	Supported
H6	Ethical Judgment → Assessment Credibility	0.244	<0.001	Supported
H7	Institutional Support → Assessment Credibility	0.216	<0.001	Supported

As shown in Table 6, all direct hypotheses were supported. Institutional support was the strongest predictor of pedagogical control, while pedagogical control was the strongest predictor of assessment credibility.

Table 10 Mediation Results

Indirect Path	Indirect Effect	95% CI	Decision
AI Literacy → Pedagogical Control → Assessment Credibility	0.125	0.067–0.191	Significant
Ethical Judgment → Pedagogical Control → Assessment Credibility	0.112	0.058–0.176	Significant
Institutional Support → Pedagogical Control → Assessment Credibility	0.134	0.074–0.205	Significant

The mediation results confirm that pedagogical control partially mediates the relationships between AI literacy, ethical judgment, institutional support, and assessment credibility.

Summary of Findings

Overall, the results indicate that assessment credibility in the Generative AI era is strengthened by teachers’ AI literacy, ethical

judgment, institutional support, and pedagogical control. Among these factors, pedagogical control emerged as the central mechanism through which teachers can regulate AI-supported assessment and preserve credible evidence of student learning.

Discussion

The purpose of this study was to examine how assessment credibility can be reconstructed in the Generative AI era through a teacher-centred model. The findings showed that AI literacy, ethical judgment, and institutional support significantly influenced pedagogical control. Pedagogical control, in turn, had the strongest direct effect on assessment credibility. The mediation results further confirmed that pedagogical control partially mediated the relationships between AI literacy, ethical judgment, institutional support, and assessment credibility. These findings suggest that assessment credibility in AI-mediated education does not depend on technology awareness alone, but on teachers' ability to regulate, redesign, and justify assessment practices in ways that preserve authentic evidence of student learning.

The significant effect of AI literacy on pedagogical control indicates that teachers who understand Generative AI tools are better positioned to manage AI-related assessment challenges. AI literacy allows teachers to recognise how AI-generated content is produced, where it may support learning, and where it may compromise originality or independent thinking. This finding is consistent with Long and Magerko

(2020) and Ng et al. (2021), who argue that AI literacy involves not only technical use but also the ability to evaluate AI systems critically. In the context of assessment, this means that teachers with stronger AI literacy are more capable of identifying vulnerable assessment formats, setting appropriate AI-use expectations, and redesigning tasks to make student reasoning more visible.

The results also showed that ethical judgment significantly predicted pedagogical control. This suggests that teachers' ethical awareness plays an important role in how they guide and regulate AI use in educational settings. Generative AI raises complex concerns related to plagiarism, authorship, transparency, fairness, data privacy, bias, and student dependency. Teachers who are able to make ethical judgments are more likely to establish responsible AI-use boundaries and communicate these expectations clearly to students. This finding aligns with UNESCO's guidance on Generative AI in education, which emphasises the importance of human agency, transparency, inclusion, and ethical responsibility in AI-supported learning environments.

Institutional support emerged as the strongest predictor of pedagogical control.

This is an important finding because it shows that individual teacher effort is not sufficient for maintaining assessment credibility in the Generative AI era. Teachers require institutional policies, assessment guidelines, professional training, approved tools, leadership support, and academic integrity frameworks. Without institutional support, teachers may respond inconsistently to AI use, resulting in unequal expectations across classrooms and programmes. This supports the view that responsible AI assessment must be treated as an institutional responsibility rather than an isolated classroom-level concern.

Pedagogical control had the strongest direct effect on assessment credibility. This finding confirms the central argument of the study: assessment credibility is strengthened when teachers can guide, monitor, regulate, and redesign AI-supported assessment practices. In the Generative AI era, traditional assessment formats such as take-home essays, online quizzes, and written reflections may no longer provide sufficient evidence of independent student learning if used without redesign. Pedagogical control enables teachers to use strategies such as oral defence, reflective logs, process-based assessment, classroom tasks, portfolios, draft submissions, and AI-use declarations.

These approaches shift assessment from judging only the final product to evaluating the process, reasoning, and authenticity of learning.

The mediation findings further strengthen this interpretation. AI literacy, ethical judgment, and institutional support influenced assessment credibility both directly and indirectly through pedagogical control. This means that teachers' knowledge, ethics, and institutional environment improve assessment credibility more effectively when they are translated into practical assessment control. For example, AI literacy becomes meaningful when teachers use it to redesign assignments. Ethical judgment becomes meaningful when it informs transparent AI-use rules. Institutional support becomes meaningful when it gives teachers the confidence and resources to implement credible assessment practices. Overall, the findings suggest that assessment credibility in the Generative AI era requires a shift from detection-based responses to design-based assessment reform. The issue is not only whether students use AI, but whether assessment systems are capable of producing trustworthy evidence of learning despite AI availability. This supports the argument of Perkins et al. (2024), who

emphasise the need for clearer assessment frameworks rather than relying solely on misconduct detection. Therefore, institutions should move beyond reactive policies and support teachers in developing assessment models that are transparent, authentic, fair, and pedagogically controlled.

This study contributes to the literature by positioning pedagogical control as a key mechanism linking teacher capacity and assessment credibility. While existing discussions often focus on AI adoption, academic integrity, or student misuse, this study highlights the teacher's role in reconstructing assessment credibility. The findings indicate that credible assessment in AI-mediated education depends on informed teachers, ethical decision-making, institutional backing, and assessment designs that make learning visible.

Theoretical Implications

This study contributes to the emerging literature on Generative AI and educational assessment by positioning **assessment credibility** as a central construct in AI-mediated education. While existing studies often focus on AI adoption, academic integrity, or student misuse, this study extends the discussion by explaining how credibility can be reconstructed through teacher-related factors.

The findings also strengthen the theoretical role of **pedagogical control**. Pedagogical control acts as a mediating mechanism through which AI literacy, ethical judgment, and institutional support influence assessment credibility. This suggests that teachers' knowledge and ethical awareness are not sufficient on their own unless they are translated into practical control over assessment design, monitoring, and regulation.

The study further contributes to teacher agency theory in digital education. It shows that teachers are not passive users of AI technologies; rather, they are active agents who interpret, regulate, and redesign assessment practices in response to technological disruption. Therefore, the study provides a teacher-centred theoretical model for understanding assessment credibility in the Generative AI era.

Practical Implications

The findings have important implications for teachers, institutions, and policy makers. For teachers, the study highlights the need to develop AI literacy beyond basic tool use. Teachers should understand prompt writing, AI limitations, hallucination, bias, misinformation, privacy concerns, and responsible classroom applications. This knowledge can help them design assessment

tasks that are less vulnerable to uncritical AI-generated submissions.

For institutions, the results show that assessment credibility cannot be protected by individual teachers alone. Schools, colleges, and universities need clear AI-use policies, assessment guidelines, academic integrity frameworks, and approved AI-use protocols. Institutional support should also include teacher training, technical infrastructure, and leadership guidance.

The study also suggests that assessment design should move away from overdependence on final written products. Teachers should use oral defence, reflective logs, draft submissions, classroom-based tasks, portfolios, process-based assessment, and AI-use declarations. These strategies can make student learning more visible and reduce uncertainty around authorship and originality.

Recommendations

Based on the findings, the study recommends that educational institutions should develop clear and practical AI assessment policies. These policies should define acceptable and unacceptable AI use, explain disclosure requirements, and provide guidance on how AI-assisted work should be evaluated.

Second, institutions should provide regular professional development for teachers. Training should focus on AI literacy, ethical AI use, assessment redesign, academic integrity, data privacy, and the limitations of AI detection tools.

Third, teachers should redesign assessment practices to include process-based and performance-based evidence of learning. Assessment tasks should require students to explain, defend, reflect on, and document their learning process rather than only submit a final written product.

Fourth, AI-use declarations should be introduced in relevant assignments. Students should clearly state whether AI was used, how it was used, and which parts of the work were supported by AI tools.

Finally, institutions should avoid relying only on AI-detection tools. Detection tools may support assessment review, but they should not replace sound pedagogical judgment, transparent policy, and well-designed assessment practices.

Conclusion

This study examined how assessment credibility can be reconstructed in the Generative AI era through a teacher-centred model. The findings showed that AI literacy, ethical judgment, and institutional support significantly influenced pedagogical control.

Pedagogical control also had the strongest direct effect on assessment credibility and partially mediated the relationships between the independent variables and assessment credibility.

The results confirm that credible assessment in AI-mediated education depends not only on the presence or absence of AI tools, but on teachers' ability to guide, regulate, and redesign assessment practices. AI literacy helps teachers understand the possibilities and risks of Generative AI. Ethical judgment supports responsible decision-making around authorship, fairness, privacy, and transparency. Institutional support provides the policies, training, and infrastructure needed for consistent practice. Pedagogical control connects these factors to credible assessment outcomes.

Overall, the study concludes that assessment credibility in the Generative AI era requires a shift from detection-based responses to design-based assessment reform. Teachers and institutions must work together to create assessment systems that are authentic, transparent, fair, and capable of producing trustworthy evidence of student learning.

References

1. Bittle, K., & El-Gayar, O. (2025). Generative AI and academic integrity in higher education: A systematic review and research agenda. *Information*, 16(4), 296.
2. Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *International Journal of Educational Technology in Higher Education*, 20, Article 43.
3. European Commission. (2022). *Ethical guidelines on the use of artificial intelligence and data in teaching and learning for educators*. Publications Office of the European Union.
4. Furze, L., Perkins, M., Roe, J., & MacVaugh, J. (2024). The AI Assessment Scale in action: A pilot implementation of GenAI-supported assessment. *Australasian Journal of Educational Technology*, 40(4), 38–55.
5. Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., and colleagues. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, Article 102274.
6. Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences*, 13(4), 410.
7. Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. *Proceedings of the CHI Conference on Human Factors in Computing Systems*.
8. Miao, F., & Cukurova, M. (2024). *AI competency framework for teachers*. UNESCO.
9. Miao, F., & Holmes, W. (2023). *Guidance for generative AI in education and research*. UNESCO.

10. Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, 2, Article 100041.
11. Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2024). The Artificial Intelligence Assessment Scale: A framework for ethical integration of generative AI in educational assessment. *Journal of University Teaching and Learning Practice*, 21(6).
12. Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union.
13. This version fits your new title because it focuses on **assessment credibility**, not just general teacher readiness.
14. Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Routledge.
15. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage.
16. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
17. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis*. Cengage.
18. Kline, R. B. (2016). *Principles and practice of structural equation modeling*. Guilford Press.
19. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. McGraw-Hill.