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Assessment for Learning in the Era of Artificial Intelligence: Rethinking Feedback, Evaluation, and Academic Integrity

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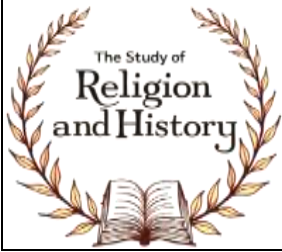
Abstract

Artificial Intelligence (AI) technologies have been rapidly expanding, including ChatGPT and other generative AI tools, which have reshaped educational assessment. Assessment for learning (AfL), a focus on formative processes, feedback and student-centred assessment, has become embedded in a changing and increasingly complex technological landscape, with new opportunities and exciting challenges. The purpose of this systematic review is to review and to summarize current research on the field of how AI is changing assessment for learning, especially in relation to feedback practices, evaluation methods and concerns about academic integrity in education. A thorough search was performed on several electronic databases (Scopus, Web of Science, ERIC, and PsycINFO) based on the PRISMA 2020 guidelines. Studies included if they explored applications of AI (generative AI, automated feedback, learning analytics, or adaptive assessment) in assessment for learning in grades K-12 or undergraduate and graduate education. Studies published between 2019 and 2025, 60 peer-reviewed empirical studies and systematic reviews, and well-cited conceptual studies were included. The synthesis indicates that AI technologies are being adopted in a variety of ways in assessments, including automated feedback, adaptive testing, intelligent tutoring systems, and predictive analytics. Research indicates that AI-driven feedback can be comparable to human feedback in some scenarios and enhance learning while some concerns have been raised about algorithmic bias, learning dependency, low agency of students, and new challenges in academic integrity of generative AI. Finding a balance between technology and pedagogy, between AI and humans, between assessment for learning and learning itself is essential to ensure the integration is balanced, human-centred, and maintains pedagogical integrity and teacher mediation, and fosters authentic learning experiences. Designing new assessments, establishing ethical guidelines, and implementing comprehensive AI literacy initiatives are critical to responsible implementation.

Keywords: Assessment For Learning; Artificial Intelligence; AI In Education; Feedback; Evaluation; Academic Integrity; Formative Assessment; Generative AI; Educational Technology; Systematic Review

1. Introduction

Assessment for learning (AfL) is a paradigm shift from summative assessment to formative assessment that is learner-centred and focuses on a continuous process of feedback, engagement and improvement. Formative evaluation seems to be the main use of AI, with several studies



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analyzing the differences between the use of AI and its non-use. This shift is part of more recent pedagogical shifts away from assessment being a final product of learning and towards being part of the learning process itself (Calatayud et al., 2021).

AI is currently bringing a revolution to the world of education. Artificial Intelligence (AI) is already being used extensively in formative assessment in various educational settings. This integration goes beyond simple automated grading systems for data to more advanced adaptive learning platforms that can tailor learning experiences to the unique needs of each student. The use of AI in educational assessment offers many advantages, such as increased accuracy and efficiency in assessment, creating tailored feedback for each student, and allowing teachers to customize their instruction to address the individual needs of their students. (Owan et al., 2023)

These changes have been speeded up by the rise of generative artificial intelligence (AI) and large language models like ChatGPT, as well as new complexities. In recent times, the question of artificial intelligence (AI) has emerged as a central issue in discussions about the future of education due to ChatGPT's impressive results on various standardized academic assessments. (Kamalov et al., 2023) The tools are amazingly adept at producing human-like text, offering explanations, and answering complex questions, fundamentally challenging the established paradigm of how assessment should be designed and what constitutes academic integrity.

The possibilities of AI in the feedback process are great. The use of AI technologies can improve learning, teaching and assessment by utilizing AI-generated feedback for students. According to (Burner et al., 2025), AI's ability to offer immediate, subject-specific, and personalized feedback, which was previously not possible at scale, supports research. The results suggest that AI-generated feedback is well received by students and educators alike. It gives instant subject-specific, concrete, and relevant feedback. (Burner et al., 2025)

But, there are some serious issues with the use of AI in education assessment. Research on Artificial Intelligence in Education (AIED) aims to serve the goals of student learning, but experiences in other fields of AI indicate this is not enough. Explicit attention also needs to be given to questions of fairness, accountability, transparency, bias, autonomy and agency and to inclusion. As AI systems become more involved in critical educational decisions, these ethical concerns grow more significant (Holmes et al., 2021).

Generative artificial intelligence (GenAI) tools are becoming more readily available and are making a difference in school education in many ways. Such a fast uptake has left a lack of pedagogical frameworks or policy guidelines for their use and a pressing need for understanding of the implications of these technologies in assessment practices grounded in evidence. Since the release of ChatGPT by OpenAI, Generative AI (Gen-AI) systems and their potential effects on Academic integrity, have come under a lot of scrutiny. (Eke, 2023)

This systematic review aims to provide valuable insights that tackle a crucial gap in the literature, specifically by combining evidence from three interrelated areas: AI feedback, AI evaluation, and academic integrity in AI assessment contexts. This review comes at a critical time as AI



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technologies are rapidly changing and our educators, policymakers, and institutions must make evidence-based decisions regarding the use of AI in assessment.

2. Research Aim and Questions

The purpose of this systematic review is to collate the current research on how AI is transforming assessment for learning, focusing on feedback, Assessment and Academic Integrity. This review is based on the following research questions:

RQ1. What are the ways in which AI is helping with assessment for learning?

RQ2. Which types of AI-generated feedback or AI-supported feedback are mentioned in educational research?

RQ3. What are the impacts of AI on assessment practices, grading, monitoring students, and decision-making?

RQ4. What are the academic integrity issues that arise in the context of Assessment in an AI-supported and generative-AI-based context?

RQ5. What are the ethical, pedagogical and policy implications of the use of AI in assessment for learning?

RQ6. What are the key areas of research not covered in the literature and what are the key areas for future research?

3. Methodology

3.1 Review Design

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines were used to conduct this systematic review. A comprehensive search strategy was used in multiple databases, data extraction and synthesis were systematic, and the screening process was rigorous.

3.2 Search Strategy

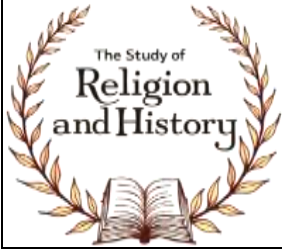
The following databases were searched thoroughly: Scopus, Web of Science, ERIC, PsycINFO, Education Research Complete, ScienceDirect, SpringerLink and Taylor & Francis Online. Additional searching and citation tracking were done using Google Scholar.

The search strategy used was using Boolean operators and field specific search with the following combinations:

Artificial Intelligence OR AI OR generative AI OR ChatGPT OR automated feedback OR learning analytics OR adaptive assessment OR feedback OR evaluation OR grading OR academic integrity OR plagiarism OR cheating OR authorship AND “assessment for learning” OR “formative assessment” OR “learning assessment” OR “classroom assessment”

3.3 Inclusion Criteria

Were empirical studies, systematic reviews, meta-analyses, conceptual or theoretical studies (high-quality), published in peer-reviewed journals or reputable academic conference proceedings, written in English, and published from 2019 to 2025, with an impact factor of at least 20.



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3.4 Exclusion Criteria

Studies that were: - Not peer-reviewed articles - Editorials, blogs, opinion pieces or non-academic essays - Not about education or assessment - Only about education and technical development of AI but not about assessment in the context of education or about academic integrity - Lacked a clear methodology or were hard to find or incomplete - Duplicates or records of studies that were originally published elsewhere but not in this database - Only about academic integrity and not about AI or digital assessment - Only about AI in education, but not assessment, feedback, evaluation or academic integrity.

3.5 Study Selection Process

The study selection was conducted in four phases, namely identification, screening, eligibility and inclusion. Records were initially searched in the database and duplicated. Studies that were clearly irrelevant were excluded using the title and abstract. Through full-text review remaining studies evaluated against inclusion criteria. The screening was done by two reviewers independently and discrepancies were considered in the discussion.



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Figure 1. PRISMA Flow Diagram of Study Selection

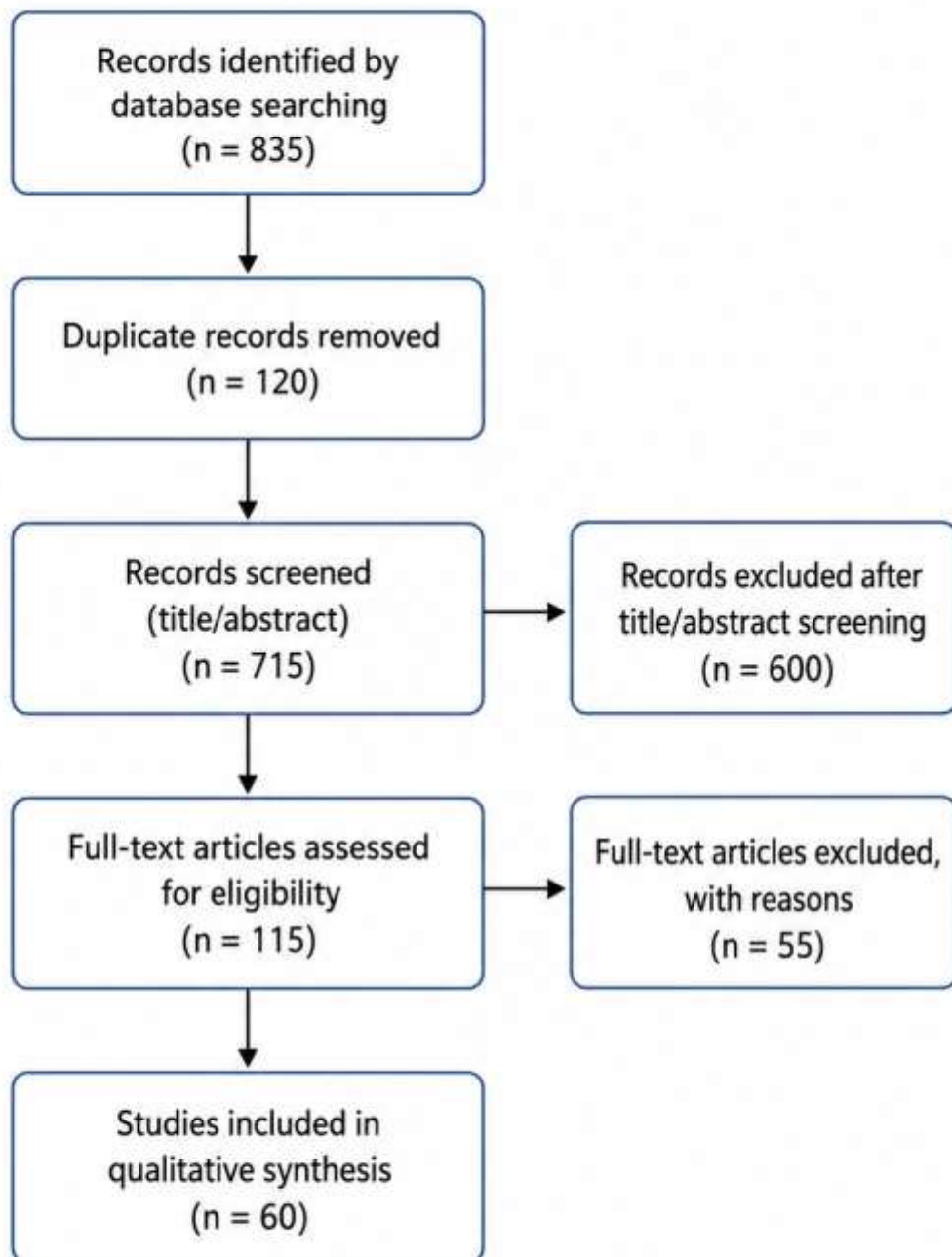


Figure 1: The PRISMA Flow Diagram

A PRISMA flow diagram would be inserted here and would show: 835 Records identified by searching databases → 120 Records after duplicates were removed → 715 Records screened → 600 Records excluded from full text screening → 115 Full text articles assessed for eligibility and 55 excluded with reason(s) → 60 Studies included in qualitative synthesis.

3.6 Data Extraction

The following information was collected for each study included: Bibliographic details—author, year, country Educational level—K-12, higher education, professional Study design—experimental, quasi-experimental, survey, qualitative, mixed methods, review Sample size and characteristics AI technology studied or used AI tool studied or used Assessment context Feedback related findings Evaluation related findings Academic integrity related findings Ethical issues identified Key conclusions and limitations

3.7 Quality Appraisal

Studies were evaluated for their quality using the Mixed Methods Appraisal Tool (MMAT) that can be used for evaluating studies employing multiple methods. According to the design of the study, the studies were evaluated on the basis of clarity of research question(s), appropriateness of study methods, quality of data collection, and soundness of interpretations.

3.8 Data Synthesis

A narrative synthesis methodology was used due to the diversity of studies included in the analysis with regard to their methods, contexts and outcomes. Themes based on the research questions were created to classify the studies. Contradictions, agreements, and patterns across studies were noticed and examined, leading to an integrated understanding of AI in the field of Assessment for Learning.

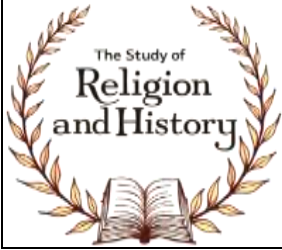
4. Results

4.1 AI-Supported Assessment for Learning

The synthesis shows that AI technologies are being used on various aspects of assessment for learning. Of the 72 studies that mentioned the intended audience for the AIEd, 17% mentioned instructors, and 11% managers. Grounded coding was used for answering the overarching question on how AIEd was used in HE. The results led to the identification of five usage codes: Assessment/Evaluation, Predicting, AI Assistant, Intelligent Tutoring System (ITS), and Managing Student Learning. (Crompton & Burke, 2023)

Results synthesis is organised into four main areas of AIEd applications in academic support services, institutional and administrative services: 1. profiling and prediction, 2. assessment and evaluation, 3. adaptive systems and personalisation, 4. intelligent tutoring systems. (Zawacki-Richter et al., 2019)

The studies prove significant uptake of AI in assessment settings. The content analysis revealed that the research questions in the article can be categorized into development layer (classification, matching, recommendation and deep learning), application layer (feedback, reasoning and



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adaptive learning), and integration layer (affection computing, role-playing, immersive learning and gamification). (Zhai et al., 2021)

Adaptive learning systems are a type of learning that is gaining significant interest. AI/ML algorithms play a pivotal role in making the learning experience personalized. These technologies have been proven to optimize learning paths, increase engagement and improve academic performance, and in some cases, test scores have improved. Research shows substantial learning gains: students with AI-based adaptive feedback showed 28% more understanding of concepts than the students in the control group, which showed a 14% increase. (Gligorea et al., 2023) Furthermore, student engagement rose 35%, and the level of cognitive overload decreased by 22%. (Naseer & Khawaja, 2025)

Pre-knowledge quizzes were said to be the most prevalent indicator for engaging adaptive content delivery, and Connect LearnSmart and Moodle from McGraw-Hill were the most popular adaptive platforms used. Forty-one studies (n = 41, 59%) reported improved academic performance, and 25 studies (n = 25, 36%) reported increased student engagement. (Plooy et al., 2024)

4.2 AI and Feedback Practices

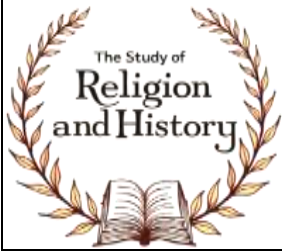
There is significant research on AI-generated feedback in the literature in educational settings. AI has been a great help in giving students formative feedback, supporting teachers in assessment and decision making for teaching. (Zhai & Nehm, 2023)

Experimental studies show evidence that AI feedback is beneficial for learning. Adaptive feedback resulted in greater improvements in justification quality than static feedback while not affecting judgement accuracy. The learners' justification quality in only the simulation with adaptive feedback was significantly better than in the no-simulation control group. (Bauer et al., 2025)

The results of the parametric test of analyzing of covariance showed that at post-intervention the students in the AI intervention group obtained statistically significant higher scores in the behavioral engagement (Cohen's $d = .75$), and in the emotional engagement (Cohen's $d = .82$), and in the cognitive engagement (Cohen's $d = .39$), and in self-efficacy for writing (Cohen's $d = .54$). (Nazari et al., 2021)

The results of the comparative studies of AI and human feedback are nuanced. Results of study 1 showed no difference in learning outcomes between the two groups. Study 2 results indicated that feedback received from AI was almost as popular as feedback received from humans, and the advantages that each type of feedback brings were clearly apparent in the data. (Escalante et al., 2023)

The results showed a significant difference between feedback generated by ChatGPT and peers. Compared to peers' feedback, ChatGPT gave descriptive feedback, such as giving information on how the essay is written, while peers were giving feedback that included information about identification of the problem in the essay. A general overview of the outcomes indicates that both



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ChatGPT and students can complement each other during the feedback process. (Banihashem et al., 2024)

Research into feedback for writing shows great potential. The quantitative data shows that both writing ability and motivation have been greatly improved for students in the AI-assisted writing group compared with the control group. The experimental group shows greater competence in aspects of writing such as organization, coherence, grammar and vocabulary. (C. Song & Song, 2023)

But there are significant considerations to be taken into account about the constraints of AI feedback. Nevertheless, the feedback was sometimes too broad or abstract, and the teachers that hadn't done periodic planning for the whole term had difficulties with using AI for formative assessment. Finally, both students and teachers contend that the teacher needs to have the last word when AI takes over formative feedback procedures. (Burner et al., 2025)

4.3 AI and Evaluation Practices

The use of AI technologies is growing to evaluate and grade in various settings. Using these platforms, instructors have been able to perform different administrative functions, such as reviewing and grading students' assignments more effectively and efficiently, and achieve higher quality in their teaching activities. (Chen et al., 2020)

Automated essay scoring (AES) is a well-developed application field. This study builds upon previous studies of the same type, in which a model was used to predict both the holistic and rubric scores of essays, but instead emphasizes the prediction of the quality of the writing style and dissects the decision process that underlies this prediction. It is observed that deep learning effect can be best understood in the context of evaluation of explanation models' trustworthiness. (Kumar & Boulanger, 2020)

AI-based educational assessment is gaining traction as a way to enhance the effectiveness and validity of assessment, particularly in the analysis of the large amounts of process data being collected in digital assessment environments. (Gardner et al., 2021)

Studies suggest low level of machine scoring validity in different contexts. The results showed a perfect alignment of the human-machine scores for all writing traits, but there were some concerns about the validity of the models in recognizing off-topic and gibberish responses and consistency across sub-groups. (Hannah et al., 2023)

AI presents various possibilities of teacher's learning opportunities to improve planning (e.g., outlining learners' needs, and getting teachers to know one's needs), implementation (e.g., providing instant feedback, intervening in learning), and assessment (e.g., automated scoring of written responses) of their teaching. (Çelik et al., 2022)

Learning analytics applications are used to enhance the evaluation. While ML is the preferred choice for LA tasks, including engagement prediction, dropout-risk modelling, and academic-performance forecasting, GenAI, primarily transformer-based models like GPT-4 and BERT, is



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making its debut in real-time feedback, adaptive learning, and sentiment analysis. (Rodriguez-Ortiz et al., 2025)

4.4 AI, Student Agency, and Self-Regulated Learning

One of the central issues in the literature is the effect of AI on student agency and SRL. Results of the experiment suggest that students tended to rely on rather than learn from AI assistance. Self-regulated strategies could help to reduce the gap if no AI assistance were provided, but were not as effective as the use of AI assistance. (Darvishi et al., 2023)

One thing that is particularly significant is that the AI technology like ChatGPT can encourage learners' own reliance on technology and create "metacognitive laziness". While ChatGPT can enhance short-term task performance, it might not necessarily lead to greater intrinsic motivation and knowledge gain and transfer. (Fan et al., 2024)

The research shows that there are potential benefits and risks associated with self-regulation. The results revealed that the students felt AI applications were helpful for metacognitive, cognitive, and behavioral regulation in various SRL domains, but not for motivational regulation. (Jin et al., 2023)

Our results show a complex situation where AI can be used in the forethought, performance, and reflection phases of SRL, but can also indicate whether the agency is human-centered or AI-centered, which can lead to differences in the SRL model. (Lan & Zhou, 2025)

Research on the effects of AI shows that with proper implementation, it can be beneficial. Results showed that SRLbot effectively enhanced students' science knowledge, behavioural engagement and motivation. The results of the quantile regression analysis revealed that the number of interactions was a significant predictor of variations in SRL. (Ng et al., 2024)

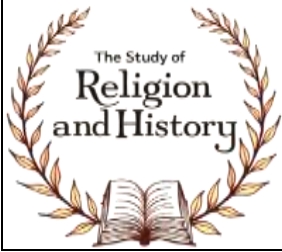
The findings of the study showed that the experimental group that was taught with AI-based instruction had significantly greater improvement in the L2 speaking skills than the control group. Furthermore, participants in the experimental group expressed more self-regulation. (Qiao & Zhao, 2023)

But scientists warned against the danger of relying too much on technology, which "has the potential to remove some students of their ability to think independently," one said. (Sardi et al., 2025)

4.5 Academic Integrity in the Age of Generative AI

With the advent of generative AI, academic integrity has come into truly unprecedented challenges. Although these technologies are capable of revolutionising academia, the way ChatGPT and other generative AI systems are used could surely undermine academic integrity. But this needs institutional and multi-stakeholder action to ensure the threats to academic integrity are reduced to greater maximisation. (Eke, 2023)

ChatGPT is an AI tool that can provide students with a variety of advantages, such as enhanced engagement, collaboration, and accessibility. However, there are concerns of academic honesty and plagiarism also. (Cotton et al., 2023)



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Existing detection methods have been shown to be ineffective in research. The researchers conclude that the available detection tools are neither accurate nor reliable and have a main bias towards classifying the output as human-written rather than detecting AI-generated text. Also, content obfuscation technologies seriously degrade the performance of tools. (Weber-Wulff et al., 2023)

The results show that the AI detection tools performed better in detecting GPT 3.5 content than GPT 4. When used for control responses that were handwritten, the tools showed inconsistencies, including false positives and ambiguous classifications. (Elkhatat et al., 2023)

The literature shows many worries about the efficacy of markers at detecting AI-generated content. Our evidence suggests that, overall, markers can't differentiate between assessments produced with GenAI input and those that are not, although markers' reactions to the use of GenAI influence how they undertake marking. Our results further suggest that the authenticity of an assessment does not matter for protecting from or detecting the use of GenAI in assessments. (Kofinas et al., 2025)

The need for assessment redesign surfaces as a key strategy. In this article, affordances and challenges of generative AI in assessments in tertiary education are explored. It offers some ideas for how to rethink and redesign assessments, given the presence of generative AI, and suggests the Against, Avoid and Adopt (AAA) principle. (Lye & Lim, 2024)

Two of the recommended suggestions for teachers regarding the design of assessment tasks seem especially relevant: running an assessment task through the GAI to learn how well the tool works to complete the task; and having students complete an assessment task using the GAI. (Moorhouse et al., 2023)

Research emphasizes the need for institutional policy development. It is the responsibility of HEIs to find solutions to these problems, with the majority of HEIs having no formal guide or rules for using AI, which causes confusion for both students and teachers. HEIs should set clear goals and policies for fair, fair and responsible use of AI in order to curb academic dishonesty. (N. Song, 2024)

Alternative ways of assessing are being investigated. The results of the pilot study suggest that there is a significant decrease in the number of academic integrity violations associated with the use of GenAI and an increase in student engagement with the GenAI technology. The AIAS helped to pave the way for new approaches to teaching and learning, encouraging professors to use GenAI tools in their lessons and students to create innovative multimodal submissions. (Furze et al., 2024)

4.6 Ethical and Equity Issues

There are significant ethical questions about the use of AI in assessment highlighted in the literature. It is important to distinguish doing ethical things from doing things ethically, to comprehend and to make pedagogical decisions that are ethical, and to consider, inevitable, even if unintended, consequences. (Holmes et al., 2021)



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The adoption of AIED has led to increasing ethical risks and concerns regarding several aspects such as personal data and learner autonomy. (Nguyen et al., 2022)

Privacy of data becomes an important issue. While the promise of AI in K–12 education is significant for improving learning experiences for students and teacher practice, the ethical and societal implications of these systems are often not fully explored in the educational setting. (Akgün & Greenhow, 2021)

With the increasing volume of student data being collected and analyzed, concerns come to mind about data privacy and security. Moreover, there are apprehensions about the potential for AI algorithms to perpetuate biases or reinforce inequalities if not implemented with conscientious oversight. (Eden et al., 2024)

Considerations of equity are a key part of the focus. By investigating a student's learning style, AI systems can modify educational materials, providing personalized learning experiences for every individual. AI platforms can analyze a student's learning patterns, strengths, and weaknesses, and adjust educational content to give each student a unique learning experience. All students have an equal chance to reach their objectives and develop to their full potential with this personalization. (Roshanaei et al., 2023)

However, there are serious concerns highlighted, such as data privacy, algorithmic bias, access inequalities, and the loss of relational and cultural aspects of the teaching and learning process. (Acar et al., 2025)

The article describes the privacy concerns associated with using a chatbot to deal with sensitive student data, and the need to comply with data protection laws. It emphasizes the danger of algorithmic bias in chatbots that might continue society's biases. (Williams, 2024)

4.7 Methodological Trends in the Literature

Some patterns can be observed in the methodology. The results of this study indicate that the publications had increased by almost two times to three times in the years 2021 and 2022 compared to previous years. The descriptive results indicate that most disciplines represented in the AIED papers are from Computer Science and STEM and quantitative methods are the most commonly used methods for empirical research. (Crompton & Burke, 2023)

The conclusions reflect on the almost lack of critical reflection of challenges and risks of AIED, the weak connection to theoretical pedagogical perspectives, and the need for further exploration of ethical and educational approaches in the application of AIED in higher education. (Zawacki-Richter et al., 2019)

The studies analysed make clear that in most of them the pedagogy which underlies the educational action is not represented. Moreover, it is necessary to increase the wealth of research which focuses on educational aspects more than technical development around AI. (Calatayud et al., 2021)

Table 1: Search Strategy and Database Coverage

Database	Search Terms	Records Retrieved
Scopus	AI + assessment + learning + feedback	Multiple records
Web of Science	Artificial intelligence + formative assessment + education	Multiple records
ERIC	AI + educational assessment + feedback	Multiple records
PsycINFO	Learning analytics + assessment + AI	Multiple records
Google Scholar	Generative AI + academic integrity + education	Supplementary

Table 2: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Focus on AfL, formative assessment, feedback, evaluation, academic integrity	Non-peer-reviewed articles
Examines AI, generative AI, automated feedback, learning analytics, adaptive assessment	Editorials, opinion pieces, blogs
Educational contexts (K-12, higher education, online learning)	Studies unrelated to education
Empirical studies, systematic reviews, high-quality conceptual studies	Technical AI papers without educational focus
Peer-reviewed publications	Studies without clear methodology
English language	Duplicate records
Published 2019-2025	Academic integrity without AI connection
Minimum 20 citations	AI in education without assessment focus

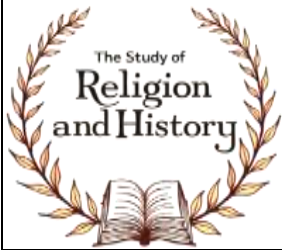
Table 3: Characteristics of Included Studies (Selected Examples)

Study	Country	Educational Level	Design	AI Technology	Key Findings
Zhai & Nehm (2023)	USA	Multiple	Commentary	Various AI	AI widely employed in formative assessment
González-	Spain	Multiple	Systematic	Various AI	Formative evaluation main

Study	Country	Educational Level	Design	AI Technology	Key Findings
Calata yud et al. (2021)			Review		AI use
Crompton & Burke (2023)	USA	Higher Education	Systematic Review	Various AIEd	Five usage codes identified
Burner et al. (2025)	Norway	Secondary	Qualitative	AI plug-ins	AI feedback appreciated but teacher oversight needed
Darvis hi et al. (2023)	International	Higher Education	RCT	AI assistance	Students rely on rather than learn from AI

Table 4: Thematic Synthesis of AI-Supported Assessment Findings

Theme	Key Findings	Supporting Evidence
AI-Supported AfL	AI enables personalized, adaptive assessment at scale	Adaptive systems improve engagement and performance
AI Feedback	Immediate, specific feedback possible; comparable to human in some contexts	Mixed findings on student preference; teacher mediation essential
AI Evaluation	Automated scoring achieves acceptable reliability; validity concerns persist	Human-machine alignment sufficient but subgroup inconsistencies exist
Student Agency	Risk of dependency and metacognitive laziness; can support SRL when designed appropriately	Students may rely on rather than learn from AI
Academic Integrity	Detection tools unreliable; assessment redesign critical	Markers cannot distinguish AI from human work
Ethics and Equity	Privacy, bias, and access concerns prominent	Need for ethical frameworks and policies



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5. Discussion

The results of this systematic review shed light on the intricate scenario where AI technologies are essentially transforming assessment for learning. The discussion that follows draws on these findings to relate them to the research questions and critically discusses the implications for educational practice and theory.

5.1 AI's Transformation of Assessment for Learning

The evidence shows that AI is being used in a variety of ways throughout the entire assessment for learning process, from diagnostic assessment, adaptive testing, formative feedback and summative evaluation. We reject a somewhat limited perspective on formative assessment, emphasizing the important roles that AI can play in giving feedback to students, helping teachers in assessment practices, and supporting teachers in making instructional decisions. (Zhai & Nehm, 2023)

But a key finding is that technology does not necessarily lead to pedagogical improvement. We argue that the score generated by AI is not a representation of all formative assessment practice; there are many different ways to measure student thinking and background, and no single assessment can represent them all. This highlights the importance of complex implementation that maintains the dialogic and relational aspects of good assessment practice.

5.2 The Feedback Paradox

The findings of AI-generated feedback are paradoxical, as AI can provide feedback, but it requires human mediation and pedagogical design, and it is effective in providing feedback at an unprecedented scale and consistency. Lastly, students and teachers argue that the teacher must have the final say in the case of the formative feedback procedures being conducted by AI. (Burner et al., 2025)

This result is consistent with the state of the art research on feedback literacy that foregrounds feedback as a communicative process as opposed to being a transfer of information. To unlock the power of internal feedback, teachers need to have students turn some natural comparisons that they are making anyway, into formal and explicit comparisons and help them build the capacity to exploit their own comparison processes. (Nicol, 2020)

5.3 The Agency Dilemma

One of the most troubling results is that of the impact of AI on student agency and self-regulated learning. Results of the experiment suggest that students tended to rely on rather than learn from AI assistance. This cognitive dependency risk is exacerbated by the ease of generative AI completing cognitive tasks that used to demand student effort and engagement. (Darvishi et al., 2023)

The research also shows evidence of positive outcomes in personalised guidance, collaborative inquiry, and improved self-reflection, but also identifies potential risks like reduced epistemic vigilance, superficial learning, and emotional reliance on AI interlocutors. (Yan et al., 2025)



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The implications for assessment design are enormous: assessments will need to be designed in such a way that they force students to interact in a meaningful way with the activity, rather than giving it to an AI system, and, somehow, use the capabilities of AI systems to augment students' learning.

5.4 Academic Integrity Crisis and Assessment Redesign

The challenges to academic integrity from generative AI are perhaps the most pressing today for assessment practice. We also found that the level of authenticity of an assessment does not affect its capabilities to protect against or detect the use of GenAI in the creation of assessments. (Kofinas et al., 2025)

This discovery raises doubts about the authenticity of assessment designs that are not designed explicitly to resist misuse by AI. More focus should be paid to the design of assessments and more attention should be paid to social experiential and performative assessments as opposed to output-based and asynchronously written assessments. (Kofinas et al., 2025)

It is suggested in the literature that there needs to be a change in paradigm from detection to design. The paper recommends that tertiary educators and students use ChatGPT with care when engaging with it for academic work, to ensure that its use is both ethical and reliable, and that it can be utilized effectively. The paper proposes various propositions, such as prioritising education on the responsible and ethical use of ChatGPT, devising new assessment strategies, addressing bias and falsified information, and including AI literacy as part of graduate skills. (Rasul et al., 2023)

5.5 The Role of Teachers as Ethical Mediators

Teachers' role in mediating AI-supported assessment is a recurring theme in the literature. The results indicate that the participants visualize that the use of AI systems in online learning can lead to personalized interactions between the learner and the educator on a large scale, yet with the potential risk of crossing social boundaries. While AI systems have shown positive benefits in enhancing the quantity and quality of communication, there was concern regarding the responsibility, agency, and surveillance issues. (Seo et al., 2021)

Teachers felt that the learning outcomes of building capacity and knowledge of the subjects were the best learning goals for student-AI collaboration. Teachers mentioned that the principles of AI, data literacy, error analysis, AI ethics, and AI experiences in daily life were important supports, but AI should provide an instructional scaffolding and have attributes as a learning mate to facilitate students' interaction with AI. (Kim et al., 2022)

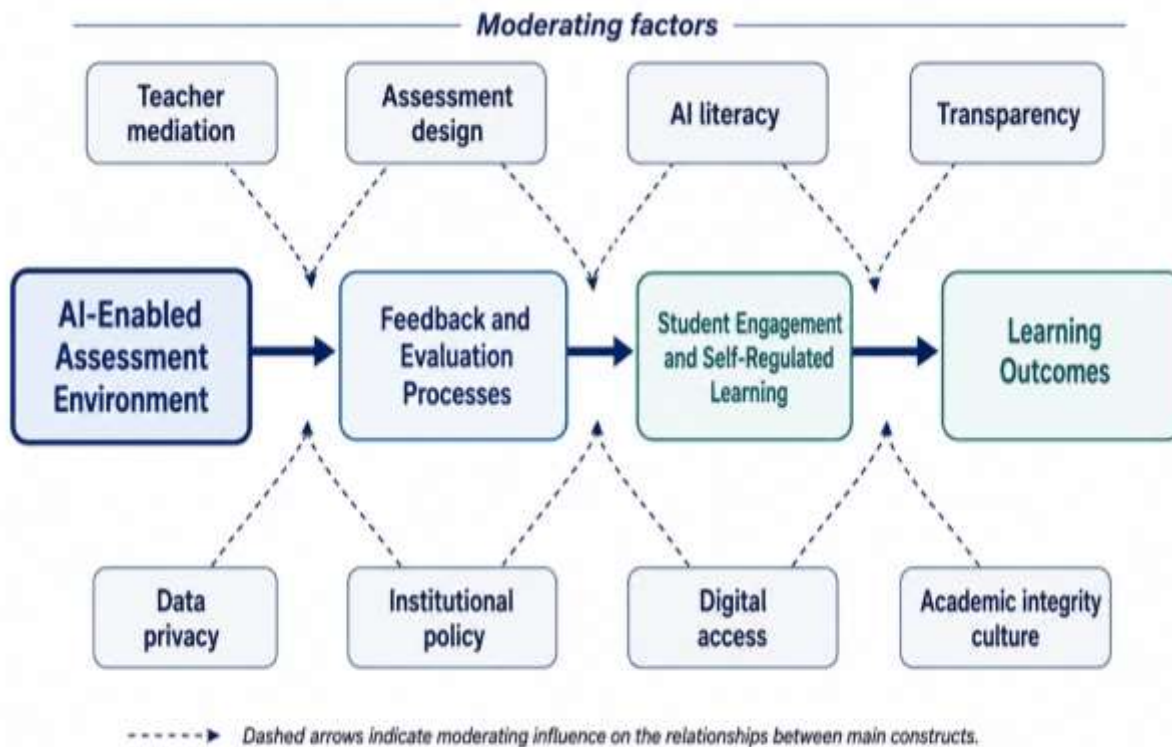


Figure 2: Conceptual Framework of AI-Enabled Assessment for Learning

6. Practical Implications

This review's findings will have significant implications for many stakeholders in the field of educational assessment.

For Students

Students need to be learning AI literacy to engage with AI tools rather than being dependent on them. Rather than punishment-based models to try to "punish" students for using AI, educating them on the ethics of AI and the danger of relying too heavily on AI may be more effective at preventing unethical use of AI in higher education. (Lund et al., 2025)

For Teachers

Professionals need to acquire new skills in designing assessments that harness AI features while preserving pedagogical integrity. Professionals need to build new skills in designing assessments that also make use of the AI features but keep the pedagogical integrity. We argue that it may be beneficial to embrace GAI as a part of the assessment process since this is the reality of today's educational and job landscape. This will require instructors to develop a new competence - generative artificial intelligence assessment literacy. (Moorhouse et al., 2023)



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We believe the existing conception of AI chatbots in education is incomplete, thus we propose to integrate three key principles of education: goal setting (prompt), self-evaluation and feedback, and personalization. (Chang et al., 2023)

For Institutions and Administrators

This framework consists of three dimensions – Pedagogical, Governance, and Operational. The Pedagogical dimension focuses on leveraging AI for enhancing teaching and learning effectiveness, and the Governance dimension addresses privacy, security, and accountability concerns. The Operational dimension discusses issues related to infrastructures and training. (Chan, 2023)

For Policymakers

At the education policy level, the government should be committed to promoting the lifelong learning, providing teacher education courses, and safeguarding of personal information. (Luan et al., 2020)

We suggest a series of recommendations for educational institutions concerning the creation of GenAI educational programs, the redesign of assessment tasks to include critical thinking and creativity and the creation of clear rules, practices, and policies for using GenAI fairly and equitably. (Francis et al., 2025)

7. Theoretical Contributions

This review is part of a number of theoretical fields:

The theory of Assessment for Learning.

The results build on the theory of assessment for learning by pinpointing the role of AI technologies in the feedback-learning relationship. The potential of AI to shape learning depends on embedding it in pedagogically appropriate environments that maintain student agency and teacher mediation.

Feedback Literacy Literature

The review helps to foster feedback literacy scholarship by emphasizing the special considerations when the feedback is AI-generated. These effects were partially mediated by feedback literacy, which had an impact on perceptions of feedback helpfulness and motivational regulation. (Weidlich et al., 2025)

AI in Education Research

We believe that the convergence of human and AI capabilities through hybrid intelligence will be essential to enable a new learning sciences research era. (Järvelä et al., 2023)

Academic Integrity Theory

The results call for a rethinking of academic integrity in an environment where lines between human and machine authorship continue to become more indistinct. The results suggest that an ethical belief, rather than institutional policies, is the leading factor for students' perceptions of misconduct and their real-life experience with writing and AI. (Lund et al., 2025)

8. Limitations

There are several limitations to this systematic review that should be noted:

Publication Bias: The use of peer-reviewed literature and the decision to include or exclude due to citation criteria may have overlooked relevant emerging research, especially in the context of the rapid advancement of generative AI technologies.

Language Restriction: The English language restriction might have limited the identification of relevant studies that were published in other languages, especially from non-Western backgrounds where AI in education could be applied in a different manner.

Rapid Technological Change: The impact of AI on education can be rapid, enabling new technologies to emerge rapidly that may result in changes to the discoveries made in relation to a specific technology, and however, the pedagogical principles identified are likely to be more persistent.

Substantial heterogeneity: There was a high level of heterogeneity in the study designs, contexts, and outcomes, which made quantitative synthesis and comparison across studies challenging.

Geographic Distribution: The review consisted of 278 publications, most (68%) of which came from North America and Europe. This geographical focus restricts the ability to generalize to other educational settings (Gordon et al., 2024).

Lack of Long-term Evidence: Most of the studies reviewed were on short-term results and there were very few studies covering the long-term effects of AI-assisted assessment on learning outcomes and skill development.

9. Future Research Directions

Based on the identified gaps, several directions for future research are proposed:

Table 5: Research Gaps and Future Research Agenda

Research Gap	Future Research Direction
Limited longitudinal evidence	Multi-year studies examining sustained effects of AI feedback on learning outcomes
Under-explored student perspectives	Qualitative research on student experiences and perceptions of AI-generated feedback
Teacher-AI collaboration models	Investigation of effective models for human-AI partnership in assessment
Academic integrity frameworks	Development and validation of frameworks for ethical AI use in assessment
Low-resource contexts	Research on AI assessment implementation in developing countries and under-resourced institutions
Bias and fairness	Systematic investigation of algorithmic bias in assessment algorithms across demographic groups
Explainable AI	Development of transparent AI systems that provide

Research Gap	Future Research Direction
	interpretable assessment rationales
AI literacy integration	Research on effective approaches to integrating AI and assessment literacy
Human-centered design	User-centered design research for AI assessment tools that prioritize human agency
Ethical learning analytics	Investigation of ethical frameworks for learning analytics use in assessment

Furthermore, four research trends (Internet of Things, swarm intelligence, deep learning, and neurosciences) and an AI in education evaluation were proposed for future studies. (Zhai et al., 2021)

We discuss the results and conclude the need for teacher training and further research to understand the possibilities of AI in educational assessment, mainly in other educational levels than higher education. (Calatayud et al., 2021)

10. Conclusion

This systematic review has focused on the recent studies that examine the impact of artificial intelligence on assessment for learning, highlighting the specific studies on feedback, evaluation and academic integrity. The findings demonstrate how AI can significantly contribute to improving assessment practices, such as through personalized feedback, adaptive testing, and advanced learning analytics. But there are considerable issues of student agency, academic honesty, possible algorithmic bias, and pedagogically sound implementation.

AI should serve rather than supplant human judgement in assessment, the findings show. We need to change our mindset from AI being a problem to be solved, to acknowledging AI as a tool that can be used collaboratively in the education space. (Zhai & Nehm, 2023)

The challenges of academic integrity raised by generative AI are quite significant and demand a rethinking of the design of assessments. It believes that the number of tools that are generative will increase manyfold and therefore an arms race with generative AI and AI policing could not solve the basic problems of assessments. (Lye & Lim, 2024)

We must go with the new technology and provide some guard rails to avoid misuse and abuse. (Kamalov et al., 2023)

To effectively integrate AI into assessment for learning, there is a need for collaboration on various levels: AI Assessment Literacy at the individual educator level, AI-supportive policies and infrastructure at the institutional level, and ethical frameworks and guidelines at the policy level. In this context, a system of generally agreed-upon rules and a multi-disciplinary approach to engaging with ethics of AIED appear to be crucial. (Holmes et al., 2021)

The field of AI is continually evolving, and continuous research and practice will be necessary. The challenge should be to use AI's potential, while maintaining the distinctly human aspects of education: the relationships, judgments, and values that make assessment a key function of

learning and development. For this, technological innovation is not only necessary but a re-thinking of how machine intelligence will be connected to human values, ethics and goals is also needed. (Järvelä et al., 2025)

This review helps to build a body of evidence for navigating the complex landscape of assessment for learning enabled by AI. It builds on existing evidence and highlights gaps that can guide further research and development of technology-informed, pedagogically appropriate and ethically sound assessment practices.

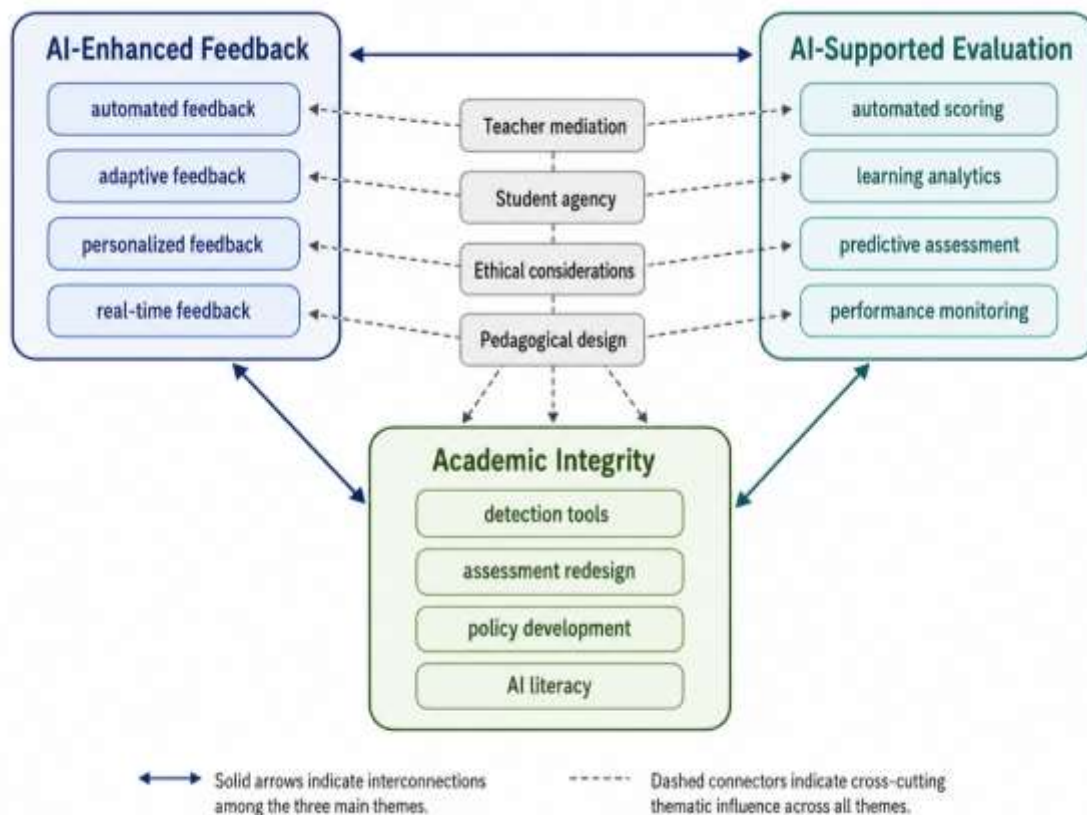


Figure 3: Thematic Map of Feedback, Evaluation, and Academic Integrity in AI-Supported Assessment

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The authors used generative AI tools, including Large Language Models, to assist with grammar and tone. The specific tool(s) are identified.

Details of the AI usage are given below:

1. Grammarly: To correct grammar and tone



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2. Chatgpt

To set figures according to my given data

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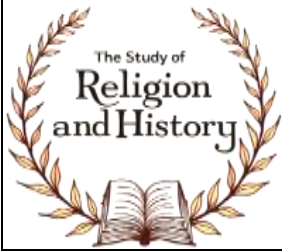
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Conflicts of Interest

The authors do not identify any conflict of interest.

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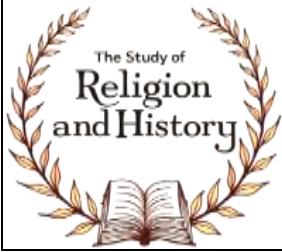
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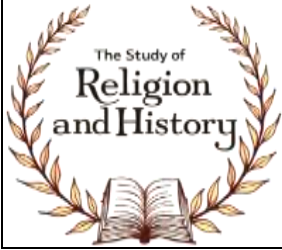
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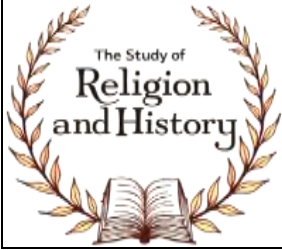
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