

AI-Mediated Digital Formative Assessment, EFL Writing: Validity, Teacher Digital Literacy, Ethical Implications

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*Zeli Utari, Zulfani Sesmiarni, Widya Syafitri^{abc}

¹²³Universitas Islam Negeri Sjech M. Djamil Djambek Bukittinggi, Indonesia

Corresponding Author: utarizeli@gmail.com

ABSTRACT

The integration of Artificial Intelligence (AI) in formative assessment practices has transformed how English as a Foreign Language (EFL) writing is taught and evaluated. However, existing studies have rarely provided an integrated review that simultaneously addresses issues of validity, teacher digital literacy, and ethical concerns in AI-mediated formative assessment. This study employs a qualitative Systematic Literature Review (SLR) guided by the PRISMA protocol to explore empirical and conceptual studies on AI-mediated digital formative assessment, focusing on three key dimensions: validity, teacher digital literacy, and ethical implications. From an initial pool of 237 studies published between 2018 - 2025, 22 studies met the inclusion criteria. A narrative synthesis revealed that while AI tools enhance feedback immediacy and data-driven decision-making, issues of construct validity, teacher competence in AI-based feedback interpretation, and ethical concerns - such as bias and data privacy - remain unresolved. The review concludes that the effective implementation of AI-mediated assessment requires not only technological readiness but also a deep pedagogical understanding and ethical awareness among teachers.

Keywords: *Artificial Intelligence, Formative Assessment, EFL Writing, Systematic Literature Review*

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INTRODUCTION

The accelerated evolution of Artificial Intelligence (AI) has fundamentally reshaped how assessment is conceptualized, designed, and enacted within English as a Foreign Language (EFL) writing classrooms. As intelligent technologies become embedded within digital learning ecosystems, tools such as Grammarly, Turnitin, and AI-driven writing assistants have shifted from peripheral supports to central formative partners that mediate writing development. The rapid integration reflects the broader rise of AI across education, yet writing - more than other language skills - is uniquely impacted because it relies heavily on iterative feedback, revision cycles, and detailed linguistic analysis that AI systems are designed to automate. The centrality of feedback in writing development makes the skill particularly sensitive to technological shifts, as AI tools directly intervene in processes traditionally mediated through teacher - students interaction. Consequently, the formative function of assessment in writing is being reconfigured at a faster rate than in reading, speaking or listening, where feedback is less text - bound and less algorithmically predictable. These systems deliver instantaneous, granular, and adaptive feedback that enables learners to monitor progress, evaluate linguistic choices, and refine texts through iterative revision, thereby supporting autonomous and self-regulated writing in ways aligned with contemporary pedagogical principles (Chang et al., 2021; Yang et al., 2024). The personalized, data intensive nature of such feedback marks a departure from traditional teacher-centered assessment, positioning AI-mediated digital formative assessment as a cornerstone of 21st-century EFL pedagogy (Taskiran & Göksel, 2022). Yet these advancements introduce substantial pedagogical, epistemological, and ethical challenges. As formative assessment - long understood as an interactive cycle of generating evidence, providing feedback, and

adjusting instruction (Zhang et al., 2024) becomes increasingly automated, concerns arise regarding the validity of AI-generated feedback, the preparedness of teachers to interpret and mediate automated evaluations, and the ethical implications surrounding data governance, algorithmic bias, and the depersonalization of formative interaction (Brocca et al., 2024; Maleki et al., 2025). While AI enhances efficiency and scalability, it simultaneously risks over-automation that marginalizes human judgment and pedagogical contextualization (Yang et al., 2024), thereby complicating questions of authenticity, interpretive depth, and the meaningfulness of feedback. As Maleki et al. argue, valid formative assessment depends upon the interplay of authentic tasks, actionable feedback, multidimensional evaluation, and sustained pedagogical support - dimensions that underscore the irreplaceable interpretive and humanistic role of teachers.

In this evolving landscape, teacher digital literacy emerges as a decisive mediating factor, yet empirical studies consistently report limited competence among EFL instructors, particularly within Asian contexts such as Indonesia and Iran, where assessment literacy and the ability to critically evaluate AI-generated feedback remain only moderate (Cirocki et al., 2025; Isnawati, 2023; Mohammadkhah et al., 2022). When teachers are unable to contextualize or problematize automated feedback, they may rely on AI passively or uncritically, reducing the formative potential of assessment and diminishing learners' engagement with reflective writing processes (Brocca et al., 2024). Ethical concerns further intensify these challenges, as issues of algorithmic opacity, bias in training datasets, privacy vulnerabilities, and the impersonality of automated comments demand heightened critical digital literacy to ensure that feedback is interpreted responsibly and equitably. Taken together, assessment validity, teacher digital readiness, and ethical literacy intersect to form a complex pedagogical terrain that remains insufficiently understood despite the rapid expansion of research in the field.

Although the literature on AI-mediated formative assessment is growing, it remains marked by several notable gaps that constrain a holistic understanding of its pedagogical impact. Much existing work has adopted a fragmented approach, focusing either on linguistic accuracy or performance gains while insufficiently theorizing broader validity constructs such as authenticity, contextual alignment, and learner engagement within AI-mediated feedback environments (Maleki et al., 2025; Taskiran & Göksel, 2022). Research rarely examines how teachers actually mediate AI feedback in real classroom settings, leaving critical gaps concerning how instructors negotiate, filter, or adapt automated evaluations to support learner development (Cirocki et al., 2025; Yang et al., 2024). Ethical issues are also underexplored empirically, as current discussions largely remain conceptual rather than examining how bias, transparency, or data protection shape learners' trust, motivation, and participation in AI-supported assessment processes (Brocca et al., 2024). Additionally, the field lacks integrated theoretical and empirical models that synthesize validity, teacher literacy, and ethical practice into a cohesive framework. These gaps collectively indicate that while AI tools are rapidly adopted, the mechanisms through which they influence assessment validity, teacher agency, and ethical classroom practice remain insufficiently synthesized.

To address these limitations, the present study conducts a Systematic Literature Review (SLR) guided by PRISMA protocols, employing narrative synthesis to develop an integrated understanding of AI-mediated formative assessment in EFL writing (Kitchenham & Charters, 2007). This study therefore seeks to examine how AI technologies influence the validity and pedagogical robustness of formative assessment, how teacher digital literacy mediates the interpretation and instructional use of automated feedback, and how ethical considerations shape responsible AI adoption in writing evaluation. In line with these aims, the study is guided by the following research questions: (1) How does AI-mediated formative assessment influence the validity and authenticity of feedback in EFL writing? (2) In what ways does teacher digital literacy mediate the interpretation, adaptation, and pedagogical use of AI-generated feedback? (3) What ethical implications arise in the integration of AI into formative assessment practices in EFL writing classrooms? By articulating these questions within a unified analytical frame, the study contributes a comprehensive conceptual foundation to

inform future research, teacher training, and policy development for more equitable, critical, and pedagogically sound AI integration in language education.

METHOD

This study adopted a qualitative Systematic Literature Review (SLR) approach guided by the PRISMA 2020 statement (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) to ensure methodological transparency, reproducibility, and rigor (Page et al., 2021). The review systematically identified, screened, and synthesized peer-reviewed publications focusing on AI-mediated formative assessment within English as a Foreign Language (EFL) writing contexts. Narrative synthesis was used to integrate and interpret diverse findings, enabling the construction of a comprehensive understanding of emerging themes, challenges, and pedagogical implications in AI-based formative assessment research.

Searches were conducted across four major academic database - Scopus, ERIC, ScienceDirect, and Google Scholar - supplemented by manual searches through reference tracing and citation chaining. The following Boolean string was applied consistently across database:

Table 1. Search Result Across Database

No.	Search Engine / Database	Number of Articles Found (n)
1	Scopus	78
2	ERIC (Education Resources Information Center)	64
3	ScienceDirect	56
4	Google Scholar	39
5	Manual Search (reference tracing and citation chaining)	18
Total		255

A total of 255 articles were identified through five databases. Scopus contributed the largest number of records (n=78), followed by ERIC (n=64), ScienceDirect (n=56), Google Scholar (n=39), and manual searches (n=18). This multi-source strategy ensured comprehensive coverage and minimized the risk of missing relevant studies. After determining the final set of eligible studies, the next phase of the review involved an in-depth qualitative analysis aimed at synthesizing key findings, theoretical orientations, and methodological trends across the included research. The study selection process followed the PRISMA 2020 guidelines. The complete flow of identification, screening and eligibility assessment is presented in figure 1.

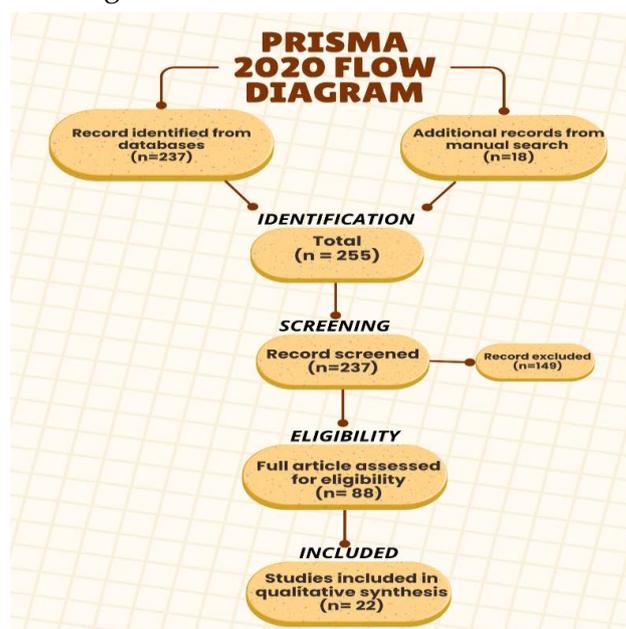


Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

As illustrated in Figure 1, the PRISMA 2020 flow diagram outlines the systematic selection process undertaken in this review. A total of 237 records were retrieved from electronic databases, with an additional 18 records identified through manual searches, resulting in 255 initial entries. After removing duplicates and screening titles and abstracts, 88 studies were retained for further evaluation, while 149 records were excluded for not meeting the inclusion criteria. Subsequently, 88 full-text articles were assessed for eligibility based on relevance to AI-mediated formative assessment in EFL writing, methodological clarity, and publication quality. Finally, 22 studies met all inclusion standards and were incorporated into the qualitative synthesis. This rigorous selection procedure ensured that only high-quality, contextually relevant research informed the review's analysis and conclusions.

FINDINGS AND DISCUSSION

A comprehensive review of the selected studies indicates a rapidly expanding scholarly interest in the intersection of artificial intelligence and EFL writing assessment. The analyses reveal diverse methodological orientations - ranging from qualitative case explorations to mixed-method validations - that collectively illuminate the pedagogical, technological, and evaluative dimensions of AI-mediated formative assessment. Across these studies, a wide range of AI-Powered tools are employed, including Grammarly, ChatGPT, Quillbot, Write&Improve, and automated writing evaluation systems such as Criterion and GrammarCheck, each contributing differently to feedback generation and writing development. These studies consistently underscore how AI tools reshape feedback practices, influence learner engagement, and challenge existing notions of assessment validity, teacher preparedness, and ethical considerations. To provide a clearer overview of how these themes manifest across individual studies, the following table summarizes the core attributes and findings of each reviewed article.

No	Title	Author(s)	Year	Research Approach	Result
1	Exploring Generative Artificial Intelligence Preparedness among University Language Instructors: A Case Study	Lucas Kohnke, Benjamin Luke Moorhouse, Di Zou	2023	Qualitative	Sig
2	AI-Powered Mediated Synchronous Corrective Feedback on EFL Senior High School Students' Paragraph Writing Skill	Siti Hanna Sumedi	2024	Quantitative	Sig
3	ChatGPT as a Formative Feedback Tool: Improving Narrative Essay Writing among EFL Students	Pariyanto & Novalita Fransisca Tungka	2025	Quantitative	Sig
4	Examining the Role of AI-Powered Writing Assistants in Enhancing Critical Thinking in EFL Academic Writing	Muhammad Tahir, Andi Sahtiani Jahrir, Andi Asrifan, Ariatna	2025	Qualitative	Sig
5	AI-driven Feedback in EFL Students' Writing: Does it Enhance Their Skills?	Maudina Fathimatuzahro & Faiqotur Rizkiyah	2025	Qualitative	Sig
6	Integrating Automated Writing Evaluation into Saudi EFL Students' Writing Practice	Mona Alshehri	2025	Mix-Method	Sig
7	Artificial Intelligence (AI) for EFL Writing Skills: Systematic Literature Review	Pratita Pawestri & Bambang Widi Pratolo	2024	Qualitative	Sig
8	Exploring an Artificial Intelligence as Automated Feedback Program in EFL Writing	Fiki Setiawan & Annas Alkhowarizmi	2025	Qualitative	Sig

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9	Enhancing EFL Writing Revision Practices: The Impact of AI- and Teacher-Generated Feedback and Their Sequences	Thi Thanh Thao Tran	2025	Quantitative	Sig
10	Development and Validation of the Online Formative Assessment Validity Scale (OFAVS) in EFL Contexts	Alireza Maleki, Hossein Khodabakhshzadeh, Mitra Zeraatpishe, Purya Baghaei	2025	Qualitative	Sig
11	Assessment Literacy Among Indonesian Pre-service English Language Teachers	Andrzej Cirocki, Syafi'ul Anam, Nur Arifah Drajadi, Bill Soden	2025	Mix-Method	Sig
12	Learner Interaction with, and Response to, AI-Programmed Automated Writing Evaluation Feedback in EFL Writing	Hongzhi Yang, Chuan Gao, Hui-zhong Shen	2024	Qualitative	Sig
13	The Differential Role of AI-operated WCF in L2 Students' Noticing of Errors and Its Impact on Writing Scores	Khaled ElEbyary, Ramy Shabara, Deena Boraie	2024	Qualitative	Sig
14	Exploring the Impact of Automated Written Corrective Feedback on Academic Writing Skills of EFL Learners	Masoud Rahimi, Jalil Fathi, Di Zou	2025	Mix-Method	Sig
15	Generative AI-Assisted Feedback and EFL Writing	Mohamed Mekheimer	2025	Qualitative	Sig
16	Artificial Intelligence (AI) for EFL Writing Skills: Systematic Literature Review	Pratita Pawestri, Bambang Widi Pratolo	2024	Qualitative	Sig
17	A Systematic Review of AI-Based and Teacher-Based Writing Assessment	Reno Setiyowati, Viqi Ardaniah	2025	Qualitative	Sig
18	EFL Educators' Perceptions of AI-Driven Assessments: A Systematic Review	Reza Sahmaniasl	2025	Qualitative	Sig
19	Enhancing EFL Students' Recount Writing via Grammarly, QuillBot, and GrammarCheck	Titik Ismailia, Adriadi Novawan	2025	Quantitative	Sig
20	Exploring the Influencing Factors and Validity of Formative Assessment in Online Learning	Yan Liu, Hongfeng Zhang	2022	Qualitative	Sig
21	Digital Feedback Literacy Development Through AI-Mediated Writing Platforms	Zahra Fakher Ajabshir, Saman Ebadi	2025	Qualitative	Sig
22	Using Digital Formative Assessment to Evaluate EFL Learners' English Speaking Skills	Zeynep Çetin Köroğlu	2021	Mix-Method	Sig

Across the reviewed literature, a clear pattern emerges: AI technologies consistently demonstrate the potential to enhance writing performance, accelerate feedback cycles, and support learner autonomy. However, the dominance of qualitative approaches also reveals a gap concerning large-scale empirical validation of AI-driven assessment practices. Moreover, while most studies report significant improvements, few scrutinize the long-term pedagogical implications, the reliability of AI-generated judgments, or the readiness of teachers to integrate such tools effectively. This indicates an urgent need for research that not only measures learning outcomes but also interrogates issues of digital literacy, assessment fairness, and the ethical boundaries of AI involvement in EFL learning environments.

Conceptualization of AI-Mediated Formative Assessment

AI-mediated formative assessment in EFL writing has evolved from simple automated correction tools to sophisticated, adaptive systems capable of delivering tailored feedback throughout the writing process. Current literature describes AI algorithms as mechanisms that analyze linguistic patterns, detect structural weaknesses, and offer real-time suggestions that support drafting, revising, and editing (Liu & Zhang, 2022; Rahimi et al., 2025). These systems not only enhance mechanical accuracy but also help learners identify recurring errors, monitor writing development, and engage in iterative refinement. Platforms such as Grammarly, Write & Improve, Criterion, Quillbot, and Turnitin have therefore become integral to many EFL learning environments (Mekheimer, 2025; Pawestri & Pratolo, 2024.).

Beyond error correction, scholars now emphasize the cognitive and metacognitive benefits of AI-mediated feedback. Immediate and individualized prompts improve learners' self-regulated learning by fostering awareness, reflection, and strategic revision habits (Marzuki et al., 2023; Özçeli & Özçelik, 2025). This interactive feedback loop enables students to take ownership of their writing development and practice autonomous decision-making regarding language accuracy, lexical choice, and sentence organization. As a result, AI functions not merely as a corrective engine but as a scaffold that supports deeper learning processes. Recent studies also stress the importance of viewing AI tools within a sociocultural perspective. In this view, AI-mediated feedback serves as a mediating artifact that complements teacher scaffolding rather than replacing it (Pawestri & Pratolo, n.d.). Teachers remain essential in guiding students to interpret AI feedback critically, distinguishing between helpful suggestions and errors caused by algorithmic limitations. When human and machine support are integrated meaningfully, learners benefit from both increased writing accuracy and stronger conceptual development (Ginting et al., n.d.; Wang et al., 2024).

Thus, AI-mediated formative assessment represents a hybrid ecosystem where technology enhances efficiency and precision, while teachers ensure depth, contextualization, and meaningful learning. This synergy strengthens writing quality, learner confidence, and cognitive engagement.

Validity Concerns

Although AI tools provide rapid and consistent feedback, scholars have raised concerns about the validity of automated assessment, particularly regarding the aspects of writing that AI tends to privilege. Studies show that AI systems predominantly focus on surface-level features such as grammar, spelling, and syntactic accuracy, often giving insufficient attention to broader rhetorical elements like coherence, argumentation, creativity, and content development (Huang et al., 2023; Rahimi et al., 2025). This imbalance risks narrowing learners' understanding of effective writing and may promote reductive language learning outcomes (Marzuki et al., 2023; Wang et al., 2024).

Validity concerns also arise because AI-generated feedback may not fully reflect the complexity of human judgment. Automated scoring can misinterpret nuanced expressions, contextual meaning, or genre-specific conventions, especially in multilingual settings where students' linguistic and cultural backgrounds influence writing performance. Over-reliance on such feedback may therefore compromise fairness, authenticity, and the holistic evaluation of learners' writing abilities.

Teacher mediation becomes crucial in solving these validity challenges. Research consistently highlights that human teachers are able to contextualize AI feedback, align it with instructional goals, and provide interpretive depth that AI cannot achieve (Mekheimer, 2025; Pawestri & Pratolo, 2024.). Teachers help students evaluate the relevance and accuracy of automated suggestions, interpret discourse-level issues, and understand the rationale behind revisions. Without this mediation, students may develop dependency on automated systems and fail to cultivate critical awareness and higher-order composition skills (Ginting et al., n.d.; Özçeli & Özçelik, 2025).

Therefore, integrating AI into writing assessment requires a balanced approach: AI contributes efficiency and consistency, while teachers ensure validity, fairness, and

pedagogical coherence. Maintaining this complementary relationship safeguards the integrity of formative assessment in EFL writing.

Teacher Digital Literacy and Pedagogical Readiness

Teacher competence in digital and assessment literacy is a determining factor in the effectiveness of AI-mediated formative assessment. While AI tools offer promising innovations, many EFL teachers still face challenges in navigating, interpreting, and integrating automated feedback into their instructional practice (Cirocki et al., 2025; Farida & Rosyidi, 2019). Limited proficiency in understanding AI-generated suggestions can hinder the alignment between technology use and learning goals, reducing the pedagogical value of automated assessment.

Digital literacy must therefore extend beyond operational familiarity to include critical and evaluative skills. Scholars argue that teachers need to be able to assess the quality of AI feedback, identify algorithmic bias, and determine whether suggestions support valid and meaningful learning outcomes (Brocca et al., 2024). This form of critical digital literacy enables teachers to mediate AI feedback responsibly, ensuring that it enhances rather than distorts students' writing development. Professional development plays a pivotal role in cultivating such competencies. Teachers who lack sufficient training may become passive users of AI technologies, relying heavily on automated feedback without considering its limitations or pedagogical implications. Maleki et al. emphasize that digital assessment literacy requires understanding not only how tools function but also how principles such as validity, fairness, and learner agency intersect with technological use in the classroom.

Thus, building teacher readiness involves cultivating technological fluency, pedagogical adaptability, and ethical awareness. When teachers possess strong digital literacy, they are better positioned to guide learners effectively, maximize the benefits of AI tools, and maintain a learner-centered orientation in assessment practices.

Ethical Implications

As AI-based assessment becomes more prevalent, ethical concerns have become central to scholarly discussions. The use of automated writing systems involves continuous data collection, raising critical questions about data privacy, transparency, and institutional oversight (Huang et al., 2023; Zhang et al., 2024). Without clear policies and informed consent, student data may be used in ways that compromise confidentiality or violate ethical standards (Liu & Zhang, 2022). Ensuring data protection is therefore essential for maintaining trust in digital assessment environments.

Another major concern is algorithmic bias. AI systems are trained on specific datasets that may not fully represent the linguistic diversity of EFL learners. As a result, automated feedback may unintentionally reinforce cultural or linguistic inequities, producing inaccurate or unfair evaluations (Ajabshir & Ebadi, 2023). Bias within AI feedback threatens the fairness and inclusivity of assessment practices, making human oversight indispensable.

Teachers serve as ethical mediators who safeguard the responsible use of AI in classrooms. By monitoring feedback accuracy, ensuring transparent communication with learners, and reinforcing reflective use of technology, educators help maintain ethical integrity in assessment processes (Amirian, 2025; Sivanganam et al., 2025). Their role includes educating students about the appropriate use of AI tools, potential risks, and the importance of maintaining academic integrity.

Institutions must also implement ethical governance frameworks - including data security measures, fairness audits, and accountability mechanisms - to ensure that AI integration aligns with human-centered educational principles. When ethical considerations are embedded into policy and practice, AI-mediated formative assessment becomes more trustworthy, equitable, and pedagogically sustainable.

CONCLUSIONS

The synthesis of current research shows that AI-mediated formative assessment is reshaping the landscape of EFL writing instruction by offering rapid, adaptive, and accessible

feedback that supports students' ongoing revisions. AI tools have proven effective in strengthening linguistic accuracy and promoting learner independence, positioning them as valuable assets in the writing classroom. Nonetheless, persistent issues related to assessment validity, the predominance of surface-level feedback, teacher preparedness, and ethical safeguards indicate that AI cannot replace the interpretive and pedagogical functions of human instructors. The impact of AI is contingent on teachers' ability to evaluate its feedback critically, align it with instructional aims, and enrich it with guidance that targets higher-order writing development. At the same time, the integration of AI demands that educators possess strong digital and assessment literacy, as well as a clear understanding of privacy, transparency, and fairness in algorithmic systems. Therefore, the review highlights that targeted and continuous teacher training is essential to develop the assessment literacy to interpret, adapt and mediate AI-generated feedback responsibility. Without such training the pedagogical potential of AI-Mediated formative assessment cannot be fully realized. Evidence from the reviewed studies consistently suggests that AI is most beneficial when employed as part of a blended model where technology provides efficiency and accuracy, while teachers ensure conceptual depth, contextual relevance, and ethical oversight. Sustainable implementation therefore requires professional development initiatives, institutional governance frameworks, and pedagogical strategies that maintain a balanced and human-centred approach. In sum, while AI significantly advances formative assessment practices in EFL writing, its true value emerges through thoughtful, ethical, and pedagogically grounded collaboration between human expertise and machine intelligence.

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