

Research paper

**Artificial Intelligence in Critical Media Literacy: Enhancing Bias Detection,
News Evaluation, and Algorithm Understanding**

Shahriar Jalili

Department of English, IsG.C., Islamic Azad University, Islamabad Gharb, Iran

Jalili, Sh. (2026). Artificial intelligence in critical media literacy: Enhancing bias detection, news evaluation, and algorithm understanding. *Journal of new advances in English Language Teaching and Applied Linguistics*, 8(1), 255-280.

Doi: 10.22034/Jeltal.2026.8.1.11

*corresponding author: jalilishahriar@iau.ac.ir

Abstract

This study examines the impact of artificial intelligence (AI)-enhanced critical media literacy training on EFL learners' ability to identify implicit bias, evaluate news accuracy, and analyze AI-generated digital content. A mixed-methods design was employed with 60 intermediate-to-advanced Iranian EFL learners. Quantitative data were collected using a one-group pretest–posttest design and a researcher-developed performance assessment measuring bias detection, news accuracy evaluation, and algorithmic awareness. Qualitative data were obtained through semi-structured interviews with 15 learners and analysis of algorithmic-content review tasks. The six-week intervention combined instructor-led instruction, guided analysis, collaborative activities, authentic digital materials, and AI-supported tasks. Quantitative data were analyzed using paired-samples t-tests and effect sizes, while qualitative data were thematically analyzed. Findings indicated significant gains in bias detection and news accuracy evaluation, whereas improvement in algorithmic awareness was small and non-significant. Qualitative findings revealed increased critical awareness, motivation, confidence, and appreciation of AI-supported feedback, although learners continued to struggle with understanding algorithmic processes. The study highlights implications for AI literacy integration into language education curricula.

Keywords: *AI literacy, Algorithm understanding, Bias detection, Media literacy, News evaluation*

Received: 2026-01-24

Revised: 2026-03-13

Accepted: 2026-03-24

Introduction

In today's digital world, artificial intelligence (AI) is transforming many areas of education, including language learning and media literacy. For EFL learners, who increasingly rely on digital media for language practice and access to information, developing critical media literacy (CML) is essential. CML involves more than simply accessing and understanding media messages; it also requires learners to examine how such messages are produced and how their construction influences the information, ideas, and values they communicate (Kellner & Share, 2007). From this perspective, CML enables learners to recognize bias, assess the credibility and reliability of news and other media content, and critically examine the assumptions and perspectives embedded in different sources. These skills are particularly important in contemporary digital environments, where algorithmic systems increasingly shape the information users encounter and the ways in which that information is presented. In this context, AI literacy provides a complementary framework that emphasizes the ability to understand, evaluate, and critically engage with AI systems and their outputs (Long & Magerko, 2020). For EFL learners, these competencies are particularly relevant because they may need to evaluate online information and digital media as part of their language-learning experiences (Silvhiany et al., 2021). Developing both CML and AI literacy can therefore help EFL learners move beyond simply accessing digital information toward critically evaluating its credibility, potential biases, and algorithmic influences.

The rise of AI-powered tools has made both media consumption and education more complex. AI-driven recommendation systems can shape the information users encounter and influence how they interpret issues and events. At the same time, algorithmic selection has raised concerns regarding bias, transparency, accountability, privacy, and fairness (Risteska, 2023). Although AI can support tailored instruction, learner engagement, and accessibility, it also raises concerns about

data privacy, algorithmic bias, the need for human interaction, and the ethical challenges associated with misinformation and information dissemination (Sangkala & Mardonovna, 2024; Washington, 2023).

Although the theoretical foundations of AI literacy and CML are well established, there is still a need for empirical research examining how AI-enhanced instruction affects EFL learners' media-literacy skills. Existing literature has discussed the potential of integrating AI and media-literacy education, while research on critical digital literacy in EFL contexts remains relatively underexplored (Rini & Nabhan, 2023; Washington, 2023). This limited evidence may be partly attributable to the complexity of studying AI-supported media literacy, as researchers need to consider both measurable changes in learners' skills and how learners use and respond to AI-generated information. In addition, much of the available research has focused on broader educational or technology-related contexts, making it unclear whether these findings apply equally to EFL classrooms, where language proficiency and cultural perspectives may influence how learners understand and evaluate media content. Further research should therefore combine assessments of learners' skills with investigations of their experiences to provide a more comprehensive understanding of the effects of AI-enhanced instruction.

Addressing this gap is important for developing evidence-based curricula and supporting ethical teaching across linguistic and cultural contexts. EFL learners may require explicit instruction in evaluating online information because frequent use of social media and other digital sources does not necessarily translate into strong critical-evaluation skills (Silvhiany et al., 2021). Without stronger evidence from actual EFL classrooms, teachers have limited guidance on how to integrate AI into media-literacy instruction while helping learners question and evaluate AI-generated content rather than simply accept it. Addressing this gap is therefore important not only

for determining whether AI-enhanced instruction can improve CML skills but also for understanding how such instruction can be implemented in ways that are appropriate for learners' linguistic and cultural contexts.

To address this need, the present study focuses on three related areas: identifying hidden media biases, assessing the credibility and accuracy of news, and critically analyzing AI-generated content. These areas were selected because they represent distinct but interconnected dimensions of how learners make sense of information in contemporary digital environments. Recognizing potential bias requires learners to identify how information may be shaped by particular perspectives or interests; evaluating news accuracy requires them to judge whether information is supported by credible evidence; and analyzing AI-generated content requires them to consider how technological systems may influence the information they encounter. Taken together, these skills can help learners move from identifying potential problems in media messages to evaluating their reliability and reflecting more critically on the technological processes underlying digital content. The study therefore aims to provide empirical evidence on whether AI-enhanced instruction can improve EFL learners' critical media-literacy skills and support more informed and critical participation in digital environments.

Accordingly, to address the identified research gap, the study was guided by the following research questions:

1. To what extent have pictorial minimal pair-based stories significantly affected the pronunciation accuracy of EFL beginners?
2. To what extent have pictorial minimal pair-based stories significantly affected the vocabulary recall of EFL beginners?
- 3.

Review of the Related Literature

The integration of artificial intelligence AI into language learning has transformed how learners develop second-language skills. Tools such as ChatGPT are particularly notable for providing immediate feedback, personalized support, and assistance with language-related tasks, addressing common limitations of traditional classrooms, such as limited interaction, delayed feedback, and a lack of individualized instruction. Adaptive AI systems can adjust lessons in real time, provide feedback tailored to individual students (Sangkala & Mardonovna, 2024), and support the development of analytical competencies among EFL learners (Long & Magerko, 2020). In media literacy education, AI can help learners verify information and analyze content, enabling them to think critically about news, bias, and misinformation (Risteska, 2023).

In EFL research, bias detection has generally been assessed through task-based critical digital literacy activities rather than through a single established instrument. For example, Silvhiany et al. (2021) assessed 152 EFL students using tasks involving visual information, WhatsApp messages, website comparisons, sponsored content, YouTube claims, and Instagram posts. The students demonstrated particular difficulty identifying unsupported claims in a YouTube video, suggesting that bias detection involves source evaluation, evidence checking, and recognition of persuasive or commercial intent. In EFL research, bias detection has commonly been examined through performance-based critical-reading tasks rather than a single standardized instrument. These tasks ask learners to analyze biased texts, identify writers' ideological or persuasive tendencies, and support their interpretations with textual or linguistic evidence (Ghaemi & Sadeghi, 2015).

Despite these benefits, AI is not without risks. Concerns include algorithmic bias, data privacy, the need for human interaction, and ethical challenges associated with AI-supported information dissemination (Sangkala & Mardonovna, 2024; Washington, 2023). EFL/ESL learners have also

demonstrated specific difficulties in assessing online credibility. Malaysian ESL undergraduates, for example, showed limited ability to evaluate the accuracy and trustworthiness of online information (Ahmad et al., 2018), while another study found that students who accepted manipulated images or junk news often relied on surface features and struggled to distinguish among different source types (Nygren et al., 2020). These findings suggest that credibility assessment can be particularly demanding when learners must verify unfamiliar sources, compare information across websites, or engage in lateral reading in a second language. Consequently, educators and researchers have emphasized the importance of AI literacy, which encompasses knowledge of how AI systems function, the ability to evaluate their implications critically, and the capacity to interact with AI in informed and responsible ways (Allen & Kendeou, 2024).

Instructional studies suggest that these skills can be developed through practice-based activities. For example, an online intervention based on civic-online-reasoning tutorials found that observational learning and feedback supported students' lateral reading and their ability to determine the credibility of digital news and social-media posts (Axelsson et al., 2021). A competency-based AI-literacy framework provides a structured approach to developing these skills. Long and Magerko (2020) identified core AI-literacy competencies and proposed design considerations for learner-centered AI systems. Their framework emphasizes helping learners interact effectively with AI while critically evaluating AI technologies.

However, algorithmic understanding has been measured less directly in EFL research. Existing studies have primarily relied on self-report AI-literacy scales, interviews, surveys, and pretest–posttest measures. For example, a survey of Chinese EFL students found that AI evaluation was the lowest-scoring dimension of AI literacy; however, the study measured general perceptions of AI literacy rather than learners' ability to explain how algorithms rank, personalize, recommend,

or generate information (Zhang & Soo, 2026). Such measures provide useful information about general AI literacy but do not directly assess learners' understanding of algorithmic processes. The three areas have largely been studied separately because they derive from different research traditions: credibility research emphasizes source and evidence evaluation, CML focuses on bias and representation, and AI literacy emphasizes understanding and evaluating AI systems. This fragmentation makes it difficult to determine how these competencies work together when learners encounter AI-mediated information. By promoting critical AI literacy, educators can help students engage with AI more thoughtfully and critically examine its broader social, cultural, political, and ethical implications (Veldhuis et al., 2025). Future EFL assessment should therefore incorporate performance-based tasks that require learners to explain algorithmic decisions, identify potential data or ranking biases, and verify AI-generated claims using independent sources.

Critical media literacy (CML) has become increasingly important in today's digital environment, where learners are exposed to large amounts of diverse content that can spread rapidly. Although CML shares important ground with media and information literacy (MIL), it goes further by encouraging learners to examine how media messages are created, whose interests they may represent, and how bias, power, and ideology influence their meaning. From this perspective, MIL provides skills for finding and evaluating information, creating and sharing messages, and communicating responsibly, whereas CML extends these skills by examining how media organize and communicate information, ideas, and values (Allison, 2010; Kellner & Share, 2007). Hobbs (2010) further conceptualizes media and digital literacy as involving access, analysis, creation, reflection, and action. Together with Kellner and Share's (2007) critical perspective, this work suggests that CML involves not only evaluating information but also examining how media messages are constructed, whose interests they reflect, and how they shape

audiences' understanding. The two perspectives are therefore complementary rather than competing. MIL helps learners navigate an increasingly complex information environment, whereas CML encourages them to examine more closely the biases, agendas, and power relations embedded within that environment. In the framework adopted in this study, MIL provides the foundation, while CML extends this foundation by encouraging learners to consider not only whether information is credible but also how it was produced, whose interests it may represent, what assumptions it conveys, and what effects it may have on society.

This distinction is particularly important in digital environments, where AI-driven recommendation systems shape users' information consumption and can influence political and social opinion formation. Because algorithmic selection may narrow exposure to diverse content, recommender systems have raised concerns about filter bubbles, transparency, privacy, accountability, and fairness (Bernstein et al., 2019; Kowald, 2024). Building on these complementary perspectives, the present study conceptualizes CML as a combination of interconnected abilities: (a) evaluating the credibility and context of information, (b) recognizing bias, implicit meanings, and persuasive intentions, and (c) considering the broader social implications of digitally mediated messages. In the present framework, the three competencies are complementary: credibility evaluation asks whether information can be trusted, bias detection examines how perspectives and interests shape messages, and algorithmic awareness considers how technological systems influence the information learners encounter. Together, they represent a progression from evaluating information to questioning its construction and technological mediation.

Accordingly, the framework proposed in this study begins with evaluating whether information can be trusted, moves toward examining the biases and underlying assumptions within media

messages, and ultimately encourages learners to reflect on issues of power, participation, and responsibility. Rather than treating CML as separate from MIL, this framework understands it as a reflective extension that deepens and connects foundational information-evaluation skills within digital environments. In this way, CML can help learners engage with digital information more thoughtfully and responsibly while supporting the development of critical thinking and intercultural understanding.

In EFL education, critical media literacy serves two complementary functions. It supports language learning by exposing students to diverse, multimodal, and interactive digital resources, while also developing their ability to analyze the credibility of information, critique texts, and process information critically in a second-language context (Afrilyasanti et al., 2023). Research has proposed integrating AI with media-literacy instruction to address misinformation and encourage critical reflection on the ethical implications of generative AI and information dissemination (Washington, 2023). Media-literacy education can also help learners develop critical awareness of algorithmic biases, technological limitations, data practices, and potential risks associated with AI-driven recommendation systems (Risteska, 2023).

Adapting media literacy to the AI era can help learners respond to misinformation created or amplified by algorithmic processes. Developing both media literacy and algorithmic literacy is therefore increasingly important for navigating online content responsibly, since users need to understand how algorithms shape information consumption, evaluate algorithmic systems critically, and respond to disinformation. This issue is particularly relevant in EFL settings, where media-literacy instruction must be integrated with foreign-language learning and critical assessment of digital content (Frau-Meigs, 2024; Bilotserkovets et al., 2021).

Recent research in EFL and ESL contexts indicates that CML is becoming increasingly important in digital language-learning environments. Studies have examined how learners evaluate online sources, identify misinformation, and use digital media in language classrooms. For example, Silvhiany et al. (2021) found that 152 EFL students experienced difficulties evaluating online information across tasks involving websites, social-media posts, visual content, sponsored material, and video claims. The students were particularly weak at identifying unsupported claims. Similarly, Malaysian ESL undergraduates demonstrated limited ability to evaluate the accuracy and trustworthiness of online information, with interviews and classroom observations revealing weaknesses in online information evaluation (Ahmad et al., 2018).

Research with EFL students further suggests that explicit instruction in strategies for evaluating online sources should be incorporated into language courses (Silvhiany et al., 2021). These findings indicate that EFL learners may benefit from explicit instruction in source verification, evidence checking, and the detection of misinformation and bias alongside language instruction. More broadly, an online intervention based on civic-online-reasoning tutorials found that observational learning and feedback supported students' lateral reading and credibility judgments concerning digital news and social-media posts (Axelsson et al., 2021).

Studies further suggest that integrating multimodal media activities into language classes can support language-related learning outcomes. For example, an intervention involving 46 Spanish-speaking university EFL students found that infographic-based instruction significantly improved reading comprehension (Cárcamo & Pino, 2025). Research in Indonesian ELT settings similarly indicates that combining media analysis with creative writing can foster both critical literacy and creativity. However, students may still require explicit support to develop clear and well-justified interpretations. For example, a study of Indonesian university EFL teachers reported that critical

digital-literacy practices included providing online materials, analyzing Internet sources, incorporating multimodal texts, and supporting students' identity development through digital media (Rini & Nabhan, 2023).

Research focusing on teachers also points to both the potential of media literacy and the practical difficulties involved in implementing it. In Kazakhstan, Yeleussiz and Qanay (2025) used focus groups and interviews with 31 EFL teachers and three school leaders and found that media-literacy instruction was constrained by unclear regulations, limited resources, and insufficient institutional capacity. They emphasized that successful implementation depends on clearer policy guidance, equitable access to digital technologies, and ongoing professional development for teachers. Similar findings were reported by Askar et al. (2024), who surveyed 116 secondary-school EFL teachers in Almaty. The teachers identified unreliable teaching resources and limited training as major obstacles to incorporating media literacy into their classrooms. Together, these findings suggest that successful integration of media literacy requires more than teachers' willingness to adopt it; it also depends on appropriate resources, institutional support, clear policies, and sustained opportunities for professional development.

Multimodal activities, particularly those involving infographics, have also shown potential for improving EFL reading comprehension. Cárcamo and Pino (2025), for instance, conducted a pretest–posttest intervention with 46 Spanish-speaking university EFL students and found that students who received infographic-based instruction achieved significantly higher reading-comprehension scores. Likewise, an Indonesian EFL reading intervention found that using infographics to summarize texts helped students organize and condense information, participate actively, and develop creativity (Lastari & Silvana, 2020). Taken together, these studies suggest that working with visual and textual information through multimodal activities can support

comprehension, engagement, and creative meaning-making. However, the existing evidence is more convincing for reading comprehension and learner engagement than for higher-order critical interpretation, indicating a need for further research examining whether such activities can help learners critically evaluate and interpret multimodal content.

The specific contribution of the present study is therefore to integrate these three competencies within a single AI-enhanced CML framework for EFL learners. This approach extends previous research by examining whether AI-enhanced instruction can develop these related competencies simultaneously and whether learning gains differ across them.

Overall, earlier research suggests that critical media literacy activities, such as evaluating media sources, engaging in guided discussions, and working with multimodal texts, can help EFL learners develop critical thinking, writing and reading skills, and greater engagement with digital content. At the same time, these activities appear to work best when learners receive clear guidance and teachers have access to suitable resources, training, and institutional support. However, it is still not clear how these practices can be brought together within a single, coherent instructional approach that helps EFL learners look beyond whether digital information is credible and consider the biases, assumptions, purposes, and agendas behind it. Research has also paid relatively little attention to how learners use these critical literacy skills when evaluating AI-generated content, despite its growing presence in today's digital information environment. The present study responds to these gaps by bringing credibility evaluation, bias and agenda analysis, and critical interpretation together within one instructional framework, while also considering learners' responses to both conventional digital content and AI-generated information. In this way, the study examines whether an integrated approach can strengthen EFL learners' critical media literacy and

help them engage with digital and AI-mediated information in more thoughtful, informed, and responsible ways.

Method

Study Design

This study employed a mixed-methods design incorporating a one-group pretest–posttest quantitative component and a qualitative component to evaluate the effects of AI-enhanced critical media literacy training on EFL learners. The quantitative part measured changes in learners’ ability to detect hidden bias, verify news accuracy, and analyze AI-generated content using pre- and post-intervention assessments. The qualitative part examined learners’ experiences, attitudes, and perceptions about integrating AI into media literacy education, adding contextual depth to the numerical results. This convergent parallel design allowed for triangulation of data, strengthening the validity and reliability of the findings.

Participants and Setting

The participants were 60 intermediate-to-advanced Iranian EFL learners enrolled in general English programs at several language institutions in Iran. They were recruited through announcements and invitations distributed through the participating institutions. Purposive sampling was used to select learners who had an intermediate-to-advanced level of English proficiency, regularly used digital media for language learning, and had basic familiarity with AI-based tools. Before data collection, participants were informed about the study and its voluntary nature, and informed consent was obtained from all participants. Demographic information, including age, gender, and previous exposure to media-literacy activities, was collected for

descriptive purposes. All 60 participants completed the study; therefore, no attrition occurred and the final sample consisted of 60 learners. Table 1 summarizes the participants' characteristics, recruitment procedures, eligibility criteria, and ethical considerations.

Table 1
Demographic Characteristics of the Participants

Characteristic	Description
Participants	60 Iranian EFL learners
Level	Intermediate–advanced
Sampling	Purposive
Setting	General English programs at Iranian language institutions
Eligibility	Digital-media use and basic AI familiarity
Recruitment	Institutional announcements and invitations

Note. EFL = English as a foreign language

Instruments

The study employed three instruments: a researcher-developed Critical Media Literacy Performance Assessment, a semi-structured interview protocol, and algorithmic content review tasks. To evaluate participants' critical media-literacy skills, the study used a researcher-developed performance assessment based on established media-literacy principles and previous task-based research on online source evaluation. The assessment focused on three areas: bias detection, which involved identifying biased framing, unsupported claims, and persuasive intentions; news evaluation, which required learners to judge the credibility and context of digital news, compare information across sources, and support their conclusions with relevant evidence; and algorithmic awareness, which examined learners' understanding of the limitations, personalization effects, and potential biases associated with algorithmically generated or mediated content. These task types were informed by previous EFL research examining learners' evaluation of websites, visual materials, sponsored content, social-media posts, and video claims (Silvhiany et al., 2021).

Participants' responses were evaluated using an analytic rubric covering the three dimensions. Two experts independently reviewed and scored the responses, with particular attention to the relevance and clarity of the assessment criteria and their alignment with the study objectives. Inter-rater agreement was strong, as indicated by a Cohen's kappa of $\kappa = .86$. The assessment was administered before and after the intervention to determine changes in participants' performance. Because the assessment was developed specifically for this study rather than adopted from a standardized instrument, its results are interpreted as evidence of learners' performance on the targeted media-literacy tasks rather than as evidence of a universally validated measure of critical media literacy.

Additionally, after the training session, semi-structured interviews were conducted with a purposive sub-sample of 15 participants. These interviews explored participants' perceptions of AI tools, the challenges they encountered, and their reflections on the learning experience. The interview procedures were designed in accordance with established qualitative research standards to ensure credibility and rigor (Kvale & Brinkmann, 2009).

Participants were also asked to analyze samples of AI-generated media content. They were instructed to identify features commonly associated with bias and algorithm-driven manipulation. Their responses were systematically documented and analyzed using both qualitative and quantitative methods to gain a comprehensive understanding of their evaluative skills.

Procedure

The study used one group to examine changes in EFL learners' critical media-literacy performance following a six-week AI-enhanced instructional program. The intervention focused on three areas: identifying media bias, evaluating the credibility of digital news, and critically

examining AI-generated content. Instruction combined brief theoretical input, guided analysis, hands-on activities, group discussion, and AI-supported tasks using authentic digital materials. Participants completed the media-literacy assessment before the intervention and again at its conclusion. Their pre- and post-test performance was compared to examine changes following the six-week program. Because the study included neither a control group nor random assignment, the findings are interpreted as evidence of changes following the intervention rather than definitive evidence of causal effects.

The instructional design followed a gradual progression from foundational concepts to more complex analytical tasks. AI tools were introduced incrementally to promote learner independence and scaffold skill development. Throughout the program, peer discussions, collaborative analysis, and case-based activities encouraged learners to exchange perspectives and co-construct understanding—key components of critical media literacy. AI-driven tools offered ongoing formative feedback alongside instructor guidance, enabling students to track their progress and refine their analytical skills. All materials and examples were carefully selected to match learners' language proficiency levels and cultural backgrounds, ensuring both accessibility and relevance. The program was delivered over six weeks, with two 90-minute sessions per week in a blended format. This structure combined synchronous, instructor-led sessions with asynchronous AI-supported activities. Each phase of the program focused on a specific thematic area.

Weeks 1–2: Foundations of Critical Media Literacy and Bias Detection

During the first phase, learners were introduced to key concepts such as spin bias, slant bias, sensationalism, partisan bias, negativity bias, mind-reading bias, and missing perspectives. They were taught practical strategies for critical analysis, including cross-checking information,

examining language choices, evaluating source intent, identifying omissions, distinguishing fact from opinion, verifying evidence, reflecting on emotional reactions, and analyzing visuals and headlines. Interactive discussions and examples tailored to the EFL context enhanced engagement and deepened conceptual understanding.

Weeks 3–4: Verification and Misinformation Analysis

This stage focused on evaluating the credibility of news sources and developing fact-checking skills. Learners practiced analyzing news articles and social media posts using AI-supported tools embedded in the learning platform. The Bias Detection Assistant helped identify linguistic patterns that signal framing or bias, while the Fact-Checking Engine cross-referenced claims with reliable databases and provided real-time credibility assessments. These tools delivered immediate, actionable feedback, allowing students to revise their evaluations and engage in iterative, guided learning.

Weeks 5–6: Understanding Algorithmic Content and AI Bias

In the final phase, learners examined how AI algorithms generate and curate digital content, with particular attention to algorithmic bias. Using an Algorithm Visualization Platform, students explored outputs from content generation systems and recommender algorithms, tracing decision pathways to understand how data inputs shape results. Structured tasks guided learners in identifying indicators of bias and reflecting on the broader ethical implications of algorithm-driven media. Group discussions further encouraged critical reflection on the role of AI in shaping contemporary information environments.

Data Analysis

First, pre- and post-test scores were compared using paired-samples *t*-tests to determine whether participants showed significant changes following the intervention. Effect sizes were also calculated to assess the magnitude and practical significance of these changes. Demographic characteristics were examined descriptively to characterize the sample and, where appropriate, explore whether participants with different backgrounds showed different patterns of change.

Second, we analyzed the interview transcripts and participants' responses to the algorithmic-content review tasks using the thematic-analysis procedures proposed by Braun and Clarke (2006). Two researchers first coded the data independently, using both deductive codes based on the research questions and inductive codes that emerged from participants' responses. NVivo was used to organize the transcripts, manage the codes, and support the systematic categorization of the data. The researchers then compared their coding, discussed any differences, and agreed on the final codes and themes. This process provided researcher triangulation and strengthened the credibility of the analysis. The analysis focused on recurring themes related to participants' perceptions of AI tools, the challenges they encountered during the learning process, and the development of their critical media-literacy skills. Data collection and analysis continued until the researchers stopped identifying substantially new codes or themes, indicating that thematic saturation had been reached.

Finally, findings from the quantitative and qualitative strands were integrated to generate a more comprehensive understanding of the intervention's overall effectiveness. This mixed-methods integration enabled the results to be interpreted not only in terms of measurable learning gains but also in relation to learners' lived experiences within broader educational and technological contexts.

Results

A paired-samples t-test was used to examine changes in participants' performance across three key critical media literacy skills after completing the AI-enhanced training program. The skills assessed were Bias Detection, News Accuracy Evaluation, and Algorithmic Awareness. Pre- and post-training scores were compared to see how much participants improved. Table 2 presents the descriptive statistics, test results, and effect sizes for these comparisons.

Table 2

Paired-Samples t Test Comparing Pre- and Post-intervention Performance on Media Literacy Competencies

Dimension	Pre-intervention <i>M</i> (<i>SD</i>)	Post-intervention <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Bias detection	52.3 (8.7)	71.8 (7.2)	14.35	< .001	1.85
News-accuracy evaluation	58.1 (9.0)	74.6 (6.8)	12.27	< .001	1.59
Algorithmic awareness	62.1 (10.4)	64.8 (9.7)	1.84	.070	0.23

Note. *M* = mean; *SD* = standard deviation

The results indicated statistically significant improvements in both Bias Detection and News Accuracy Evaluation following the intervention. The large effect sizes associated with these gains suggest that the program had a meaningful and substantial impact on participants' learning in these areas. In contrast, Algorithmic Awareness demonstrated only a slight, non-significant increase, indicating that participants' understanding of algorithmic processes did not improve to a comparable extent. This outcome points to the need for more focused and explicit instructional approaches to strengthen algorithmic literacy.

An exploratory analysis was also conducted to examine whether learning gains varied across demographic characteristics. Because gender difference was not specified as a research question, these analyses were treated as supplementary rather than primary analyses. Therefore, to explore

potential gender-based differences in learning gains, an independent-samples t-test was conducted comparing female and male participants (Table 3).

Table 3

Independent Samples t-Test Comparing Improvement in Media Literacy Performance by Gender

Test	<i>t</i>	<i>df</i>	<i>p</i>
Learning gain	2.45	58	.017

Through thematic analysis of the semi-structured interviews, four key themes emerged from learners' reflections on their experience with the AI-enhanced training program. These themes, along with illustrative quotes from participants, are presented in Table 4.

Table 4

Themes Identified from Learners' Experiences with the AI-Enhanced Training Program and Representative Quotations

Theme	Description	Representative Quotation
CA	Improved detection of media bias and source evaluation	"I notice loaded words more easily and don't take news at face value."
AI appreciation	Positive responses to AI-generated feedback	"Using the AI assistant felt like having a personal tutor available to guide my learning."
Algorithmic understanding	Initial difficulties improved through scaffolding	"The visual explanations made it easier to understand how algorithms determine what I see online."
Empowerment	Increased confidence in evaluating digital information	"I feel more confident evaluating which online information is accurate or biased."

Note. AI= Artificial Intelligence; AC= critical awareness

The quantitative findings revealed substantial improvements in participants' critical media literacy skills, particularly in the areas of bias detection and news evaluation, following the AI-enhanced intervention. The qualitative data further deepened this understanding, showing that learners developed stronger critical awareness, expressed positive perceptions of AI-supported tools, and reported increased motivation and a sense of empowerment. At the same time, ongoing difficulties in grasping algorithmic processes underscored the need for more targeted and sustained

instructional support in AI literacy. Taken together, the results demonstrate the effectiveness of the intervention in strengthening critical media literacy among EFL learners, while also identifying areas for future curricular enhancement.

Overall, this study investigated the impact of an AI-integrated critical media literacy program on EFL learners' abilities to recognize media bias, assess the credibility of news content, and build algorithmic awareness. The combined quantitative and qualitative evidence highlights the program's meaningful contribution to developing essential media literacy competencies within a rapidly evolving digital landscape shaped by AI technologies.

Discussion

This study shows that AI enhanced critical media literacy instruction can significantly improve EFL learners' ability to detect bias and evaluate the accuracy of news. The large effect sizes (Cohen's $d > 1.5$) indicate not only statistical significance but also strong practical impact. After the instruction, learners were better able to recognize subtle forms of media manipulation and judge whether information was reliable. In today's digital world where misinformation spreads easily and much online content is shaped by algorithms these skills are essential. These findings are consistent with broader research showing that AI supported instructional strategies can foster higher order thinking skills, such as critical thinking and evaluative reasoning, in educational settings (Costa et al., 2024). The use of authentic AI generated materials also made the lessons more relevant and engaging, as learners were challenged to interact with realistic digital content and apply critical evaluation strategies in context. In EFL settings, where language level and cultural context influence comprehension, such materials likely helped learners understand and apply new concepts more effectively.

However, the small and statistically non-significant improvement in algorithmic awareness suggests that learners still had limited understanding of how AI systems select and organize digital content. Algorithmic processes are abstract and complex, and they may be especially challenging for EFL learners who are dealing with both new concepts and a second language. Although visual supports and group discussions were used, these strategies alone did not lead to strong improvement. This finding highlights the need for more structured and gradual teaching approaches. Methods such as interactive simulations, step-by-step scaffolding, and gamified activities may help learners better understand how algorithms work. Future research should examine longer and more intensive AI literacy programs to improve conceptual understanding and learner confidence, in line with recommendations from media literacy scholars.

The finding that female participants showed greater learning gains than male participants also deserves further study. This difference may be related to factors such as engagement, motivation, or preferred learning strategies, but more research is needed to explain it clearly. Although prior media literacy experience was moderately related to learners' initial skill levels, it did not predict how much they improved. This suggests that the program was effective for learners with different backgrounds. At the same time, the gender difference highlights the importance of using inclusive teaching approaches that address diverse learner needs .

The qualitative findings provide further insight into the quantitative results by showing how learners experienced the intervention. Many participants reported greater awareness of how digital information is constructed and expressed positive views of AI-based personalized feedback. They also described increased motivation and greater ability to regulate their own learning. Some referred to AI tools as “always-ready teachers,” reflecting their appreciation of immediate and accessible support. However, learners' experiences were not uniformly positive. Some found AI

feedback unclear, overly general, or less useful when the tool misunderstood their intended meaning, while others questioned the accuracy of its suggestions or expressed concerns about becoming overly dependent on AI. Although many learners initially struggled with algorithmic concepts, visual scaffolding and group discussions helped them develop a clearer understanding, while those who remained uncertain needed additional explanation and teacher support. These contrasting responses suggest that the value of AI-supported learning depends not only on the availability of the technology but also on the quality of its feedback, learners' ability to evaluate AI-generated suggestions, and continued access to human guidance. Overall, the findings indicate that integrating critical media literacy into EFL instruction can serve two complementary purposes: supporting language development through meaningful digital content and helping learners develop a more critical and informed understanding of an increasingly AI-mediated media environment.

Overall, this study provides strong evidence that AI literacy should be considered an important part of critical media literacy education. It highlights the need to teach students how to evaluate AI systems ethically and transparently, which is essential for responsible digital citizenship. At the same time, the limited growth in algorithmic awareness shows that further curricular development and research are needed. The observed gender differences also suggest the importance of designing equitable and inclusive learning environments.

Conclusions

This study suggests that AI-enhanced critical media literacy (CML) instruction can strengthen some skills more effectively than others. Learners made the greatest progress in identifying media bias and evaluating the credibility of news content. AI-supported activities therefore helped EFL learners engage more critically with digital information, particularly when they were asked to

assess claims, identify bias, and compare different sources. However, learners made less progress in understanding how algorithms shape the content they encounter online. Although they became more confident in evaluating media messages, the processes of algorithmic selection and personalization remained difficult for them to understand. These findings show that introducing AI into the classroom does not automatically develop every aspect of critical media literacy. Educators need to choose AI tools and activities strategically, based on the specific competencies they want learners to develop.

The qualitative findings showed that many learners valued the accessibility and personalized support offered by AI tools. This support appeared to increase their motivation and confidence during the learning process. However, positive attitudes toward AI did not lead to equal improvement across all areas of media literacy. Activities focused on evaluating information and identifying bias appeared more accessible to learners, whereas algorithmic awareness required clearer explanations, visual support, guided practice, and continued teacher involvement. AI should therefore be used purposefully rather than added to instruction simply because it is available.

The study also found greater learning gains among female learners than among male learners. Because the study did not examine the reasons for this difference, it would be premature to attribute the finding to differences in motivation, engagement, or learning styles. Further research should investigate whether similar patterns appear among learners from different backgrounds and educational settings. Future studies should also examine whether the effects of the intervention continue over time and develop more targeted materials for teaching algorithmic literacy. Overall, AI-enhanced CML instruction is best understood as a strategic approach: AI tools can support

certain critical media-literacy skills, but more complex competencies require explicit instruction and sustained teacher guidance.

References

- Afrilyasanti, R., Basthomi, Y., & Zen, E. L. (2023). Factual vs. fake news: Teachers' lens on critical media literacy education in EFL classes. *Journal of Interactive Media in Education*, 2023(1), Article 11. <https://doi.org/10.5334/jime.781>
- Ahmad, H., Kadir, H., & Sain, N. (2018). ESL students' evaluation of online information in academic English reading classrooms. *LSP International Journal*, 5(1), 95–103. <https://doi.org/10.11113/lspi.v5n1.67>
- Allison, M. A. (2010). Review: Digital and media literacy: A plan of action (2010). *Journal of Media Literacy Education*, 2(3), 7. <https://doi.org/10.23860/jmle-2-3-7>
- Allen, L. K., & Kendeou, P. (2024). ED-AI Lit: An interdisciplinary framework for AI literacy in education. *Policy Insights from the Behavioral and Brain Sciences*, 11(1), 3–10. <https://doi.org/10.1177/23727322231220339>
- Askar, Z. H., & Noruzova, G. B. (2024). The role of media literacy in foreign language education. *Bulletin of the Kazakh Ablai Khan University of International Relations and World Languages, Series "Pedagogical Sciences,"* 72(1), 437–447. <https://doi.org/10.48371/PEDS.2024.72.1.039>
- Axelsson, C.-A. W., Guath, M., & Nygren, T. (2021). Learning how to separate fake from real news: Scalable digital tutorials promoting students' civic online reasoning. *Future Internet*, 13(3), Article 60. <https://doi.org/10.3390/fi13030060>
- Bernstein, A., De Vreese, C. H., Helberger, N., Schulz, W., Zweig, K. A., Tolmeijer, S., Hauer, M., Tintarev, N., & Vrijenhoek, S. (2019). Diversity, fairness, and data-driven personalization in (news) recommender system: Report from Dagstuhl Perspectives Workshop 19482. *Dagstuhl Reports*, 9(11), 117–124. <https://doi.org/10.4230/DagRep.9.11.117>
- Bilotserkovets, M., Fomenko, T., Gubina, O., Klochkova, T., Lytvynko, O., Boichenko, M., & Lazareva, O. (2021). Fostering media literacy skills in the EFL virtual classroom: A case study in the COVID-19 lockdown period. *International Journal of Learning, Teaching and Educational Research*, 20(2), 251–269. <https://doi.org/10.26803/ijlter.20.2.14>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Cárcamo, B., & Pino, B. (2025). Developing EFL students' multimodal literacy with the use of infographics. *Asian-Pacific Journal of Second and Foreign Language Education*, 10, Article 16. <https://doi.org/10.1186/s40862-025-00322-3>
- Costa, A. R., Lima, N., Viegas, C., & Caldeira, A. (2024). Critical minds: Enhancing education with ChatGPT. *Cogent Education*, 11(1), Article 2415286. <https://doi.org/10.1080/2331186X.2024.2415286>
- Frau-Meigs, D. (2024). Algorithm literacy as a subset of media and information literacy: Competences and design considerations. *Digital*, 4(2), 512–528. <https://doi.org/10.3390/digital4020026>

- Ghaemi, F., & Sadeghi, P. (2015). Critical discourse analysis: Discovering hidden ideologies in news. *International Journal of English and Education*, 4(2), 162–169.
- Hobbs, R. (2010). *Digital and media literacy: A plan of action: A white paper on the digital and media literacy recommendations of the Knight Commission on the information needs of communities in a democracy*. Aspen Institute.
- Kellner, D., & Share, J. (2007). Critical media literacy is not an option. *Learning Inquiry*, 1(1), 59–69. <https://doi.org/10.1007/s11519-007-0004-2>
- Kowald, D. (2024). *Transparency, Privacy, and Fairness in Recommender Systems*. Zenodo. <https://doi.org/10.5281/zenodo.12699687>
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing* (2nd ed.). SAGE Publications. <https://doi.org/10.4135/9781849209731>
- Lastari, D. S., & Silvana, R. (2020). The effects of summarizing using infographics on EFL learners' reading comprehension. *Globish: An English-Indonesian Journal for English, Education and Culture*, 9(2), 129–144. <https://doi.org/10.31000/globish.v9i2.2707>
- Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1–16). Association for Computing Machinery. <https://doi.org/10.1145/3313831.3376727>
- Nygren, T., Wiksten Folkeryd, J., Liberg, C., & Guath, M. (2020). Students assessing digital news and misinformation. In M. van Duijn, M. Preuss, V. Spaiser, F. Takes, & S. Verberne (Eds.), *Disinformation in open online media* (pp. 63–79). Springer. https://doi.org/10.1007/978-3-030-61841-4_5
- Rini, H. M., & Nabhan, S. (2023). Exploring critical digital literacy in a higher education EFL classroom: Teachers' views and practices. *ELT Forum: Journal of English Language Teaching*, 12(3), 216–228. <https://doi.org/10.15294/elt.v12i3.69160>
- Risteska, A. (2023). Aware and critical navigation in the media landscape: (Un)biased algorithms and the need for new media literacy in the era of artificial intelligence and digital media. *KAIROS: Media and Communications Review*, 2(2), 16–38. <https://doi.org/10.64370/TSNH6944>
- Sangkala, I., & Mardonovna, N. S. (2024). Artificial intelligence as a personalized tutor in language learning: A systematic review. *Klasikal: Journal of Education, Language Teaching and Science*, 6(2), 565–576. <https://doi.org/10.52208/klasikal.v6i2.1193>
- Silvhiany, S., Huzafah, S., & Ismet, I. (2021). Critical digital literacy: EFL students' ability to evaluate online sources. *Indonesian Journal of EFL and Linguistics*, 6(1), 249–269. <https://doi.org/10.21462/ijefl.v6i1.364>
- Veldhuis, A., Lo, P. Y., Kenny, S., & Antle, A. N. (2025). Critical artificial intelligence literacy: A scoping review and framework synthesis. *International Journal of Child-Computer Interaction*, 43, Article 100708. <https://doi.org/10.1016/j.ijcci.2024.100708>
- Washington, J. (2023). *Combating misinformation and fake news: The potential of AI and media literacy education*. SSRN. <https://doi.org/10.2139/ssrn.4580385>
- Yeleussiz, A., & Qanay, G. (2025). Media literacy in Kazakhstan: Educators' perspectives and policy implementation. *Journal of Curriculum Studies Research*, 7(1), 1–25. <https://doi.org/10.46303/jcsr.2025.1>
- Zhang, L., & Soo, R. S. (2026). Assessing artificial intelligence literacy among Chinese EFL university students: Current status and associated factors. *Language Teaching Research Quarterly*, 54, 339–361. <https://doi.org/10.32038/ltrq.2026.54.14>