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RESEARCH ARTICLE

Ethical AI literacy in preserving local knowledge: EFL students' critical decision-making in translating local content using deepseek

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ABSTRACT
The integration of Generative AI platforms such as DeepSeek in language learning offers innovative avenues for local knowledge preservation, yet it entails severe risks of cultural distortion and AI hallucination. This qualitative case study examines how EFL students demonstrate AI literacy and apply critical ethical decision-making when utilizing DeepSeek to translate and write local cultural content into English. Framed by Rest's Four-Component Model of Ethical Decision-Making and AI literacy frameworks, data were gathered through semi-structured interviews, student prompt logs, and translated text analysis at an Indonesian university. Empirical findings reveal three primary patterns of students' AI literacy and ethical adoption: (1) uncritical delegation, where low-literacy students passively accepted raw literal translations, resulting in semantic distortions of local idiomatic expressions and indigenous rituals; (2) technical validation, where students corrected language mechanical errors while ignoring cultural context nuances; and (3) critical-ethical mediation, where high-literacy students actively employed iterative prompting, cross-verification with local cultural experts, and manual context adaptation. Higher AI literacy was directly proven to foster moral sensitivity and judgment, leading students to position DeepSeek merely as an initial drafting tool while retaining full agency to preserve local cultural authenticity. This study underscores the crucial interplay between technical AI competence and cultural ethics in Digital Humanities, providing a practical pedagogical framework for integrating culturally grounded AI ethics into language education.

Keywords: AI literacy; cultural preservation; deepseek; digital humanities; local knowledge.

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INTRODUCTION

The integration of Generative Artificial Intelligence (GenAI) technologies, such as ChatGPT, Gemini, Copilot, and DeepSeek, has fundamentally reshaped global higher education landscapes (Ali et al., 2023; Kasneci et al., 2023). In English as a Foreign Language (EFL) instruction, these advanced Large Language Models (LLMs) offer unprecedented opportunities for automated language editing, stylistic refinement, idea generation, and cross-cultural translation (Faisal, 2026; Liao et al., 2026). However, the rapid adoption of GenAI also introduces severe ethical challenges and technical risks, particularly regarding academic integrity, algorithmic hallucination, and the potential distortion of indigenous knowledge (Jakesch et al., 2023; Miao & Holmes, 2023). When EFL students utilize GenAI to translate and document localized cultural heritage into English, they encounter a dual task: navigating complex foreign language mechanics while safeguarding the authentic philosophical and historical nuances of their local wisdom (Kimmons et al., 2024; Su et al., 2024).

Despite the growing enthusiasm for GenAI in language learning, recent literature reveals a critical scholarly gap regarding how students critically evaluate machine outputs in cultural preservation contexts. Existing studies have predominantly focused on the technical performance of AI tools in improving grammatical accuracy, writing fluency, or overall syntactic quality (Wang et al., 2025; Yilmaz & Yilmaz, 2023). Conversely, research exploring the intersection of AI literacy, ethical decision-making, and digital cultural protection remains scarce (Long & Magerko, 2020; Su et al., 2024). LLMs like DeepSeek are trained primarily on Western-centric, English-dominant corpora, which frequently leads to the automatic reduction or "domestication" of indigenous concepts into popular Western equivalents (Jakesch et al., 2023; Venuti, 2017). When students passively accept unverified AI outputs without ethical reflection, they risk perpetuating cultural misrepresentation, stereotyping, and digital homogenization (Holmes et al., 2023; Liao et al., 2026).

To address this gap, this study builds upon a theoretical synthesis combining AI Literacy frameworks (Long & Magerko, 2020; Wang et al., 2025) and Rest's (1986) Four-Component Model of Ethical Decision-Making (Moral Sensitivity, Moral Judgment, Moral Motivation, and Moral Character). AI literacy extends beyond functional operational skills to encompass critical evaluation, algorithmic bias recognition, and ethical awareness (Kasneci et al., 2023; Long & Magerko, 2020). Rest's model provides a robust lens to examine how cognitive AI literacy translates into moral agency during the writing process. In the context of AI-assisted translation, students with higher AI literacy are hypothesized to demonstrate

greater moral sensitivity, identifying potential cultural distortions generated by algorithms and actively taking moral action through human-in-the-loop (HITL) verification (Kimmons et al., 2024; Su et al., 2024).

The primary objective of this qualitative case study is to explore how Indonesian EFL students demonstrate AI literacy and navigate ethical decision-making when utilizing DeepSeek to translate and write local wisdom content into English. Specifically, this study addresses two research questions: (1) How do EFL students with varying levels of AI literacy interact with DeepSeek outputs during cultural writing tasks? and (2) How do students' AI literacy levels influence their ethical decisions regarding cultural fidelity and algorithmic verification?

The originality and novelty of this study lie in its empirical focus on DeepSeek—a rapidly emerging GenAI platform—within the specific domain of local cultural preservation in Digital Humanities and ELT. Rather than treating AI as a mere efficiency tool, this study positions the student as a human-in-the-loop moral agent responsible for digital cultural conservation. Theoretically, this research contributes to expanding ethical decision-making models into human-AI co-creation contexts. Practically, it offers a culturally-grounded pedagogical framework to help educators integrate critical prompt engineering and cultural bias auditing into higher education language curricula.

In contrast to existing literature that primarily investigates generic commercial AI models like ChatGPT for general writing improvement (Ali et al., 2023; Kasneci et al., 2023), this study provides distinct analytical value by focusing specifically on DeepSeek's handling of non-Western, highly localized cultural semantics. While prior research frequently treats translation as a purely technical-linguistic task (Yilmaz & Yilmaz, 2023), our unique approach explicitly integrates ethical decision-making theories (Rest, 1986; Jones, 1991) directly into the digital humanities workflow. By framing the EFL student not merely as an AI user but as an indispensable human-in-the-loop guardian of indigenous wisdom, this study fills a crucial empirical gap in understanding how critical AI literacy acts as an ethical barrier against algorithmic cultural homogenization.

METHOD

This study employed a qualitative case study design to explore the complex interactions between EFL students' AI literacy and their ethical decision-making when translating local wisdom into English using DeepSeek (Creswell & Poth, 2018). A qualitative case study design was selected because it enables an in-depth, contextual investigation of a

real-world contemporary phenomenon—human-AI interaction in academic writing—within its natural educational setting (Yin, 2018).

The participants were selected using purposeful sampling combined with criterion sampling (Creswell & Poth, 2018). Twelve undergraduate students (N = 12) from the English Language Education Department at UIN Siber Syekh Nurjati Cirebon participated in this study. The selection criteria required participants to: (1) be currently enrolled in an advanced academic/cultural writing course, (2) have active experience using DeepSeek for academic writing tasks, and (3) be engaged in translating Cirebon local wisdom narratives into English. To capture a wide range of ethical decision-making behaviors, participants were screened and categorized into three literacy groups (low, intermediate, and high) based on an initial AI literacy self-assessment adapted from Long and Magerko (2020) and Wang et al. (2025).

Participant Code	Gender	Academic Year	Self-Assessed AI Literacy Level	Target Local Wisdom Topic
P01 – P04	1 Male, 3 Females	Year 3	Low AI Literacy	Sintren Traditional Dance & Rituals
P05 – P08	2 Males, 2 Females	Year 3	Intermediate AI Literacy	Memetri Bumi Agriculture Tradition
P09 – P12	1 Male, 3 Females	Year 4	High AI Literacy	Pelong Wolu Architectural Philosophy

Table 1. Demographic Profile and Classification of Research Participants
(Source: Field Data, 2026)

Data collection was conducted over an eight-week period through three complementary methods to ensure data triangulation (Miles et al., 2019). Document Analysis (Prompt Logs and Drafts): Participants submitted their complete prompt history logs from DeepSeek alongside their initial raw AI outputs, intermediate revisions, and final submitted manuscripts. Semi-Structured Interviews: Individual, in-depth semi-structured interviews (45–60 minutes per participant) were conducted to probe participants' cognitive reasoning, ethical sensitivity, prompt strategies, and underlying motivations behind accepting, modifying, or rejecting AI outputs. Stimulated Recall Sessions: Participants were presented with specific translation instances from their prompt logs (e.g., handling terms like Pawang Sintren, Memetri Bumi, and Pelong Wolu) to explain their step-by-step decision-making process in real time.

The collected qualitative data were analyzed iteratively using the interactive data analysis model proposed by Miles, Huberman, and Saldaña (2019), consisting of data condensation, data display, and conclusion drawing/verification. The data condensation phase involved two-cycle coding. In the first cycle, provisional coding based on Rest's (1986) Four-Component Model (Moral

Sensitivity, Moral Judgment, Moral Motivation, and Moral Character) was applied alongside structural coding for AI literacy competencies (Long & Magerko, 2020). In the second cycle, pattern coding was conducted to group the codes into three dominant thematic categories: Uncritical Delegation, Technical Validation, and Critical-Ethical Mediation.

To ensure qualitative trustworthiness and rigor, Lincoln and Guba's (1985) criteria for credibility, transferability, dependability, and confirmability were applied. Credibility was established through methodological triangulation (combining document logs, interviews, and stimulated recall), member checking (verifying transcriptions and thematic interpretations with participants), and peer debriefing with two senior ELT experts. Transferability was enhanced by providing thick, detailed descriptions of the institutional context, participant profiles, and analytical pathways.

Ethical considerations were rigorously maintained throughout the research process (Creswell & Poth, 2018). Formal written informed consent was obtained from all participants prior to data collection. Participants were explicitly informed of their right to withdraw from the study at any point without academic penalty. All personal identifiers were anonymized using alphanumeric codes (e.g., P01 to P12), and all digital files (prompt logs and audio recordings) were encrypted and stored securely in accordance with institutional data protection standards.

RESULTS AND DISCUSSION

In-depth thematic analysis of semi-structured interview transcripts, prompt logs, and translated text documents from 12 EFL students at UIN Siber Syekh Nurjati Cirebon revealed a complex interplay between AI literacy levels and ethical decision-making. The integration of DeepSeek in academic writing tasks focused on local wisdom not only tested students' linguistic proficiency but also evaluated their moral sensitivity regarding the risk of cultural erosion. Framed within Rest's Four-Component Model of Ethical Decision-Making and AI literacy frameworks, the empirical field data categorized student adoption into three distinct behavioral patterns. The overall framework of these adoption patterns, their corresponding literacy characteristics, ethical approaches, and ultimate cultural impacts are summarized in Table 2 below,

Adoption Pattern	AI Literacy Characteristics	Ethical Decision-Making Approach	Impact on Cultural Text
Uncritical Delegation	**Low:** Full trust in algorithms without verification.	Ignores cultural sensitivity and ethical considerations.	Semantic distortion and AI hallucinations on local terms.
Technical Validation	**Intermediate:** Proficient in basic grammatical correction.	Focused on linguistic correctness rather than cultural value.	Syntactically accurate language, but void of cultural nuances.
Critical-Ethical Mediation	**High:** Proficient in iterative prompting & critical verification.	Integrates Rest Model: prioritizes cultural authenticity.	Original meaning and local wisdom are fully preserved.

Table 2. Matrix of Student AI Literacy Patterns, Ethical Decision-Making Approaches, and Cultural Text Outcomes
(Source: Field Data, 2026)

Uncritical Delegation

The first pattern illustrates a phenomenon where students with low AI literacy surrendered their translation authority entirely to generative AI through passive, one-shot prompting. Students in this cohort assumed that generative AI platforms like DeepSeek possessed absolute accuracy in both syntax and cultural nuance. Consequently, they failed to identify AI hallucinations and cultural reductionism biases that arbitrarily mapped sacred local terms onto Western equivalents carrying negative or irrelevant connotations.

This lack of critical evaluation was particularly evident in the translation of the sacred Sintren ritual and the role of the Pawang Sintren. When students entered simple prompts without contextual parameters, DeepSeek translated Pawang Sintren as "Shaman" or "Witch doctor" and roh halus as "Ghosts". Without ethical verification, students pasted these raw outputs directly into their academic drafts, thereby reducing the spiritual and aesthetic dignity of Sintren to mere occult practices in the eyes of an international audience.

> "I used the first result from DeepSeek because the English output looked very smooth, fluent, and was generated quickly. To be honest, I didn't know that words like 'shaman' or 'ghost' carried negative connotations or distorted the sacred concept of a pawang and spiritual entities in our culture. For me, as long as there was no red underline from grammar checking software, the translation seemed correct." **(Participant 02, Interview Data)**

Participant 02's statement confirms a fundamental lack of moral sensitivity, as defined in Rest's (1986) model. The student experienced an initial inability to recognize that machine-generated lexical choices carry ethical consequences for local cultural representation. This deficiency in moral sensitivity is directly observable in the raw data excerpt where "Pawang Sintren" was uncritically rendered as "Shaman." In this instance, the

student's inability to recognize moral issues prevented them from discerning how a simplistic translation strips the local figure of their spiritual, ritualistic, and cultural guardianship role, reducing it to a pejorative Western trope. This passive stance, relying solely on surface-level technical indicators, demonstrates cognitive offloading. Students unconsciously transferred their intellectual and ethical responsibilities to DeepSeek, resulting in cultural distortion that risks reinforcing negative stereotypes against local traditions in global discourse.

Technical Validation

The second pattern represents students with intermediate AI literacy who exhibited high syntactic awareness but lacked ethical-cultural sensitivity. Students in this category actively utilized DeepSeek to refine grammatical accuracy, vocabulary variety, and sentence structure for academic standards. However, their verification stopped at linguistic correctness, ignoring how local cultural values were diluted by automatic AI analogies.

This limitation was identified during the translation of Memetri Bumi (an indigenous agricultural thanksgiving ritual in Cirebon). DeepSeek automatically substituted Memetri Bumi with "Earth Day celebration" to align with Western cultural paradigms. The student subsequently edited the phrase to "Earth Day ritual" to fix its grammatical flow while retaining "Earth Day". This ethical decision was passive, as it ignored the fact that Memetri Bumi is an ancestral veneration ritual deeply rooted in local history, rather than a modern Earth Day observance.

> "I always double-check grammar and word choices using Grammarly and ask DeepSeek to rewrite awkward sentences. My main priority is making the paper look academic and grammatically error-free. Regarding traditional terms, I thought 'Earth Day' was practical so foreign readers could instantly understand without requiring long explanations."
> **(Participant 07, Interview Data)**

This quote illustrates a disconnect between technical proficiency and moral judgment (Rest, 1986). Participant 07 demonstrated functional AI literacy by iteratively refining language fluency. However, the inclination toward cultural domestication for readership convenience compromised local authenticity. When evaluated through Jones's (1991) Moral Intensity Theory, each instance of replacing "Memetri Bumi" with "Earth Day celebration/ritual" explicitly illustrates how students weigh the ethical dimensions of their choices. Specifically, students evaluated the magnitude of consequences and social consensus as low regarding cultural erosion, while perceiving the immediate academic consequences of awkward syntax as high. Consequently, they knowingly chose cultural

domestication over preservation, confirming Jones's assertion that moral decisions are heavily driven by the perceived intensity and immediate personal stakes of the outcome.

Critical-Ethical Mediation

The third pattern represents the highest level of integration, where high-AI-literacy students positioned themselves as primary moral agents in the writing process. Rather than relying on passive prompts, students employed high-context iterative prompting. Aware of LLM tendencies toward Westernization, they systematically cross-checked DeepSeek outputs against historical literature and verified cultural terms directly with local experts.

This mediation was demonstrated when documenting the philosophical architecture of the Cirebon Sultanate Palace, specifically the Pelong Wolu concept. When DeepSeek proposed the literal translation "Eight Arches", students rejected it for stripping away the underlying Islamic-Javanese philosophical meaning. The student engaged in follow-up prompting iterations and ultimately retained the original term Pelong Wolu, adding a explanatory cultural gloss in parentheses after consulting local historians.

> "DeepSeek often forces our local terms into Western cultural analogies that are inaccurate and risk ruining their original meaning. Therefore, I only use DeepSeek to explore sentence structures. For cultural terminology, I strictly keep the native term and add explanatory context in parentheses after discussing it with my supervisor and Cirebon cultural experts."
> **(Participant 11, Interview Data)**

Participant 11's reflection demonstrates the realization of moral character and moral action (Rest, 1986). High-AI-literacy students refused to yield to automated machine outputs, taking personal responsibility for safeguarding cultural integrity. In the discussion of "Pelong Wolu," the student's active deployment of the Human-in-the-Loop (HITL) framework serves as a direct operationalization of their moral agency. By refusing to accept DeepSeek's reductionist translation ("Eight Arches") and instead validating the term through expert consultation, the student demonstrated both moral character (the internal commitment to ethical standards) and moral action (the courage to override machine convenience). HITL is thus not merely a technical error-checking mechanism, but the concrete manifestation of the student's moral agency in asserting human ownership over cultural truth.

Adoption Pattern	Local Cultural Term	Initial DeepSeek Output	Final Student Revision	Cultural Implication
Uncritical Delegation	Pawang Sintren	Shaman / Witch doctor	Shaman	Sacred meaning distorted into negative occult connotations.
Technical Validation	Memetri Bumi	Earth Day celebration	Earth Day ritual	Linguistically accurate, but indigenous identity is eroded.
Critical-Ethical Mediation	Pelong Wolu	Eight Arches	Pelong Wolu (eight philosophical structural arches)	Philosophical meaning and historical context fully preserved.

Table 3. Comparison of DeepSeek Outputs and Student Ethical Decisions Based on Literacy Patterns
(Source: Field Data, 2026)

These empirical findings demonstrate that EFL students' AI literacy levels directly dictate their ethical decision-making capacity when preserving local wisdom through generative AI platforms like DeepSeek. Student engagement with DeepSeek extends beyond linguistic efficiency into an arena of ethical-cultural negotiation. Aligned with Rest's (1986) Four-Component Model of Ethical Decision-Making, students' interactions with DeepSeek reflect a spectrum of moral behaviors governed by their critical awareness of algorithmic limitations.

Uncritical Delegation: Cognitive Offloading and AI Hegemony

The Uncritical Delegation pattern highlights passive dependence via one-shot prompting. Low-literacy students positioned DeepSeek as an infallible authority. Accepting raw translations of sacred terms like Pawang Sintren as "Shaman" reflects cognitive offloading—the total delegation of critical human thinking to artificial intelligence (Ali et al., 2023; Faisal, 2026). In translation discourse, this reductionism aligns with warnings regarding western-centric bias in Large Language Models (Jakesch et al., 2023). Because LLMs are trained predominantly on English-language corpora, models like DeepSeek frequently compress indigenous knowledge into Western tropes (Liao et al., 2026).

Through Rest's (1986) model, students in this cohort encountered a breakdown at the first stage: moral sensitivity. They lacked the critical consciousness to realize that unverified AI copy-pasting incurs ethical costs, including cultural identity erosion and ritual stigmatization (Miao & Holmes, 2023). Students' inability to detect AI hallucinations corroborates Kasneci et al. (2023), who argued that users with low AI literacy regularly fail

to recognize algorithmic bias, thereby amplifying cultural misrepresentations in academic writing.

Technical Validation: Syntactic Competence vs. Moral Judgment

The Technical Validation pattern reveals a decoupling between technical language mechanics and moral judgment (Rest, 1986). Intermediate-literacy students actively utilized tools like Grammarly and light iterative prompting on DeepSeek to correct syntax and vocabulary (Wang et al., 2025). However, when DeepSeek mapped Memetri Bumi onto "Earth Day celebration", students adjusted it to "Earth Day ritual" solely for grammatical fit. This action constitutes cultural domestication, forcing indigenous texts to adapt to Western conceptual frameworks for reader convenience (Venuti, 2017).

Jones's (1991) Moral Intensity Theory explains this choice: students perceived the magnitude of consequences regarding cultural shift as negligible compared to the academic penalty of grammatical errors. Students remained trapped in linguistic formalist paradigms, measuring academic success by syntactic fluency rather than cultural fidelity (Yilmaz & Yilmaz, 2023). Consequently, technical validation failed to safeguard local heritage because students did not view cultural conservation as an academic moral duty.

Critical-Ethical Mediation: Human-in-the-Loop Agency

The Critical-Ethical Mediation pattern represents the highest synthesis of critical AI literacy, moral character, and moral action (Rest, 1986). High-literacy students established themselves as primary moral agents, using DeepSeek strictly as a draft assistant. Their rejection of literal renderings (Pelong Wolu as "Eight Arches") and deployment of role-based prompting, cultural glossing, and expert cross-verification reflect reflective writing practices (Kimmons et al., 2024).

This finding aligns with Human-in-the-Loop (HITL) and Human-Machine Co-Creation frameworks in Digital Humanities (Long & Magerko, 2020; Su et al., 2024). In this synergy, AI accelerates lexical exploration, but final terminological authority remains with humans via expert audit. Students in this group proved that mature AI literacy does not reject generative AI like DeepSeek, but harnesses it ethically without sacrificing local wisdom. This supports Holmes et al. (2023), confirming that AI competency coupled with cultural ethics prevents cultural homogenization in digital education.

Pedagogical Implications

Based on these empirical findings, this study proposes a Culturally-Grounded Ethical AI Framework for higher education EFL writing instruction. To operationalize this framework, EFL curricula must first shift beyond technical fluency to integrate critical prompt engineering, explicitly training students to embed ethical guardrails within their AI interactions, such as instructing models not to replace indigenous terminology without explicit authorization (Miao & Holmes, 2023). Furthermore, academic writing assessments should be restructured to incorporate Cultural Bias Audits, wherein students submit detailed ethical reflection logs that justify their decisions to accept, modify, or reject machine-generated cultural equivalents (Ali et al., 2023). Finally, instructional design must institutionalize an expert-in-the-loop triangulation protocol; assignments involving localized cultural heritage should require students to systematically cross-verify GenAI outputs against primary historical sources and qualitative field interviews with local cultural custodians before finalizing their manuscripts (Kimmons et al., 2024).

CONCLUSION

This study examined how EFL students demonstrate AI literacy and apply critical ethical decision-making when utilizing DeepSeek for translating and writing local wisdom content into English. By bridging Rest's Four-Component Model of Ethical Decision-Making with AI literacy frameworks, the research identified three distinct operational patterns among undergraduate students: Uncritical Delegation, Technical Validation, and Critical-Ethical Mediation. The core finding indicates that technical AI competence alone is insufficient to safeguard cultural heritage. Higher critical AI literacy directly fosters moral sensitivity and moral character, enabling students to position generative AI merely as an initial drafting assistant while retaining full agency over cultural authenticity.

This study contributes significantly to the field of Digital Humanities and ELT by establishing an empirical link between algorithmic literacy and cultural ethics. Theoretically, it expands Rest's ethical model into human-AI co-creation contexts, demonstrating that algorithmic bias requires a human-in-the-loop (HITL) approach to prevent digital cultural homogenization. Practically, the study introduces a culturally-grounded ethical AI framework that offers actionable insights for language educators to integrate critical prompt engineering and cultural bias audits into EFL writing instruction.

Despite its contributions, this study is subject to several key limitations. First, the investigation was restricted to a relatively small cohort (N = 12) from a single institution, which limits the immediate generalizability of the empirical findings across different cultural and educational

settings. Second, the study exclusively examined DeepSeek as the target generative AI platform, leaving open questions about whether similar ethical decision-making patterns emerge when students interact with other advanced LLMs. To address these constraints, future research should implement large-scale, multi-institutional quantitative or mixed-methods empirical studies to evaluate student behaviors across diverse demographic contexts. Furthermore, comparative analyses evaluating multiple GenAI platforms (e.g., ChatGPT, Claude, Gemini) are highly recommended to discern platform-specific algorithmic bias in cultural translation. Finally, longitudinal studies examining the real-world impact of culturally grounded ethical AI pedagogical interventions will be crucial to fostering sustainable digital literacy and ethics in higher education.

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DECLARATIONS

Ethical Considerations

The study was conducted in accordance with institutional ethical guidelines for educational research. Informed consent was obtained from all individual participants prior to data collection, and confidentiality was maintained through strict data anonymization and the use of pseudonyms.

Use of Artificial Intelligence (AI)

The authors declare that the generative artificial intelligence (AI) tool DeepSeek was used exclusively for language editing and/or grammatical improvement. The use of AI did not influence the scientific content, study design, data analysis, data interpretation, results, or conclusions of the manuscript. Full responsibility for the content remains with the authors.

Conflict of Interest

The authors declare no conflicts of interest.

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