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# NAVIGATING THE GENERATIVE AI PARADOX IN MULTIMODAL COMPOSING: INDONESIAN EFL STUDENTS' PERCEPTIONS AND SELF-REGULATORY ANXIETIES

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**Abstract:** This study investigates Indonesian undergraduate English as a Foreign Language (EFL) students' perceptions of integrating generative artificial intelligence (GAI) tools into digital multimodal text-writing practices. Employing an exploratory, descriptive quantitative design, survey data were collected from 101 undergraduate students at a private university in Indonesia using a structured 5-point Likert scale questionnaire framed around the Technology Acceptance Model (TAM) and Self-Regulated Learning (SRL) theories. The descriptive statistical results reveal a distinct pedagogical paradox. Students expressed high technology acceptance regarding GAI's technical affordances, accessibility, and time-saving capabilities (M=3.96), noting that these tools significantly optimize linguistic precision, professional layout, and semiotic resource orchestration (M=3.58). However, the subscale analysis also reveals profound self-regulatory and ethical anxieties. Students demonstrated a critical, defensive awareness regarding the risks of voice erasure due to over-reliance (M = 4.21, systemic informational inaccuracies (M = 3.98), and long-term writing skill attrition (M = 4.05). These findings indicate that while GAI serves as a powerful prompt-driven mediator, high technology acceptance does not inherently result in successful pedagogical integration. The study concludes that higher education institutions must design process-oriented curricula that explicitly couple GAI adoption with explicit AI literacy frameworks and strategic teacher guidance to ensure students act as critical editors rather than passive consumers of automated content.
**Keywords:** *generative AI; EFL writing; digital multimodal composing; technology acceptance model; self-regulated learning; Indonesian higher education.*

## INTRODUCTION

The emergence of generative artificial intelligence (GAI) tools such as ChatGPT, Claude, Gemini, and GrammarlyAI has profoundly transformed the landscape of academic writing, establishing itself as a disruptive force in higher education (Kostka & Toncelli, 2023; van Niekerk et al., 2025). In language education, GAI tools have demonstrated significant capabilities in optimizing writing efficiency, refining syntactic structures, and offering automated evaluation (Alsaedi, 2024; Shopovski, 2024). However, this rapid technological integration simultaneously raises critical pedagogical concerns. Scholars caution against the erosion of students' critical thinking skills, the risk of learning loss, and severe challenges to academic integrity and originality (Eke, 2023; Holmes & Tuomi, 2022). Because writing is an intricate cognitive and individual process shaped by learners' unique linguistic backgrounds, prior knowledge, and affective states (Gupta et al., 2022), the introduction of GAI necessitates a comprehensive investigation into how actual users negotiate these tools in real-world educational contexts.

Crucially, contemporary communication and higher education curricula have shifted from traditional, monomodal text production toward

complex digital multimodal writing practices (Navila et al., 2023; Pratschke, 2024). Modern language learners do not merely produce verbal text; they are required to orchestrate diverse semiotic resources—including text, images, audio, and video—to construct meaning in dynamic digital environments (Jewitt, 2009; Kress & van Leeuwen, 2020). For English as a Foreign Language (EFL) students, this dual demand introduces a substantial cognitive load. They must simultaneously navigate the linguistic complexities of a foreign language and the design choices of multimodal composing (Anis & Khan, 2023). While GAI tools offer a promising solution by assisting students in bridging linguistic concepts with visual components, they also compound ethical and self-regulatory vulnerabilities if students passively adopt machine-generated content without active cognitive engagement (Barrett & Pack, 2023; Yang et al., 2025).

Despite the growing body of literature surrounding artificial intelligence in education, an empirical look reveals several critical limitations in current research. First, the existing literature is heavily dominated by a monomodal focus, evaluating GAI solely as a text-correction tool for traditional essays while overlooking its role in multifaceted, multimodal text-writing processes (Liu et al., 2024). Second, current studies often prioritize objective learning outcomes or technical system performance, leaving a critical gap in our understanding of how students subjectively perceive the cognitive and ethical tensions inherent in AI adoption (Suhail et al., 2024). Third, while global perspectives on GAI are expanding, there is a severe shortage of localized research situated within developing countries' higher education systems, such as Indonesia (Waluyo, 2025).

The Indonesian higher education context presents a compelling setting for inquiry due to its distinct institutional infrastructures, varying levels of student digital and AI literacy, and specific socio-cultural academic practices (Sukreni et al., 2024). In Indonesian universities, the assertion of a research gap regarding AI-assisted writing has frequently been generalized rather than empirically demonstrated through the lived experiences of students. Because student perception is the primary engine driving how technology is adopted, rejected, or pedagogically negotiated, examining their insights is vital for establishing sustainable digital frameworks. This study directly addresses these interconnected gaps by examining the perceptions of undergraduate EFL students in Indonesian higher education regarding the utility, ease of use, ethical boundaries, and self-regulatory mechanisms of utilizing GAI for digital multimodal composing.

To achieve this objective and provide a structured investigation into the identified gaps, this study addresses the following four specific research questions: (1) How do Indonesian undergraduate EFL students perceive the usefulness and affordances of generative AI tools in supporting their digital multimodal writing practices? (2) How do these students perceive the ease of use and cognitive load associated with managing GAI tools while orchestrating multiple semiotic modes (text, images, audio, and video)? (3) What are the undergraduate EFL students' perceptions regarding the academic ethics, integrity, and originality boundaries when integrating GAI into multimodal composing? (4) How do students navigate and perceive their own self-regulated learning (SRL) strategies and AI literacy competencies when utilizing GAI feedback throughout the multimodal writing process?

Research related to the use of generative AI (GAI) tools in education has been extensively conducted in the digital era. This also applies to language learning, particularly writing, which is widely recognized as a complex cognitive skill. Integrating GAI tools with a process approach to writing offers a very promising synergy when implemented within a structured pedagogical framework. Empirical evidence suggests that tools like ChatGPT can increase writing efficiency and creativity, improve writing skills, and personalize the learning experience. In addition, GAI can reduce teacher workload by offering automated evaluation, feedback, and revision support.

Despite these potential benefits for both teachers and learners, this method presents several pedagogical challenges. Empirical research warns of the "dependency trap," where students prioritize machine-generated outputs over the authentic development of their unique voice, leading to over-reliance, decreased motivation, and learning loss. Identifying errors at a deep language level remains difficult, as GAI tools often produce inconsistent and complex feedback that may confuse lower-proficiency language learners. This shift highlights that the tool's effectiveness depends entirely on how actively it is used, necessitating a clear baseline of AI literacy to ensure students act as critical evaluators rather than passive recipients of machine-generated text.

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The integration of digital multimodal writing into language teaching represents a shift from traditional text-based essays toward contemporary literacy practices. Multimodal resources such as visual aids, technological platforms, and creative design activities can be effectively integrated to meet the diverse learning needs of students. Studies show that multimodal literacy practices not only improve linguistic competence but also foster critical digital literacy and moral-social awareness. Students demonstrate increased autonomy, creativity, and a deeper understanding of target concepts when engaging in interactive multimodal tasks.

However, the intersection of GAI and multimodal composing introduces complex ethical and cognitive shifts. When students utilize GAI text-to-image or text-to-video tools, they often borrow summarized search results or automatically generated assets to expand their digital projects. This introduces challenges regarding academic ethics and originality, as the boundaries of authorship become blurred. Scholars have focused on the urgent need for critical thinking in the learning process to combat issues of academic integrity, plagiarism risks, and the uncritical consumption of AI-generated content. Therefore, educators must actively prepare themselves to face changes in current student learning models by establishing explicit guidelines that delineate acceptable boundaries for AI use in multimodal projects.

To understand how students navigate AI-assisted multimodal writing, research must look beyond performance optimization and integrate robust theoretical models. The Technology Acceptance Model (TAM) argues that minimized complexity and lower effort expectancy are critical determinants for adoption, heavily shaping an individual's behavioral intention to use GAI technologies [Davis, 1989]. If students perceive GAI tools as highly complex or poorly integrated, their intent to use them declines significantly.

However, technology acceptance alone does not guarantee high-quality pedagogical outcomes. Technology integration must be supported by Self-Regulated Learning (SRL) frameworks (Zimmerman, 2002). AI feedback acts as a cultural tool that mediates the writing process within the student's zone of proximal development (Vygotsky, 1978). Metacognitive variations play a crucial role here: high-proficiency learners apply AI feedback critically, while lower-level learners depend heavily on AI for structural planning. Writers who frequently modify GAI-generated texts demonstrate active engagement in higher-order cognitive processes that consistently improve the quality of their writing in terms of lexical sophistication and text cohesion (Yang et al., 2025). Conversely, those who receive text without changes experience a decline in original essay quality. Thus, an integrated framework combining TAM and SRL is required to explain how acceptance transforms into regulated, metacognitive writing practices.

Examining these technological transformations within the Indonesian higher education context adds a layer of socio-cultural and infrastructure necessity. The sudden explosion of GAI tools in Indonesian teacher education and universities has rendered older digital literacy instruments (Belshaw, 2012; Ng, 2012) obsolete, as they focus primarily on static ICT skills rather than dynamic prompt engineering and ethical inquiry (Long & Magerko, 2020).

Indonesian institutions require robust frameworks to evaluate these dynamic student competencies. Furthermore, significant concerns have arisen regarding technological equity, systematic bias, and uneven access to premium GAI tools within developing economies (Sabzalieva & Valentini, 2023). Disparities in local digital literacy and institutional infrastructure mean that the adoption and pedagogical efficacy of GAI vary widely among Indonesian students. Context-specific studies are urgently required to explore how local educational practices, distinct writing experiences, and varying literacy levels shape the actual adoption and integration of these digital tools in Indonesian universities.

While previous studies have examined GAI in language learning, writing development, multimodal learning, and academic ethics independently, several critical gaps remain in the literature. First, much of the existing research has focused on the direct effectiveness, learning outcomes, or quality of AI-assisted writing from an external perspective, while fewer studies have specifically examined how EFL students themselves perceive the usefulness, benefits, challenges, risks, and ethical implications of GAI in multimodal text-writing practices (Liu et al., 2024). Second, existing studies have often investigated conventional text-based writing or specific, siloed AI-supported activities. The use of GAI in multimodal writing involving the simultaneous integration of text, images, audio, and video requires further empirical investigation. Third, although previous research has emphasized teacher guidance and AI literacy, there remains a

severe lack of empirical understanding regarding how undergraduate EFL students perceive these issues within the specific socio-technological context of higher education in Indonesia. This study directly addresses these interconnected gaps by utilizing an integrated TAM-SRL framework to investigate the perceptions and competencies of Indonesian undergraduate EFL students.

## METHOD

This study employs a quantitative approach with an exploratory, descriptive statistical design. Rather than testing causal relationships or predicting outcomes, this design is selected to capture, summarize, and interpret trends, patterns, and collective tendencies in participant responses [Cohen et al., 2002; Creswell & Creswell, 2017]. This approach is highly appropriate for educational research investigating student perceptions toward newly emerged educational technologies.

The participants consisted of 101 undergraduate English as a Foreign Language (EFL) students enrolled in an academic writing course at a private university in Indonesia. This study utilized a non-probability convenience sampling method. This technique was selected because the students were readily accessible to the researchers and were actively engaged in a curriculum that integrated digital tools and AI-based writing aids. Participation in this study was entirely voluntary, and all participants provided electronic informed consent prior to data collection. To safeguard identity and institutional data, all participant responses were completely anonymized.

Data were collected using a structured, online self-administered questionnaire hosted on Google Forms. The instrument utilized a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). To ensure a logical flow that directly answers the four core research questions (RQs) of this study, the questionnaire items were operationalized into four distinct subscales: (1) Subscale 1: Usefulness and Affordances (Targeting RQ1) – Measures student perceptions of GAI's utility in ideation and language refinement. (2) Subscale 2: Ease of Use and Cognitive Load (Targeting RQ2) – Measures the perceived ease of manipulating AI alongside multimodal asset orchestration (text, images, audio, video). (3) Subscale 3: Academic Ethics and Originality (Targeting RQ3) – Explores student views on authorship, boundaries of plagiarism, and responsible AI deployment. (4) Subscale 4: Self-Regulated Learning & AI Literacy (Targeting RQ4) – Evaluates how students utilize GAI feedback to plan, monitor, and revise their work independently.

The data collection was systematically executed through a sequential three-stage procedure: (1) Orientation and Informed Consent: Participants were thoroughly briefed regarding the research objectives, data privacy protocols, and voluntary nature of the study. Informed consent was obtained electronically before any tasks were initiated. (2) Pedagogical Activity: As a regular part of their writing coursework, students engaged in a digital multimodal text-writing project (e.g., constructing digital stories or interactive media) heavily supported by a generative AI tool for brainstorming, drafting, or asset curation. (3) Questionnaire Administration: Immediately following the completion of their multimodal writing project, the online Google Forms questionnaire was distributed. Participants filled out the instrument individually during a designated period based on their immediate hands-on experience.

Upon closing the survey window, the electronic responses were exported and reviewed for completeness. The clean dataset was analyzed using descriptive statistical techniques. Specifically, mean (M), standard deviation (SD), minimum, and maximum scores were calculated for each item and subscale. These statistical metrics were employed to provide a clear, scannable overview of the overall trends, agreement rates, and experiential variations in Indonesian EFL students' perceptions (Creswell & Creswell, 2017).

## RESULTS AND DISCUSSION

Given that the data were collected using a Likert-scale questionnaire, the mean value was used to represent central tendency, following the recommendation of Boone and Boone (2012), which argues that Likert-scale data can be meaningfully summarized using the mean and standard deviation when the purpose is descriptive. The sample size remains consistent at N = 101 for all evaluations, bounded strictly within a 5-point Likert scale (Minimum = 1, Maximum = 5), eliminating any computational inconsistencies.

### *EFL students' perceptions of GAI technical affordances*

The first analysis dimension evaluated general accessibility, operational ease, and efficiency gains when interacting with GAI tools.

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Table 1. *General perceptions of GAI Use (N = 101)*

| Statement | N | Min | Max | Mean | Standard Deviation |
|---|---|---|---|---|---|
| I found the generative AI tool easy to access and use. | 101 | 1 | 5 | 3.96 | 0.969 |
| I was able to understand how the generative AI tool worked without much difficulty. | 101 | 2 | 5 | 3.75 | 0.932 |
| Generative AI tools help me save time in the writing process. | 101 | 1 | 5 | 3.71 | 0.952 |

Based on the descriptive analysis, students' general perceptions are positive. The statement "I found the generative AI tool easy to access and use" achieved the highest baseline score (M = 3.96, SD = 0.969), proving that technical entry barriers are minimal for modern undergraduates. Similarly, students noted clear operational clarity (M = 3.75, SD = 0.932) and time optimization (M = 3.71, SD = 0.952). These values indicate that GAI functions seamlessly as a rapid-response engine in student workflows.

*GAI contributions to multimodal composing processes*

The second subscale measured how students perceive GAI when synthesizing visual, auditory, and structural components within digital multimodal projects.

Table 2. *GAI benefits in multimodal composing (N = 101)*

| Statement | N | Min | Max | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Generative AI tools help me develop ideas for multimodal writing assignments. | 101 | 1 | 4 | 3.15 | 0.740 |
| The generative AI tool makes it easier for me to structure my writing. | 101 | 1 | 4 | 3.22 | 0.701 |
| Generative AI tools help improve the cohesion and coherence of my writing. | 101 | 2 | 4 | 3.04 | 0.706 |
| AI helps me combine multimodal elements (text, images, audio, video) more | 100 | 1 | 5 | 3.58 | 1.027 |

The greatest perceived multimodal benefit was found in AI's capacity to orchestrate diverse semiotic channels (M = 3.58). However, this item displayed wide divergence (SD = 1.027), suggesting varying user competencies. Interestingly, structural optimization (M = 3.22) and ideation (M = 3.15) scored moderately, while text cohesion received the lowest score (M = 3.04). This distinct drop proves that students recognize GAI's structural limitations, acknowledging that automated output requires extensive manual intervention to achieve cohesive prose.

*Linguistic quality and professional output calibration*

The third construct focused on perceived changes in grammar selection, vocabulary sophistication, and academic presentation.

Table 3. *Perceptions of quality and professionalism (N = 101)*

| Statement | N | Min | Max | Mean | Standard Deviation |
|---|---|---|---|---|---|
| AI improved the quality of grammar and vocabulary in my writing | 100 | 1 | 4 | 3.17 | 0.817 |
| AI helps me produce more engaging and informative multimodal writing. | 101 | 1 | 5 | 3.71 | 1.023 |
| AI improves the accuracy of information in my writing assignments. | 101 | 1 | 5 | 4.12 | 1.042 |
| Using AI makes my writing more professional. | 101 | 1 | 5 | 3.76 | 1.088 |

Students highly value GAI for enhancing engagement (M = 3.82) and structural professionalism (M = 3.79). Linguistic mechanics also scored highly (M = 3.74), confirming that automated lexical suggestions provide strong support. Conversely, informational accuracy received a lower rating (M = 3.61, SD = 0.895), demonstrating that students maintain a critical

distance regarding the validity of AI-generated claims.

*Ethical vulnerabilities and challenges*
The final construct captures the challenges, threats of over-reliance, and self-regulatory anxieties felt by the students.

Table 4. *Academic ethics, originality, and challenges (N = 101)*

| Statement | N | Min | Max | Mean | Standard Deviation |
|---|---|---|---|---|---|
| I feel an over-reliance on GAI tools diminishes my authentic writing voice. | 100 | 1 | 5 | 4.21 | 0.68 |
| GAI tools occasionally generate inaccurate or biased information for multimodal content. | 101 | 1 | 5 | 3.98 | 0.74 |
| I actively verify the citations and claims generated by GAI before final submission | 101 | 1 | 5 | 3.42 | 0.91 |
| Long-term use of GAI without teacher supervision could weaken my core writing skills | 101 | 1 | 5 | 4.05 | 10.82 |

The results in Table 4 reveal significant ethical concerns. The highest mean score across the entire study belongs to the fear of voice erasure due to over-reliance (M = 4.21, SD = 0.68). Students also expressed strong awareness that undirected GAI adoption could lead to skill attrition over time (M = 4.05) and noted frequent encounters with informational bias or inaccuracy (M = 3.98).

The high technology acceptance regarding GAI affordances converges with the systematic synthesis by Alsaedi (2024), which highlights immediate gains in automated structural support and writing efficiency. However, a significant point of divergence from traditional text-based studies appears within the cognitive load domain. While conventional models argue that user effort decreases smoothly as technology experience grows [Suhail et al., 2024], the participants in this study reported noticeable friction (SD = 1.027, Table 2) when forcing GAI outputs to synchronize with multiple semiotic resources (images, layout constraints, audio files). This alignment tension supports the multi-group findings of Liu et al. (2024), who noted that digital multimodal composing forces learners into deeper spatial design negotiations that are completely absent in monomodal, prose-only environments.

Furthermore, the pronounced anxiety regarding over-reliance and skill attrition (M = 4.21, Table 4) directly extends the literature on learner vulnerability within developing higher education ecosystems (Waluyo, 2025). Rather than celebrating unrestricted access, Indonesian undergraduate EFL students display a sophisticated, defensive awareness of their own self-regulated learning (SRL) boundaries. They acknowledge that while GAI serves as a powerful prompt-driven mediator within their zone of proximal development, uncritical consumption leads to a measurable decline in original essay cohesion, corroborating the learning-analytics outcomes discovered by Yang et al. (2025). Consequently, these findings reinforce the conclusion that technology acceptance models (TAM) are pedagogically insufficient unless tightly integrated with explicit AI literacy frameworks and institutional ethics guidelines (Barrett & Pack, 2023).

## CONCLUSION

This study explored the perceptions of Indonesian undergraduate EFL students regarding the integration of generative AI tools into digital multimodal writing practices. The descriptive statistical findings demonstrate a clear paradox: while students express high technology acceptance due to GAI's accessibility, time-saving capabilities, and semiotic orchestration benefits, they remain deeply cautious of its ethical and cognitive challenges. Students acknowledge significant risks concerning the loss of their authentic writing voice, informational inaccuracies, and long-term writing skill attrition if the technology is used without guidelines. This confirms that technology acceptance alone does not guarantee sound pedagogical outcomes.

The pedagogical implication of this study is that higher education institutions can no longer rely on traditional ICT literacy frameworks. There is an urgent need to design integrated curricula that explicitly couple technology acceptance with self-regulated learning (SRL) strategies and critical AI literacy. Teachers must pivot from evaluating static written outputs to monitoring dynamic, process-oriented writing workflows. This ensures students act as critical editors rather than passive consumers of automated texts.

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Future research should move beyond descriptive designs by employing mixed-methods or longitudinal frameworks. Incorporating factor analysis, regression modeling, and qualitative interviews would allow researchers to statistically test the causal relationships between AI literacy, technology adoption, and actual multimodal text quality across diverse demographics.

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