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AI ASSISTANCE OR OVERRELIANCE? ANALYZING INDONESIAN ENGINEERING STUDENTS' `DIGITAL-LINGUISTIC AGENCY AND CRITICAL USE OF GENERATIVE AI IN ESP

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Abstract: The rapid integration of generative artificial intelligence (GenAI) tools as reshaped how English for Specific Purposes (ESP) students —like in engineering disciplines— approach language production. Despite their growing presence, limited research has examined the risk of overreliance on GenAI and its potential to diminish students' critical language awareness. Using a purposive sampling in which 27 students who met the criteria, the study addressed three questions: (1) To what extent do ESP students critically evaluate AI-generated suggestions? (2) What factors influence their acceptance, revision, or rejection of AI output? and (3) In what ways do ESP students utilize AI tools to support their English skills? A qualitative approach was utilized to explore the transition from traditional Critical Language Awareness (CLA) to an emerging Digital-Linguistic Agency. The data were collected through class observation and open-ended questionnaires. The findings revealed that while AI use is widespread, many students demonstrated critical engagement, often modified sentence structures to sound more humanized. However, lack of confidence in their English abilities and time constraints were key reasons for passive acceptance of AI output. Students used AI mostly for overcoming their lexical barriers. These findings underscore the need for careful integration of GenAI into ESP classrooms, supported by targeted instruction and thoughtful lesson design, particularly for students with lower proficiency. Future research should further examine patterns of overreliance across more diverse learner populations.
Keywords: *English for Specific Purposes; Generative Artificial Intelligence; student overreliance on AI*

INTRODUCTION

The rapid adoption of Generative AI (GAI) technologies in education has sparked considerable interest in their implications, particularly within the field of language learning. The establishment of these technologies has introduced innovative methodologies and tools that enhance the educational landscape, promising personalized learning experiences. Research indicates that GAI tools—such as chatbots, adaptive learning systems, and intelligent tutoring systems—can tailor educational content to meet individual learners' needs, thus improving both engagement and outcomes (Jane et al., 2024; Sadykova et al., 2025). Previous studies emphasize the benefit of GAI in providing diverse materials; for instance, Liu (2023) notes that these technologies provide interactive environments that improve efficiency, while Crompton et al. (2024) discuss how GAI helps educators in forming adaptive learning spaces. Furthermore, some studies show that GAI significantly reduces the administrative and preparatory burden on both students and educators. Preiksaitis & Rose (2023) highlight its capacity to expediently generate quizzes, case studies, and content for literature reviews. This efficiency allows educators to pivot toward more "innovative teaching methods" and "reform teaching practices" (Yu & Guo, 2023). Specialized tools like Fusion Brain and Suno AI have even been shown to improve language development in early childhood education (Sadykova et al., 2025). In higher education, GAI enables educators to enhance interpersonal communication and diversify instructional methods (Jane et al., 2024), particularly in writing, where platforms like

ChatGPT provide real-time feedback that enhances grammar and style while encouraging students to explore their writing voices (Tseng & Lin, 2024; Pratama & Sulistiyo, 2024). A study by Grassini (2023) show that GAI empowers students to tackle complex problem-solving tasks more effectively. In addition, A recurring theme across Zawacki-Richter et al. (2019), Almansour & Mohammad Alfhaid (2024) and (Kanont et al., 2024) is GAI's ability to function as a "Supportive Learning Assistant." It provides tailored resources, adaptive learning paths, and personalized feedback that align with individual learner needs, thereby increasing student engagement.

The rapid integration of Artificial Intelligence (AI) in higher education has introduced a significant tension between technological empowerment and the preservation of fundamental human capacities. While AI offers transformative advantages in personalization and diagnostic efficiency (Pitchika et al., 2024; Seo et al., 2021), a growing body of literature warns that without robust ethical frameworks, the "blind acceptance" of these tools may lead to a decline in independent critical thinking and language proficiency (Holmes et al., 2022; Jobin et al., 2019). However, this transformative potential is accompanied by significant ethical considerations and concerns about maintaining independent language skills. The evolving nature of AI-generated content distorts the boundaries between creativity and automation, raising concerns about plagiarism, the authenticity of educational outputs, and the possibility for "learned helplessness" (Chavez et al., 2024; Creely, 2024). While GAI can meet specific educational needs, overdependence may impede the development of foundational skills necessary for critical language engagement (Almufarreh, 2024). As Zawacki-Richter et al. (2019) and Conijn et al. (2023) highlight, the challenge for modern educators lies in bridging the gap between automated support and the maintenance of independent cognitive and linguistic skills. Wiredu et al. (2024) argue that the integration of AI tools requires a focus on maintaining rigorous academic standards against this potential overreliance, a phenomenon that is particularly concerning as students may neglect essential self-review when they become too accustomed to AI assistance (Rahmawati Zaimah et al., 2024). Ultimately, ethical issues regarding intellectual property and the normalization of uncritical acceptance of AI outputs remain prominent, necessitating a focus on human autonomy and professional judgment (Gutiérrez, 2023; Soelistiyowati et al., 2024).

To navigate these complexities, Critical Language Awareness (CLA) provides a framework emphasizing reflection and agency. Traditionally, CLA focused on sociopolitical power structures inherent in language, but the emergence of GAI necessitates a conceptual shift toward what may be termed "Digital-Linguistic Agency." CLA encourages students to identify biases inherent in AI algorithms and promotes a deeper understanding of language construction ((Escalante et al., 2023). Recent scholarship suggests that interacting with AI chatbots can sharpen critical thinking if students are prompted to evaluate the responses (Pimentel et al., 2024). Fostering this sense of agency is vital; students must be empowered to take charge of their learning trajectories, asserting their preferences and reflecting on how AI influences their acquisition process (Anwar & Ahyarudin, 2023; Xu & Li, 2024).

Despite the growing body of literature on the general advantages of GAI, there is a notable gap in research focusing on the specific risk of overreliance among higher education students in English for Specific Purposes (ESP), particularly within the engineering field. Understanding how these students—who face unique technical vocabulary and discipline-specific requirements—navigate AI suggestions is essential for shaping effective pedagogy. This study addresses this gap by demonstrating that for ESP learners, criticality is no longer just about analyzing human-authored discourse, but about navigating algorithmic suggestions. The findings challenge the assumption that technological reliance leads to cognitive passivity; instead, they reveal a nuanced process of "negotiated autonomy," where engineering students apply discipline-specific logic to interrogate and "humanize" AI output.

By documenting this shift from passive consumption to active validation, this research contributes a novel perspective on how CLA functions as a vital safeguard for maintaining independent communicative competence. Using a qualitative approach with 27 Mechanical Engineering students, this research addresses three core questions: (1) To what extent do ESP students critically evaluate AI-generated suggestions? (2) What factors influence their acceptance, revision, or rejection of AI output? and (3) In what ways do ESP students utilize AI tools to support their English skills?

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METHOD

This study employed a qualitative descriptive design to capture and present how ESP students interact with generative artificial intelligence (GenAI) tools and whether they critically evaluate or passively accept AI-generated language. This approach was chosen because the study aimed to explore students' perceptions, attitudes, and decision-making processes in depth rather than measure predetermined variables.

The participant of this study initially consisted of an intact class of 51 undergraduate Mechanical Engineering students. Through purposive sampling, 27 students were selected for the final study based on their active and prior experience with GenAI tools like ChatGPT and Grammarly. This purposive sampling was applied to ensure that the participants were directly relevant to the research objectives. By focusing on this intact group, the study was able to capture authentic insights into how engineering students engage with AI-generated language within the context of an ESP classroom. Selecting participants with this background ensured that the data collected would be meaningful for examining the ways in which ESP learners critically engage with or passively accept AI-generated language.

To maintain a consistent qualitative epistemological stance, the primary instrument was an open-ended qualitative questionnaire complemented by participant observation. While a preliminary Likert-style survey was used to screen for frequency of use, the core analysis relies on the narrative accounts provided by students to capture the "why" behind their AI interactions. The questionnaire was delivered in Bahasa Indonesia to ensure participant honesty and depth of reflection.

The research was conducted over a two-week period. Using a structured observation sheet, the researcher monitored 51 students and found out that 27 of the Mechanical Engineering students utilized Generative AI (GAI) tools to complete their tasks. Following the practical session, those 27 students were asked to complete an open-ended questionnaire. Unlike a Likert-scale survey, this instrument prompted students to provide narrative accounts of their experiences. Questions focused on their motivations for using AI, their perceived level of dependence on the tool, and the criteria they used to accept or reject AI suggestions. The questionnaire was distributed online, allowing students sufficient time to reflect on their AI-assisted writing experiences. Responses were collected, organized, and thematically analysed to identify patterns in critical evaluation, influencing factors, and English language skills supported. Ethical considerations were observed throughout the study, and students' identities were kept confidential. Informed consent was obtained from all participants prior to data collection.

Data Analysis

The collected data were analyzed using Thematic Analysis (Braun & Clarke). Student responses were read carefully and coded to identify recurring themes related to critical evaluation, influencing factors, and English language skills supported. Patterns were categorized and compared to highlight variations in students' approaches to AI-generated language suggestions. The analysis aimed to provide a rich, descriptive account of students' engagement levels and their decision-making processes.

RESULTS AND DISCUSSION

This section presents the findings of the study on how Mechanical Engineering students engaged with generative AI (GenAI) tools in their ESP course. The analysis is organized around the three guiding research questions: (1) the extent to which students critically evaluated AI-generated language suggestions, (2) the factors influencing their acceptance, rejection, or refraining from AI-generated content, and (3) the ways in which ESP students employed AI tools to support the development of their English language skills.

RQ1. To what extent do ESP students critically evaluate AI-Generated language suggestions?

Types of AI used by the students

Before examining the extent to which students critically evaluated AI-generated language, the researcher first explored the types of tools that commonly employed by all 51 students in their English learning process.

Table 1. *The type of GenAI tools the students used*

Type of GenAI Tool	Frequency
ChatGPT	30
Google Gemini	12
Voice AI	2
Others (Unspecified)	7

Table 1 was the data before the participants were selected and evaluated for this study. The findings indicated that, among the various GenAI platforms available, students most frequently mentioned using ChatGPT, Google Gemini, and Vice AI as their preferred tools.

The result showed that in addition to ChatGPT as the most frequent tools to be used by 30 students (more than 50% of the students in the class),

students also identified other GenAI tools that supported their English learning. Google Gemini was mentioned by 12 students, suggesting that it is becoming an increasingly recognized alternative to ChatGPT, particularly for generating ideas and checking language accuracy. Voice AI, although cited by only 2 students, appeared to serve a more specific purpose, most likely for practicing pronunciation and improving spoken English. Meanwhile, 7 students selected the category "Others," but did not specify the tools they used, indicating that a small portion of learners may be experimenting with less common or emerging applications.

Evaluating AI-Gen apps: Accepting, rejecting, or modifying

To investigate the extent to which ESP students critically evaluated AI-generated language suggestions, the researcher employed a Likert-scale questionnaire complemented by open-ended questions. In addition to rating their level of reliance on AI tools for learning English in the ESP context, students were invited to share their perceptions by explaining the reasons behind their response as shown in table 2.

Table 2. *Students critical evaluation towards AI tools*

Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
I usually accept AI suggestions without questioning their accuracy.	2	9	11	4	1
I use AI tools for almost all language tasks in my ESP class (listening, speaking, reading, and writing).	3	8	11	4	1
I often rely on AI to provide answers, summaries, or even sample conversations with little personal effort.	5	8	9	4	1
I feel uncomfortable completing assignments without AI assistance.	3	6	15	2	1
I always double-check the accuracy of AI-generated language across all skills (listening, speaking, reading, writing).	1	3	6	4	13
I compare AI-generated responses with other trusted sources (e.g., dictionaries, textbooks, or lecturers).	1	1	5	9	11
I try to understand the reasoning behind AI suggestions or answers.	0	2	9	8	8
I sometimes reject AI suggestions if I feel they do not match the context of my task.	0	2	6	4	15
I feel confident using my own language skills to evaluate AI-generated results.	1	2	12	10	2

The findings reveal a complicated relationship between generative AI reliance and critical thinking among ESP students. While widespread usage is evident—with many students employing AI for core linguistic tasks and occasionally exhibiting passive acceptance—this dependence is countered by an emerging critical consciousness. A significant student actively validates AI outputs against authoritative sources and interrogates the underlying logic of suggestions. Furthermore, students frequently exercise autonomy by rejecting misaligned AI recommendations, demonstrating confidence in their own evaluative skills. Ultimately, the data suggests a shift from unreflective consumption toward a more sophisticated, critical engagement with AI tools.

Then, when they were asked to give deeper idea on how they face AI suggestions whether they like to accept, reject, or modify it, their insight can be seen in Table 3.

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Table 3. *Students' perspective on accepting, rejecting, or modifying AI*

Response Category	Students Responses (Translated)	Number of Students
Always Follow AI	"Yes, I always follow AI suggestions," "Often follow"	1
Sometimes / Selective Use	"Sometimes, when AI's answer makes sense with the question", "Not always", "Not always, but I usually copy friends' answers", "Usually when I'm really struggling, I filter the AI answers", "50/50, I reject AI suggestions if the results don't meet my expectations", "Sometimes"	6
Critical / Reject AI When Needed	"When I feel the answer is incorrect or incomplete", "I disagree with AI suggestions and seek other sources like materials from the lecturer", "I reject because my notes are complete", "AI is helpful, but I still use professional judgment and intuition", "AI suggestions are not always correct or relevant, so I read them first", "If the method is very different from what the lecturer taught, I will not use AI answers", "When the answer given is wrong", "If the AI answer doesn't match the expected one, I reject it", "I don't agree with the answer and check the dictionary or guidebooks", "AI translated 'nervous' incorrectly as 'saraf', so I concluded AI outputs need checking"	15
Never / Do Not Use AI	"No use of AI suggestions", "Cannot do it", "No"	3
Modify AI Output / Adapt	"Make it more like a student would write", "AI gave English sentences that were too formal or textbook-like, I changed them to a more natural style"	2

The analysis of students' responses data regarding their adherence to AI suggestions revealed varied engagement patterns. Only a few students reported always following AI, indicating full reliance on its output. Several students used AI selectively, following suggestions only when they appeared reasonable or aligned with the task. Most students critically evaluated AI-generated content, rejecting or modifying suggestions when they were incorrect, irrelevant, overly formal, or inconsistent with classroom instruction. A small group of students reported not using AI suggestions at all, while others adapted AI outputs to better suit the assignment or their personal style.

Overall, these findings indicate that although AI is widely used as a supportive tool, students exercise discernment and critical judgment, selectively accepting, rejecting, or adapting AI suggestions rather than relying on them blindly.

Having explored how students respond to AI suggestions—whether they accept, reject, or modify them—the next focus is on how they handle mistakes in AI-generated answers or suggestions.

Table 4. *Students' reaction on the AI-Gen mistakes*

Response Category	Example Responses	Count
Frequently Encounter & Double-check / Cross-check	"Often, double check," "Frequently occurs, I compare with other sources and readings from the lecturer," "Often, AI is not fully accurate, so I check manually per word," "I have and I checked again"	4
Encountered & Compare with Other Sources	"Once, by searching from various AI," "Yes! We need to check other references," "Once, I looked for examples from other sources and matched with lecturer's materials," "Once, I compared with other AI," "Once, usually I check again using a dictionary"	5
Encountered & Validate with Lecture Materials / Books / Notes	"Once, not consistent with theory," "I cross-check with materials provided by the lecturer and slides," "Before writing, we corrected it first," "Once, I searched in books," "Looked in notes"	5
Encountered & Modify / Adjust Personally	"I handle it as I explained in the previous question", "Once, tried entering another prompt", "I modify it according to my understanding",	5

	"Sometimes AI gives answers that are off-context; I revise myself or find references", "Once, I tried using more accurate prompts"	
Structured / Academic Validation Approach	"Although AI helps speed up ESP teaching, I always validate, correct, and adjust based on: a) specific professional context, b) communication objectives in ESP, c) valid academic sources. This way, AI is an effective assistant, not a sole source of information."	2
Never Encountered	"Never"	1
Manual / Other Strategies	"Yes, by doing manually," "Yes, using another AI until answer is accurate", "Once, I searched answers through other sources"	5

The analysis revealed that students employ a variety of strategies to ensure accuracy and maintain control over their learning. Some frequently double-check or cross-check AI outputs, while others compare suggestions with alternative AI tools or external references. Many validate AI-generated content against lecture materials, books, or personal notes before incorporating it. Others actively modify AI outputs, either by refining prompts or rephrasing suggestions to better fit the task or context. They believe that the power of a right prompt can change the results. A few students apply a structured academic validation approach, systematically aligning AI output with professional contexts, ESP communication goals, and credible sources. For example, when they talked about the word "press," they did not accept the word "push" as the equivalent but more to "machine." Then, they needed to decide what kind of machine to give the whole right meaning. These findings indicate that students do not accept AI suggestions blindly; rather, they critically evaluate, verify, and adapt AI-generated content, demonstrating active engagement and responsible use of AI as a supportive learning tool.

Moreover, the analysis of students' responses regarding mistakes in AI-generated answers revealed that they engage in critical and strategic approaches to manage inaccuracies. Several students frequently encountered errors and consistently double-checked or cross-checked AI outputs to ensure correctness. Several relied on comparing AI suggestions with other sources, including alternative AI tools or reference materials, to verify the answers. Many validated AI-generated content against lecture materials, textbooks, or personal notes before using it in their work. Others actively modified AI outputs by adjusting prompts or rephrasing answers according to their own understanding. One student described a structured academic validation approach, systematically checking AI content against professional context, ESP communication goals, and credible academic sources. A smaller group reported never encountering AI mistakes or emphasized manual strategies until achieving accurate results. In sum, these findings demonstrate that students critically evaluate AI output, employing verification, adaptation, and professional judgment rather than accepting suggestions blindly, highlighting responsible and reflective use of AI in ESP learning.

GenAI dependency

To further explore the findings, the researcher invited students to share their perceptions regarding their dependency on AI in the context of ESP learning with the question of "Do you think you rely too much on AI tools in the ESP English learning process? Why?" Their replies are shown in Table 5.

Table 5. Students' perception of AI dependence in ESP learning

Category	Number of Students	Student Responses (Translated)
Not Dependent	2	• No—for example, some friends used AI while others did not, and those who studied without AI understood better. • No, I do not always feel AI gives 100% correct answers.
Low / Minimal Dependence	6	• Sometimes wrong. • Not always correct. • Maybe. • Not entirely. • Sometimes wrong in vocabulary. • Not always, sometimes wrong depending on the prompt.

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Moderate / Pragmatic Use	4	• For simple translation, it is quite accurate. • Helpful when struggling with difficult words. • AI helped me when I did not understand material from the lecturer. • AI helped when I was confused making a descriptive paragraph.
Aware but Cautious	9	• AI does not always give the right answer because it is still developing and not 100% perfect. • Not always—example: "nervous" vs. "nerveus," word correction is still weak. • Not always correct—sometimes off-topic. • AI gave a very different summary compared to the original material. • AI sometimes makes mistakes in complex tasks. • AI goes out of context. • AI may be wrong depending on task complexity. • AI sometimes wrong in structuring vocabulary. • AI sometimes inaccurate in statistical solutions compared to lecturer's method.
Dependent	2	• Yes, because AI never makes mistakes. • AI helped me when I had no notes and did not know where to search.
Justified Dependence	2	• I often use AI for cooking recipes (like rendang seasoning). • AI can be helpful in translation to Indonesian.
Cautious Trust	2	• AI is very helpful but sometimes wrong, especially in specific contexts. • Sometimes correct, sometimes wrong, depending on the AI used.

The findings reveal a wide range of student responses regarding their dependence on AI in ESP learning. As shown in table 5, the largest group of students (9 out of 27) fell into the "Aware but Cautious" category. These students acknowledged the usefulness of AI tools while simultaneously highlighting their limitations, such as errors in vocabulary, contextual inaccuracy, or mismatches with lecturer-provided materials. This reflects a balanced awareness that AI can support learning but should not be accepted uncritically. The second largest group (6 students) demonstrated "Low or Minimal Dependence," indicating that they occasionally used AI but remained largely independent, often noting its inaccuracies or limited reliability. Meanwhile, 4 students were categorized as "Moderate/Pragmatic Users," who employed AI selectively—for example, for translation or generating ideas—while retaining an evaluative stance toward its output. A smaller proportion of students revealed stronger reliance patterns. Two students were categorized as "Dependent," expressing full trust in AI or using it as their primary fallback when resources were lacking. Another two students expressed "Justified Dependence," where reliance on AI was linked to practical, non-academic tasks (e.g., recipe searching or simple translation). Finally, two students showed "Cautious Trust," acknowledging AI's value but stressing the need for cross-checking and context-sensitive use.

Overall, these results suggest that while ESP students actively engage with AI tools, most adopt a critical or cautious stance rather than unquestioning reliance. This indicates the potential for educators to nurture students' evaluative skills and guide them toward independent, reflective use of AI in language learning.

Next, to know how often the students used AI-Gen in their learning process, the researcher gave a question "Do you often use AI to quickly answer reading questions, translate listening materials, or generate ideas for speaking? How often?" The answers are shown in Table 6.

Table 6. *Students' use of AI tools for ESP English tasks*

Frequency Category	Example Responses	Count
Never	No/ never	4
Rarely	Rarely/Not too often	4
Sometimes / Occasionally / Moderate	Sometimes/ Moderate/ Not always/ Not as often as I imagined/ For translation tasks, mostly yes and fairly often.	7
Often / Frequently / Quite often	Yes, often/ Yes, quite often/ Yes, often if the assignment deadline is tight.	6
Very Often / Almost always	Like 9/10 I use it 7/10 for conciseness Yes, often for reference I might use AI for long readings; I use AI more often for video editing Yes, for quick answers, but it depends on the time available	6

The analysis of students' responses regarding their use of AI tools for ESP English tasks revealed varying levels of reliance. A small number of students reported never using AI, while several others used it only rarely, indicating minimal engagement. A larger portion of students used AI sometimes, often depending on task difficulty or time constraints, reflecting moderate interaction with AI-generated suggestions. Notably, a significant group of students reported frequent or very frequent use, particularly when deadlines were tight, assignments were numerous, or tasks were challenging. These findings suggest that while some students exercise caution and critically evaluate AI output, a considerable proportion rely heavily on these tools, highlighting both the widespread adoption of AI in ESP learning and the variation in students' critical engagement. This underscores the importance of understanding not only the frequency of AI use but also how critically students assess and modify AI-generated language in their learning process.

When they were asked if their language ability would be different without AI assistance, they delivered their idea in Table 7.

Table 7. *Student's thought without AI*

Response Category	Example Responses	Number of Students
No Difference / Minimal Change	"No, because I understand quite well," "No," "Not really," "Because my language ability is the same, only vocabulary expression sometimes differs," "According to me it would be the same because AI does not help much in correcting my language," "Seems not, because there are many ways to improve language skills in class or self-study," "Not too much, 11-12", "Cannot say,"	10
Slightly Different / Minor Change	"Slightly different," "Maybe not much," "Not too much, because my weakness is verbs and grammar is okay," "Maybe, because I need to search for materials myself, and the process takes time"	4
Different / Improved with AI	"Yes, because my vocabulary understanding is still limited," "Yes, definitely different because not everything AI produces is correct," "Yes, because I have to arrange words and understand structure, while AI helps speed up the learning process but shouldn't be overly relied on", "It could be different because each person thinks differently", "Yes, AI uses formal language, which is sometimes difficult to understand", "It will be different, maybe much better if learning is guided by a professional", "For storytelling tasks, maybe yes, because I still cannot improve English writing much without AI",	9

	"Certainly different. Without AI, I think more on my own, which slowly improves skills. But with AI I also learn how to write or respond properly, so both complement each other", "Yes, because I must structure words and understand grammar, while AI helps learning faster"	
AI as Helpful Supplement / Mixed View	"Let's see the positive side, we can learn language anywhere, especially with new technology," "Maybe yes, AI helps understand vocabulary and things I haven't known," "Quite a lot, because AI has corrected many books, so the language used is broader and more flexible"	3
Other / Context-Dependent	"No"	1

The analysis of students' perceptions regarding their language ability without AI assistance revealed a wide range of views. Ten students indicated that their skills would remain largely unchanged, reflecting confidence in their independent abilities and minimal reliance on AI. Four students anticipated only slight differences, suggesting minor impacts on certain aspects of language performance, such as vocabulary or grammar. Nine students reported that their language ability would be noticeably different without AI, emphasizing that AI support helps them understand vocabulary, structure sentences, and complete complex tasks more effectively. Three students highlighted AI as a helpful supplement, appreciating its role in broadening language exposure and facilitating learning without being essential. One response was context-dependent or ambiguous. Overall, these findings illustrate a spectrum of dependency on AI, from minimal impact to significant enhancement, while also highlighting that many students perceive AI as a useful tool that complements, rather than replaces, their own learning efforts.

RQ2. What factors influence students' acceptance, rejection, or refraining from AI-Generated content?

This section presents the underlying reasons behind students' responses to AI-generated applications their acceptance, when they found the suggestions useful and chose to incorporate them into their learning; their rejection, when the output did not align with their needs or expectations; and their refraining, when they perceived little necessity to rely on such tools.

Table 8. *The reason of students 'acceptance on AI in ESP Learning*

Category	Student Responses (Translated)	Number of Students
Understanding Material	To understand the material To clarify things, I do not understand To make it easier to understand the material.	10
Vocabulary & Translation	To improve understanding of unknown vocabulary To help translate vocab I do not know Because it helps translate and explain	5
Writing Support	Mostly for writing and translation For comparison Helps with assignments	4
Speaking & Listening Skills	To improve speaking skills To help understand listening materials with transcripts or exercises	2
Task Completion & Efficiency	To reduce workload Because I do not know the answer AI can save time	4
Confidence & Verification	To make sure of my answers Because I am not confident For comparison	3
General/Other	Only for assistance Because it is useful and helpful blank.	3

The findings indicate that most ESP students primarily use AI to support understanding of course materials, with ten students highlighting its role in clarifying lessons, reinforcing comprehension, and helping them remember content. A significant portion also relies on AI for vocabulary acquisition and translation (five students), showing its importance in overcoming language barriers. In addition, several students reported using AI for writing tasks (four students), either for generating text, translation, or idea development, while a smaller number applied it to listening and speaking practice (two students), reflecting a more limited but meaningful role in productive skills. Four students also valued AI for task efficiency and problem-solving when they struggled with assignments or wanted to save time, while three used it for confidence-building and verification of their work.

Overall, the results suggest that students see AI as a multifunctional tool—mainly a support system for comprehension and vocabulary, but also as an aid in writing, listening, and speaking, as well to increase confidence and reduce workload. This highlights a pragmatic and supportive use of AI in ESP learning rather than total dependence.

However, the students did not accept the results of GAI as it was as mentioned in Table 9.

Table 9. *The reason of students' rejection on AI in ESP Learning*

Category	Description	Number of Students	Examples of Responses
Not Always Follow	Students stated they do not always follow AI suggestions, depending on accuracy, context, or task requirements.	13	• "Not always." • "Sometimes, when the answer makes sense." • "I reject if the answer is wrong." • "Not always, because sometimes AI doesn't match what we need."
Reject When Inaccurate	Students gave specific examples of rejecting AI due to wrong, irrelevant, or misleading answers.	6	• "When the answer is not correct." • "I didn't agree when AI translated *nervous* as *saraf*." • "I reject if AI's language is too formal, I change it to more natural style."
Compare with Other Sources	Students cross-check AI answers with notes, textbooks, lecturers, or friends before accepting.	5	• "I usually compare with my notes." • "I prefer to follow my friends' answers." • "I search in the lecturer's material." • "I use dictionary or guidebook instead."
Follow Frequently	Students claimed they often follow AI, though not blindly.	1	• "Often follow." • "Yes, I always follow AI's suggestion."
Critical/Professional Judgment	One response emphasized using AI as support but still relying on professional judgment or intuition.	1	• "AI is helpful, but I still use my professional judgment and intuition as an educator."
Unclear / Minimal Answer	Responses unclear or very brief.	1	• "Didn't use suggestions." • "Cannot."

The results reveal that ESP students do not blindly follow AI-generated suggestions. A large majority reported selective adoption of AI output, where they accepted suggestions only if these aligned with their understanding or task requirements. About half of the students (14/27) admitted they do not always follow AI, while 6 students explicitly shared instances of rejecting AI due to inaccurate or misleading answers. Additionally, 5 students highlighted the importance of cross-checking with external sources such as notes, textbooks, lecturers, or dictionaries before relying on AI. Only a small minority stated they always or often follow AI (2/27), and one respondent reflected a more professional stance, treating AI as a supportive tool

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but relying on critical judgment for final decisions. These findings indicate that students generally show cautious and evaluative behaviour, suggesting that they are aware of both the benefits and limitations of AI tools in ESP learning.

Table 10. *The reason of students refrain from using AI in ESP learning*

Category	Student Responses (Translated)	Number of Students
Tasks are easy / understanding is sufficient	• When the words are easy and commonly used in daily life. • When I understand the task given. • When I can answer without AI. • When I am confident in my answer. • When I feel I understand and do not face difficulty. • When the questions are not too long and I understand them. • In mathematics, because it is about calculations. • For simple tasks/exams.	8
Desire for independence / self-practice	• Because I want to try by myself. • When I am studying and writing a lot, I decide not to use AI. • To avoid becoming too dependent on AI. • If the task requires original thought or rules prohibit AI. • When I want to practice to test my own ability. • When I need to use my own opinion. • Sometimes I want to write or speak in my own style so the result feels more personal and unique.	7
Accuracy / Reliability issues	• When I feel the AI answer is not correct. • Because the answer provided is inaccurate, or I already found it from another source. • When I feel AI is not helpful.	3
Ethical / Exam-related reasons	• During exams, because if I use AI, it means AI is the one taking the exam, not me. • Also, because the lecturer (Miss Ruru) said it is okay if the grade is not good, as long as we are honest. • During midterm exams in vocational school, I used AI once but got a bad grade, so I decided not to use it again.	3
Conditional / selective use	• In urgent situations when something is unclear, I may use AI while also trying to understand. • Sometimes only for reference. • Depends on what I want to look for.	3
Still dependent	• In English, I still need AI tools because it is quite difficult.	1
Confidence / motivation	• Because I feel confident. • Because I must use my own opinion.	2

Later, the findings in Table 10 suggest that ESP students adopt a selective and critical stance toward AI tools in their English learning. Most students decide not to use AI when tasks are simple or when they already understand the material, reflecting a desire for independence and self-practice. Others avoid AI due to concerns about accuracy, ethical considerations during exams, or a wish to maintain originality. Only a few admitted continued reliance on AI because of language difficulty, while some acknowledged using it selectively as a reference. Moreover, students agreed that AI is not always accurate, particularly in vocabulary, translation, and ESP-specific terminology. Nevertheless, they recognized its usefulness for generating ideas, checking grammar, and expanding vocabulary. Many adopt a balanced approach, using AI as a reference but cross-checking with trusted sources. Interestingly, some students saw AI's mistakes as beneficial, as these encouraged critical evaluation and independent learning.

Overall, the results highlight that students view AI as a supportive but imperfect tool. They do not depend on it fully; instead, they critically evaluate its output, make selective use, and prioritize personal understanding and originality in learning. This demonstrates a growing awareness of AI

literacy, where students balance the benefits of AI assistance with the need for autonomy and critical thinking in ESP contexts. These reflections might be influenced by the lecturer's encouragement in the first time of the lesson where she said that AI is a tool to help, not a tool to lean on everything. She said that the students must be responsible to every choice they take.

RQ3. In what ways do ESP students utilize AI tools to support their English skills

Table 11. *AI tools utilization*

Skill/Category	Examples of Responses	Number of Students
Translation/ Vocabulary Support	Just by scanning. I only use AI for translation. To translate texts in assignments when I do not understand vocabulary. Usually, I use AI if there is a word I do not understand. For class tasks (translate, verb forms). If there is a very long text, I use AI to translate it to save time. Looking up new/unfamiliar vocabulary.	14
Speaking/ Pronunciation	Using Google Translate to know correct pronunciation. For speaking. Occasionally for pronunciation.	4
Reading Comprehension	Reviewing a reading passage. Usually used to clarify unknown parts. Sending a photo of the task for AI to analyze.	3
Writing Support	I usually use AI to help with writing. Entering context, getting an answer, then correcting it. Creating prompts to get answers.	3
Listening	Prefer listening through audio or video. Sometimes use AI for pronunciation/listening practice.	2
General/ Integrated Use	AI in ESP class accelerates learning, provides context-based practice, and personalizes learning	1

The students showed that they utilized Gen-AI application for some goals as seen on Table 11 (appendix) where mostly are for translation or vocabulary support; a very typical EFL students to break the language barrier.

From the classification, most ESP students rely on AI primarily for translation and vocabulary support, with 13 students (50%) indicating that they use AI tools to translate texts, check unfamiliar words, or simplify long passages. This shows that overcoming lexical barriers remains their main concern when engaging with English tasks. A smaller group of students, around 4, reported using AI for speaking and pronunciation practice, typically through Google Translate or pronunciation features, while 3 students each mentioned using AI to support reading comprehension and writing activities such as generating prompts, drafting, or clarifying difficult passages. Listening practice appeared to be the least common application, with only 2 students relying on AI, as most still preferred traditional audio or video materials. Interestingly, only 1 student articulated a more advanced and integrated perspective, emphasizing AI's role in accelerating learning, providing context-based practice, and personalizing the learning process. Overall, these findings indicate that while students recognize the usefulness of AI, their utilization remains limited to basic support functions, particularly translation, with less emphasis on developing productive or integrative skills.

The findings highlight that half of the ESP students use AI mainly for translation and vocabulary, suggesting that their engagement with GenAI remains at a basic, support-focused level. Productive skills (speaking, writing) and higher-order applications (personalized or context-based tasks) are less explored, while listening is rarely practiced with AI. This suggests that while AI helps bridge lexical and comprehension barriers, there is significant room to expand its pedagogical role in developing integrated communication skills within ESP learning.

The paradox of reliance and criticality

A primary finding of this study is the complex tension between students' reliance on AI and their evolving sense of critical agency. While Table 2 shows that a substantial number of students use AI

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for almost all language tasks, Table 4 and 6 demonstrate that this reliance is often pragmatic rather than blind. This aligns with the works that emphasizes that human agency remains vital even as AI adapts to human needs (Anwar & Ahyarudin, 2023; Methnani et al., 2021;Sezgin, 2023;(Prunkl, 2022)

The high frequency of "double-checking" (Table 4) and the "Aware but Cautious" stance (Table 5) suggest that students are developing what Gutiérrez (2023) describes as a critical awareness of AI's limitations. For example, the student who rejected the AI's translation of "nervous" as "saraf" (nerve) instead of the emotional state demonstrates a high level of context-specific linguistic monitoring. This specific rejection or contextual errors proves that engineering students are applying their discipline-specific logic to language tasks. However, these results contradicted what Mehran Hosseini (2025) stated in his study that the use of AI can exacerbate disengagement among students, particularly in medical education, leading to diminished competencies in critical thinking and clinical reasoning as learners rely on AI outputs without scrutiny. Furthermore, several studies found that AI can risk students transforming into passive receivers of information, thereby diminishing cognitive activity essential for learning(Deslauriers et al., 2019); Van Nguyen & Liu, 2021; Rivera-Novoa & Duarte Arias 2025).

Factors Influencing acceptance, rejection, and modification

The results from Tables 7 and 8 indicate that student interaction with AI is governed by Professional Judgment and Accuracy. Acceptance is driven by the need for "Understanding Material" (10 students) and "Efficiency" (4 students). This supports Jane et al., (2024) who noted that GAI enhances the capabilities of learners to diversify their study methods. Rejection, however, is most frequently triggered by Instructional Alignment. Students noted they would reject AI output if it contradicted what the "lecturer taught" or the "notes provided." This highlights the enduring authority of the human instructor and the structured curriculum in an AI-saturated environment. Besides, some studied stated that the results of AI often displayed a bias for non-English writers Chen et al., 2020; Liang et al., 2023; Nazer et al., 2023). This inconsistency erodes trust in AI outputs, as students fear being penalized for using tools designed to assist them. Moreover, the ambiguity pertaining to the reliability of these AI tools makes students sceptical about their adoption in academic settings (Paustian & Slinger, 2024). The "Modification" strategy (Table 3) is particularly noteworthy. Some students played by modifying the prompt they use in the AI. Several studies have shown that a better prompt can lead to an accurate, clear, and relevant results, especially in specific terms in ESP context ((Choi et al., 2024; Meskó, 2023; Webb, 2023). Students who adapted AI output to make it more humanized and contextual are exercising agency. This mirrors the findings of Cross et al. (2024) who argue that reflective practices allow students to understand and mitigate AI biases.

ESP skills development and the risk of helplessness

While nine students believed their language skills would be different (worse) without AI, a significant group (ten students) felt their abilities remained unchanged. This suggests that for many engineering students, AI is viewed as a helpful complement rather than depend on dependency. As (Saúde et al., 2024) mentioned in their study that the ability of AI tools to cater to individual learning needs reinforces their perception as supportive rather than as crutches. AI can facilitate the students in discussion and give some recommendations (Alrayes et al., 2024; Gomez-Cabello et al., 2024; Hwang et al., 2025) . However, the Dependent group (Table 5), though small, remains a concern. These students view AI as "never making mistakes," which is the exact "uncritical acceptance" that Gutiérrez (2023) warns against. This dependency could lead to the "learned helplessness" described by Chavez et al. (2024) where students lose confidence in their independent writing abilities. The fact that students use AI most frequently when "deadlines are tight" (Table 6) suggests that academic pressure is a major driver of potential overreliance, regardless of the student's actual language competence. This finding might be a strong concern for the lecturer on how and when they give tasks to their student.

Implications for ESP pedagogy in engineering

The study's results suggest that the "Indonesian engineering context" requires a specific pedagogical approach. Since students are already cross-checking AI with "lecture materials and notes" (Table 4), educators should move away from banning AI and toward "Structured Academic Validation." By teaching students how to validate AI outputs against "professional contexts and ESP communication goals"—as one student in this study already does—instructors can foster a culture of AI Literacy. This confirms the suggestions of

Sarnovska et al. (2024) that comprehensive literacy programs are essential for navigating the complexities of AI in higher education. Furthermore, the findings of this study align with a broader shift in the Indonesian educational landscape toward specialized pedagogical frameworks necessitated by technological integration. As Zawacki-Richter et al. (2019) and (Abuzar et al. (2025) argue, the high reliance of engineering students on AI tools creates an urgent need for "tailored pedagogical strategies" that prioritize critical engagement over passive consumption. This requirement for modernization is further echoed by Hakiki et al. (2024) and Lexie Egbert Rumayar et al. (2023), who highlight that as Industry 4.0 and emerging technologies like blockchain become standard, engineering education must move beyond traditional instruction toward structured validation models. Furthermore, the success of targeted interventions—such as the ENACT model observed by (Erna et al. (2023)—suggests that when Indonesian engineering students are provided with specific evaluative frameworks, they can develop the social and professional responsibility required to navigate complex digital environments. Collectively, these studies support the conclusion that the critical discernment observed in this ESP course is not an isolated event but a necessary competency for the modern Indonesian engineer.

Limitations of the study

While this study provides significant insights into the development of "Digital-Linguistic Agency" among ESP students, several limitations must be acknowledged. First, the sample size was limited to 27 Mechanical Engineering students from a single Indonesian university. While this purposive sampling allowed for deep qualitative inquiry, the findings may not be generalizable to students in other disciplines (such as social sciences) or different geographical contexts.

Second, the research duration was relatively short, focusing on a single academic term. A longitudinal approach would be more effective in determining whether student agency strengthens or diminishes as they become more habituated to generative AI over several years. Third, the study relied heavily on self-reported data through open-ended questionnaires. Although class observations were conducted to triangulate the findings, there remains a possibility of social desirability bias, where students may over-report their critical engagement with AI to align with academic expectations.

Future research should consider larger, multi-disciplinary cohorts and employ Mixed Methods—integrating learning analytics or screen-recording data—to observe real-time student interactions with AI interfaces.

CONCLUSION

Based on the findings, several key conclusions can be drawn. First, the results indicate that ESP students are selective and critical in their use of AI tools; while they acknowledge the usefulness of AI tools, they do not rely on them blindly. Many of them evaluate the accuracy, relevance, and appropriateness of AI outputs, often cross-checking with other resources such as lecture materials, dictionaries, or peer input. This shows that students are developing a degree of critical literacy in engaging with AI-generated content. Second, in terms of factors influencing their acceptance, revision, or rejection of AI output, students' decisions were shaped by the perceived accuracy of the response, alignment with the task requirements, and compatibility with classroom instruction. Some students accepted AI suggestions when they were clear and useful, while others revised or rejected them if the language was too formal, off-topic, or inconsistent with what they had learned from their lecturers. These choices also reflected students' awareness of AI's limitations and their desire to maintain control over their own learning. Finally, the findings reveal that AI is used most frequently for translation, vocabulary building, and text comprehension. Some students also employed AI for writing support and, to a lesser extent, for speaking and listening practice. Overall, AI tools were viewed as supplementary aids that can enhance learning efficiency and provide quick access to information, but not as replacements for active learning or instructor guidance.

This study offers several recommendations to encourage more critical and responsible use of GenAI tools in ESP learning. Developing critical AI literacy should be prioritized by teaching students how to evaluate AI-generated suggestions and recognize their limitations. Classroom practices can integrate AI-awareness activities—such as peer review, guided editing, and reflective writing—to foster active engagement and critical decision-making rather than passive reliance. Scaffolding is especially important for lower-proficiency students, enabling them to build both language competence and confidence in

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questioning AI outputs. Since time pressure often leads to uncritical acceptance of AI content, instructors should also emphasize time management strategies that allow students to review and revise more thoughtfully. Finally, future research should broaden the scope by involving larger and more diverse student groups, and by employing longitudinal or mixed-method approaches to gain deeper insight into how students' critical engagement with GenAI evolves over time.

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