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Original Article

Assessing Polytechnic Students' Dependency on AI Tools in ESP Writing

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Abstract

The rapid integration of Artificial Intelligence (AI) tools in language education has reshaped writing practices, particularly in English for Specific Purposes (ESP) contexts. This study investigates Polytechnic students' dependency on AI tools in Business English writing, focusing on how AI use influences writing self-efficacy and perceived autonomy. A qualitative research design was employed involving 25 undergraduate students enrolled in a Business English course. Data were collected through open-ended questionnaires and analyzed using thematic analysis to identify recurring patterns related to AI use, confidence, dependency, and feedback perceptions. The findings reveal that students primarily perceive AI as a language enhancement tool that improves vocabulary, grammar, translation accuracy, and writing efficiency. However, strong functional dependency emerged, particularly at the lexical and sentence levels, with several students reporting reduced confidence when writing without AI assistance. While AI-generated feedback was valued for clarity and immediacy, human feedback from lecturers and peers was considered more contextually meaningful and pedagogically authoritative. Students also expressed awareness of risks such as overreliance, reduced effort, and ethical concerns. The study concludes that AI serves as both a supportive scaffold and a potential source of dependency. Effective and structured pedagogical integration is essential to ensure that AI enhances rather than replaces students' independent writing competence.

Keywords: Artificial Intelligence, ESP Writing, Learner Autonomy, Polytechnic Students, Writing Self-Efficacy.

1. Introduction

Advancements in technology have continuously reshaped the education landscape, offering new opportunities to enhance student learning experiences. Among these advancements, Artificial Intelligence (AI) has emerged as a transformative tool, particularly in language learning environments (Syarifudin, 2024; Yatri et al., 2023). AI tools, such as grammar checkers, writing assistants, and personalised learning platforms, have gained significant traction in educational settings (Chen et al., 2020; Lin et al., 2023; Qassrawi & Al Karasneh, 2025). In the context of English for Specific Purposes (ESP), particularly for polytechnic students, these technologies offer potential solutions to improve writing proficiency by helping students produce discipline-specific texts. This is because students need a deep understanding of both language and technical content. AI can help address this problem by providing direct feedback on students' writing. As Romadhon et al. (2026) notes, ChatGPT can provide feedback on students' writing by following professional communication conventions.

Despite the promising benefits of AI integration, a persistent dilemma remains in current educational approaches. There is a growing tendency for polytechnic students to rely on AI tools for ESP writing tasks. While AI tools can support students in areas such as grammar correction and vocabulary enhancement, their increasing reliance on them might

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hinder the development of essential writing competencies, including critical thinking, independent revision skills, and the ability to produce original content (Romadhon et al., 2024; Walter, 2024; Alhalangy & AbdAlgane, 2023). This dilemma becomes particularly pressing when considering the potential limitations of AI in understanding domain-specific nuances or fostering the metacognitive processes essential for authentic learning and writing in technical disciplines. According to Kim et al. (2025), AI often fails to capture nuances, rhetorical goals, or personal style, resulting in suggestions that sometimes do not align with the desired context or technical writing style.

This issue remains unresolved due to a lack of targeted research on polytechnic students' dependence on AI in ESP writing contexts. While studies have explored AI's role in general language learning, there is a gap in the literature on how these tools affect the writing practices of polytechnic students, who face the unique challenge of producing technical and professional texts. Most studies in this area are heavily focused on students at non-polytechnic higher education institutions (HEIs), without distinguishing between university and polytechnic students (Crompton & Burke, 2023; Dogan et al., 2023; Mustafa et al., 2024). As such, this dependency issue is not only under-researched but also lacks empirical evidence to assess its implications on students' long-term writing development and academic performance.

To resolve this issue, the present research proposes investigating the relationship between polytechnic students' AI dependence and their development of writing skills. By understanding how much students rely on AI tools, we can better assess whether these tools help or hinder their writing progress. This study aims to examine the relationship between polytechnic students' dependence on Artificial Intelligence (AI) tools and the development of their English for Specific Purposes (ESP) writing skills, particularly in terms of writing self-efficacy and perceived autonomy. Specifically, this study will investigate how polytechnic students use AI in their writing tasks, the factors that influence this use, and the implications for their writing capabilities. The research will seek to answer the following questions: How does the use of AI influence EFL students' writing self-efficacy and perceived autonomy? Through this, the study will provide valuable insights into the practical use of AI in polytechnic writing education and guide educators in developing more balanced and effective teaching strategies.

2. Literature Review

2.1. Writing Self-Efficacy in ESP and EFL Contexts

Writing self-efficacy, grounded in social cognitive theory (Bandura & Wessels, 1997), refers to learners' beliefs in their capability to perform writing tasks successfully. In ESP and EFL contexts, this construct has emerged as a strong predictor of writing performance, strategic engagement, and persistence. A growing body of empirical research indicates that students who report higher levels of writing self-efficacy tend to produce better quality texts and engage more actively in self-regulated learning processes (Sun et al., 2021; Sun & Wang, 2020). As Teng et al. (2022) explain, writing self-efficacy in foreign language settings is multidimensional and includes linguistic efficacy, self-regulatory efficacy, and performance efficacy.

Recent validation studies have strengthened the measurement of writing self-efficacy in EFL contexts. Teng et al. (2022) found that academic writing self-efficacy significantly predicts writing performance beyond general language proficiency. Golparvar and Khafi (2021) similarly reported that learners' efficacy beliefs were closely associated with their use of integrated writing strategies. These findings align with meta-analytic evidence showing a

consistent and meaningful association between second language writing self-efficacy and achievement across educational levels (Sun et al., 2021).

A substantial line of research highlights the relationship between writing self-efficacy and self-regulated learning. Writing self-efficacy is positively associated with cognitive, metacognitive, and motivational regulation strategies (Sun & Wang, 2020; Teng et al., 2022). Teng (2024) demonstrated that motivational beliefs, particularly self-efficacy, significantly predict learners' use of self-regulated strategies in EFL writing tasks. In both secondary and tertiary education, students with stronger efficacy beliefs are more likely to plan, monitor, and evaluate their writing strategically (Teng & Huang, 2019). In contrast, lower self-efficacy is often linked to avoidance behaviors and limited strategic engagement.

Motivational constructs such as growth mindset and task value also interact with writing self-efficacy. Bai et al. (2021) found that self-efficacy had stronger predictive power for writing competence than task value among primary EFL learners in a Confucian cultural context. Bai and Wang (2021) further showed that motivational beliefs influenced writing performance indirectly through self-regulated strategy use. These findings suggest that writing self-efficacy functions both as a direct predictor of performance and as a mediator between motivation and strategic behavior.

Intervention research confirms that writing self-efficacy can be enhanced through instructional design. Strategy-based instruction grounded in self-regulated learning theory has consistently resulted in improvements in both efficacy beliefs and writing performance (Nevisi & Safiloo, 2023; Teng, 2022). Technology-enhanced environments also show promising results. Sari and Han (2024) reported that automated writing evaluation improved EFL learners' writing self-efficacy, self-regulation, and performance. Sherafati and Largani (2023) found that computer-based feedback significantly strengthened learners' self-efficacy alongside writing achievement.

Recent studies have examined the integration of large language models into writing instruction. Liu et al. (2023) found that AI-supported instruction improved writing performance and motivational engagement, partly through increased use of self-regulated learning strategies. Experimental evidence from randomized controlled trials also indicates that automated feedback can enhance writing skills and learner confidence (Wei et al., 2023). However, Song and Song (2023) emphasize that the effectiveness of AI tools depends on appropriate pedagogical scaffolding and teacher guidance.

Contextual and individual differences influence how writing self-efficacy develops and operates. Shen and Bai (2024) reported that gender and academic major moderated the relationship between self-efficacy and writing performance among Chinese university students. Cultural variables also shape learners' interpretations of success and failure, which in turn affect efficacy development (Tao & Yu, 2024). Writing anxiety shows a consistent negative association with writing self-efficacy (Sabti et al., 2019). Longitudinal findings suggest that metacognitive strategy use can reduce anxiety while simultaneously strengthening efficacy beliefs (Shen et al., 2024).

Teacher-related variables require further attention. Structured teacher and peer feedback have been shown to enhance learners' confidence and strategic engagement (Cui et al., 2021; Yang et al., 2023). At the same time, teachers' own beliefs about self-assessment and efficacy-building practices influence classroom implementation (Zhang et al., 2022). This indicates that writing self-efficacy development is shaped not only by learner characteristics but also by instructional context.

Overall, the literature converges on several key points. Writing self-efficacy is a multidimensional and empirically supported construct that strongly predicts writing

performance in ESP and EFL contexts. Its influence is closely linked to self-regulated learning strategies and motivational beliefs. Instructional interventions, including strategy-based approaches and technology-enhanced feedback, can strengthen both efficacy beliefs and writing outcomes. Future research should continue to examine how emerging AI-mediated environments affect the development of writing self-efficacy across diverse ESP and EFL settings.

2.2. AI-Assisted Writing and Human–AI Interaction in Education

The rapid development of generative artificial intelligence has transformed academic writing practices across educational levels. AI-assisted writing tools, particularly large language models such as ChatGPT, are increasingly used for brainstorming, outlining, paraphrasing, and revising texts. Recent empirical research suggests that these tools function not only as technical aids but also as cognitive partners that shape how learners plan, draft, and refine their writing (Nguyen et al., 2024; Wang, 2025). As Kim et al. (2025) argue, students often perceive generative AI as a collaborative agent that supports idea development and reflection rather than merely correcting surface-level errors.

Studies examining patterns of human–AI collaboration show that iterative and dialogic use of AI tools tends to produce stronger writing outcomes than one-time content generation. Nguyen et al. (2024) identified distinct collaboration patterns, noting that students who engaged in cycles of prompting, evaluating, and revising with AI produced more coherent and analytically developed essays. Similarly, Wang (2024) reported that both native and nonnative English speakers benefited from structured interaction with generative AI during drafting and revision. These findings suggest that the pedagogical value of AI-assisted writing depends on how learners integrate AI feedback into their cognitive processes.

Learners' and teachers' perceptions play a central role in shaping classroom implementation. Survey-based and mixed-method studies consistently indicate that students appreciate AI tools for improving grammar, organization, and clarity (Malik et al., 2023; Ozfidan et al., 2024; Utami & Winarni, 2023). However, concerns regarding originality, overreliance, and ethical misuse remain salient (Imran & Almusharraf, 2023; Yeo, 2023). Barrett and Pack (2023) found that while many instructors acknowledge the potential benefits of generative AI, they also express uncertainty about assessment integrity and appropriate boundaries for AI use. This tension reflects a broader need to reconceptualize authorship and academic responsibility in AI-mediated environments.

Beyond technical improvement, AI-assisted writing has been linked to motivational and self-regulatory outcomes. Liu et al. (2021) demonstrated that embedding reflective prompts within AI-supported writing environments enhanced students' metacognitive awareness and engagement. More recently, Jin et al. (2025) modeled the relationship between AI-assisted writing and learning outcomes, showing that self-regulated learning strategies mediated the impact of AI use on writing performance. Song and Song (2023) also reported increased motivation and perceived competence among EFL learners who used ChatGPT in structured instructional settings. These findings indicate that AI tools can strengthen learning processes when integrated with pedagogical scaffolding.

At the same time, scholars caution against uncritical adoption. Fan et al. (2024) introduced the concept of metacognitive laziness to describe situations in which learners rely excessively on AI outputs without engaging in critical evaluation. Experimental evidence suggests that when students accept AI-generated responses passively, their analytical depth and long-term retention may decline (Fan et al., 2025). Niloy et al. (2024) further questioned whether heavy reliance on generative AI could constrain creative development in writing tasks.

Although findings are not uniform, these concerns highlight the importance of designing tasks that require active human judgment and revision.

Ethical and policy implications have become central to discussions of human–AI interaction in education. Large language models can generate original text that bypasses traditional plagiarism detection systems, complicating academic integrity frameworks (Herbold et al., 2023; Yeo, 2023). Revell et al. (2024) compared AI-generated and human-written essays and concluded that distinguishing authorship is increasingly difficult in certain contexts. Consequently, scholars advocate for assessment redesign rather than simple prohibition of AI tools. Parker et al. (2025) propose dialogic pedagogies in which AI is treated as a co-participant in meaning-making, while Ou et al. (2024) encourage post-humanist perspectives that view writing as distributed across human and technological agents.

Emerging research from diverse cultural contexts further enriches this discussion. Widiati et al. (2023) reported that Indonesian EFL teachers recognized improvements in organization and language accuracy but remained cautious about originality and student independence. Guo and Li (2024) found that EFL students who created personalized AI chatbots demonstrated increased engagement and autonomy in writing tasks. These cross-contextual findings suggest that the educational impact of AI-assisted writing is mediated by local norms, digital literacy levels, and institutional policies.

Overall, the literature indicates that AI-assisted writing represents a shift from tool-based support to interactive human-AI collaboration. Its effectiveness depends on iterative engagement, self-regulated learning, and explicit ethical guidance. Rather than replacing human writers or instructors, AI systems appear most beneficial when positioned as dialogic partners within carefully designed pedagogical frameworks. Future research should examine long-term effects on creativity, authorship identity, and assessment practices in increasingly hybrid learning environments.

3. Methods

3.1. Research Design

This study employed a qualitative research design to explore students' perceptions of AI use in academic writing. A qualitative approach was selected because the research aimed to capture participants' subjective experiences, beliefs, and reflections regarding the influence of AI tools on their writing self-efficacy and autonomy. The study relied on open-ended questionnaire responses as the primary data source, enabling in-depth thematic interpretation rather than statistical generalization.

3.2. Participants

The participants were 25 undergraduate students enrolled in a Business English course focusing on business correspondence. The course covers formal emails, inquiry letters, complaint letters, and other professional written communication genres. Participants were selected using convenience sampling, as they were students in the researcher's class.

In terms of English proficiency, the students were at the B1–B2 level according to the Common European Framework of Reference for Languages (CEFR). Their experience with AI tools, particularly generative AI platforms such as ChatGPT, was at a beginner level. Most students reported using AI primarily for idea generation, grammar checking, paraphrasing, and drafting assistance. None of the participants had received formal training in advanced AI prompting strategies.

3.3. Data Collection

Data were collected through a structured questionnaire consisting of open-ended questions. The instrument was designed to elicit students' reflections on their confidence in writing when using AI, their sense of independence or dependence on AI tools, their perceived writing ability without AI, and the overall impact of AI use on their writing development.

The questionnaire was administered after students had gained experience using AI tools in completing business correspondence tasks. Responses were collected in written form to allow participants to express their views in detail. Participation was voluntary, and respondents were informed that their answers would be used solely for research purposes. Confidentiality and anonymity were ensured by removing any identifying information from the dataset.

3.4. Data Analysis

The data were analyzed using thematic analysis following the six-phase framework proposed by Braun and Clarke (2021). This approach was selected for its systematic yet flexible procedure in identifying, analyzing, and reporting patterns within qualitative data. Given the open-ended nature of the responses, the analysis began with a close reading of all responses to achieve familiarity with the data. Each response was then segmented into meaningful units, which were assigned initial codes based on their relevance to key constructs such as writing self-efficacy, learner autonomy, dependency on AI, and perceived learning impact. The coding process was conducted manually, allowing for careful interpretation of participants' expressions and contextual meanings.

Subsequently, related codes were grouped into broader categories to form potential themes. These themes were reviewed and refined to ensure internal coherence and clear distinctions between them. Each theme was then defined and labeled to reflect its conceptual significance. The final stage involved integrating the identified themes with relevant theoretical frameworks to produce a coherent analytical narrative.

The analysis was primarily inductive, allowing themes to emerge from the data, while also being informed by existing theoretical constructs related to writing self-efficacy and learner autonomy. To enhance credibility, iterative coding and continuous refinement of themes were undertaken. Reflexive notes were maintained throughout the process to acknowledge the researcher's dual role as instructor and investigator, and to ensure that interpretations remained grounded in participants' actual responses. Given the use of convenience sampling and the relatively small sample size, the findings are not intended for broad generalization. Instead, they offer contextualized insights into how Business English students at the B1-B2 level perceive the influence of AI on their writing development.

4. Results and Discussion

4.1. Research Results

The qualitative data from 25 questionnaire responses were analyzed using thematic analysis. The analysis followed iterative stages of familiarization, initial coding, categorization, and theme development. Meaningful units related to AI use in ESP writing were first coded line-by-line. Codes were then grouped into broader categories reflecting patterns of dependency, perceived benefits, challenges, and confidence. The analysis resulted in four major themes:

4.1.1. Theme 1: AI as a Writing Support and Language Enhancement Tool

This theme reflects students' perceptions of AI as a supportive resource that enhances vocabulary, grammar, translation accuracy, and overall writing quality in Business English tasks. Participants consistently described AI as a tool that facilitates language production and reduces linguistic difficulties when composing ESP texts such as business correspondence.

A dominant pattern across responses was the perception that AI significantly assists the writing process. Several participants explicitly described AI as helpful in completing writing tasks. For example:

"In my opinion, using AI is very helpful..."

This statement reflects a clear and positive evaluation of AI as a practical aid in writing.

Students also emphasized how AI improves their linguistic awareness, particularly at the lexical and grammatical levels. One participant explained:

"I can identify parts of speech quickly..."

This suggests that AI helps students recognize grammatical categories and understand word functions more efficiently, supporting their metalinguistic awareness.

Translation support emerged as a central benefit. Multiple students described AI as enabling the immediate conversion of ideas from Indonesian into English. For instance:

"It can directly become English."

Another student stated:

"With the presence of AI, it really makes it easier for students..."

These responses indicate that AI reduces the cognitive load involved in expressing ideas in a foreign language. Students rely on AI to bridge vocabulary gaps and construct grammatically acceptable sentences.

Ease and clarity were also repeatedly mentioned. One participant remarked:

"By using AI, it definitely feels easier..."

This comment highlights how AI simplifies the writing process, particularly in formal genres such as business emails and letters. The repeated references to ease suggest that AI serves as a scaffold when students encounter linguistic uncertainty.

Collectively, these responses demonstrate that AI is primarily positioned as a language enhancement tool. It supports vocabulary expansion, grammatical correction, structural organization, and translation, thereby improving the technical quality of students' writing.

A closely related subtheme concerns efficiency. Several participants implicitly connected AI use with faster task completion. For example:

"It can directly become English."

This statement reflects immediacy and the rapid transformation of ideas into English. Similarly, the perception that AI "really makes it easier for students" suggests reduced time and effort in drafting texts.

The emphasis on speed underscores AI's functional appeal in academic contexts. Students appear to value AI not only for linguistic accuracy but also for its ability to streamline the writing process.

Overall, participants consistently framed AI as a supportive and language-enhancing tool in ESP writing. They reported improvements in vocabulary recognition, grammatical awareness, translation accuracy, and overall ease of writing. The data show strong agreement that AI reduces linguistic barriers and increases efficiency in completing Business English tasks.

4.1.2. Theme 2: Functional Dependency on AI for Translation and Accuracy

This theme reflects students' reliance on AI tools, particularly translation applications and generative AI platforms, as integral components of their Business English writing process. AI is not merely perceived as supportive, but in many cases as necessary for completing writing tasks with confidence and accuracy.

The majority of participants reported habitual and repeated use of AI tools when completing writing assignments. The most frequently mentioned tool was Google Translate, followed by ChatGPT. Students often referred to these tools in simple, direct terms, indicating routine integration into their workflow.

"I usually use Google Translate."

"ChatGPT."

"I use Google Translate more often..."

"Usually, I use AI only for translating..."

The recurring reference to translation suggests that AI is primarily utilized at the lexical and sentence level. Rather than employing AI for higher-level rhetorical organization or genre strategy in business correspondence, students tend to rely on it for converting ideas from Indonesian into grammatically correct English. This pattern indicates a functional orientation toward accuracy and linguistic correctness.

Several responses reveal that AI use extends beyond convenience and enters the domain of psychological reliance. Some students expressed a lack of confidence when writing without AI support.

"I am not confident if I do not use AI."

"If I write without using anything, I do not feel confident."

These statements indicate that AI has become embedded in students' writing routines to the extent that independent writing feels risky or inadequate. AI functions as a form of reassurance, particularly for grammar validation and translation accuracy.

At the same time, a minority of participants demonstrated partial independence:

"It is 50-50, because sometimes I also need Google..."

This response suggests a balanced dependency, where AI is used as a complementary tool rather than a total substitute for individual linguistic effort.

The data demonstrates strong functional dependency on AI, particularly for translation and grammatical accuracy. AI tools are perceived not only as efficient but as essential mechanisms for ensuring correctness and reducing anxiety in Business English writing tasks. While some students maintain partial autonomy, the dominant pattern indicates reliance at the sentence and vocabulary level rather than strategic, higher-order writing development.

4.1.3. Ambivalent Trust: AI versus Human Feedback

This theme captures students' comparative evaluations of AI generated feedback and feedback provided by peers or lecturers. The findings reveal mixed levels of trust, perceived credibility, and pedagogical value.

Several participants expressed preference for AI feedback due to its clarity, specificity, and immediate response. AI was perceived as capable of providing structured explanations that directly address linguistic errors.

"AI because it can explain in detail."

This response indicates that students value the explicitness and precision of AI generated corrections, particularly in relation to grammar and vocabulary. The perceived analytical depth strengthens trust in AI for technical revision.

However, a larger number of participants expressed stronger confidence in feedback from peers and lecturers. Human feedback was associated with greater contextual understanding and instructional relevance.

"In my opinion, it is better when feedback is given by friends."

"In my opinion, suggestions from lecturers or friends are better."

"It is better from the lecturer because it is also explained."

These responses suggest that students perceive human feedback as more pedagogically grounded. Unlike AI, lecturers and peers are seen as understanding task expectations, classroom objectives, and individual learning needs.

Participants emphasized explanation, interaction, and relational engagement when discussing lecturer feedback. Human evaluators are perceived not only as correctors of error but as facilitators of understanding. The dialogic element appears to enhance credibility and learning value.

Interestingly, not all participants adopted a polarized stance. One student articulated a balanced perspective:

"Both are equally good, depending on each person."

This statement reflects nuanced judgment rather than binary preference. It suggests that students differentiate between the functional strengths of AI and the pedagogical authority of human feedback.

The findings indicate ambivalent trust. AI is appreciated for technical accuracy, clarity, and efficiency in error correction. However, human feedback retains stronger authority in terms of contextual interpretation, instructional guidance, and evaluative legitimacy. While AI is trusted as a revision tool, lecturers and peers remain central to students' perceptions of meaningful learning and academic validation.

4.1.4. Reduced Confidence and Emerging Overreliance

This theme reflects students' acknowledgment of the potential negative consequences of AI use, particularly dependency, decreased effort, and reduced confidence when writing independently without technological assistance.

Although many participants recognized the benefits of AI, several explicitly mentioned its adverse effects. The most frequently identified concern was dependency. Students were aware that repeated reliance on AI tools might limit their own language development.

"The negative impact is dependency."

This statement directly frames AI as creating habitual reliance rather than fostering autonomous competence.

Another participant highlighted reduced cognitive engagement, particularly when AI outputs are copied without reflection:

"AI makes me lazier if I just copy and paste."

This response suggests awareness of passive learning behavior, where AI becomes a shortcut rather than a scaffold. The concern is not the tool itself, but uncritical usage that bypasses drafting and revision processes.

When asked about writing without AI, multiple students reported diminished confidence. Their responses reveal a perceived gap between assisted and unassisted performance:

"I am not confident if I do not use AI."

"If I write without using anything, I do not feel confident."

"In my opinion, no, because I myself am lacking."

These statements indicate that frequent AI mediation may weaken students' perceived writing competence. Confidence appears to be externally supported by AI validation, particularly for grammar and lexical accuracy.

Ethical reflection also emerged regarding dependency. Some students adopted a conditional stance, suggesting that AI use is acceptable within reasonable limits:

"If its use is not excessive."

This response implies that moderation determines legitimacy. AI is not inherently problematic, but overuse is viewed as detrimental.

Other participants expressed a stricter position:

"It is completely unjustified."

This stronger judgment reflects internal tension between recognizing AI's functional benefits and maintaining academic responsibility.

The findings reveal a dual awareness. Students acknowledge the efficiency and linguistic support provided by AI, yet they simultaneously recognize risks of dependency, reduced effort, and declining confidence in independent writing. While AI is embraced as a practical tool, concerns about long-term overreliance and academic integrity remain evident in their reflections.

4.2. Discussion

The present study examined Polytechnic students' dependency on AI tools in ESP Business English writing. The findings reveal a complex pattern characterized by functional reliance, perceived linguistic enhancement, ambivalent trust in AI versus human feedback, and emerging concerns about reduced confidence and overreliance. These results provide insight into how AI-mediated writing support intersects with writing self-efficacy, self-regulated learning, and human-AI interaction in ESP contexts.

First, students predominantly positioned AI as a language enhancement tool that reduces linguistic barriers in Business English writing. They reported improvements in vocabulary recognition, grammatical awareness, translation accuracy, and overall clarity. AI was valued for its immediacy and efficiency, particularly in converting ideas from Indonesian into grammatically acceptable English sentences. This indicates that AI functions primarily as a linguistic scaffold at the lexical and sentence level rather than as a strategic partner in higher-order genre development.

Second, the data show strong functional dependency. AI tools such as Google Translate and ChatGPT were described as habitual components of students' writing routines. For many participants, AI use extended beyond convenience and became psychologically embedded. Several students expressed a lack of confidence when writing without AI support. This suggests that AI may operate as an external regulator of perceived competence, particularly in grammar validation and translation accuracy. While a minority demonstrated balanced usage, the dominant pattern reflects reliance on AI for accuracy assurance rather than strategic writing development.

Third, students demonstrated ambivalent trust toward AI-generated feedback. AI was appreciated for its detailed explanations and clarity in addressing linguistic errors. However, human feedback from peers and lecturers was generally perceived as more pedagogically meaningful, contextually grounded, and aligned with instructional expectations. This distinction indicates that students differentiate between technical correction and educational guidance. AI is trusted for surface-level revision, whereas human evaluators retain authority in shaping deeper learning.

Finally, the findings reveal awareness of potential negative consequences. Participants explicitly mentioned dependency, reduced effort, and diminished confidence in independent writing. Some acknowledged that copying AI output without reflection may limit cognitive engagement. Ethical concerns were also expressed, ranging from conditional acceptance to complete rejection of excessive AI use. These reflections suggest that students are not passive consumers of AI but are critically aware of its double-edged nature.

The findings align with research demonstrating that writing self-efficacy strongly predicts engagement and performance in EFL and ESP contexts. Prior studies have shown that

higher self-efficacy is associated with greater use of self-regulated strategies (Sun & Wang, 2020; Teng, 2021; Teng et al., 2022). In the present study, however, students' confidence appears partially externalized through AI assistance. While AI may temporarily increase perceived competence, the reported lack of confidence without AI suggests that efficacy beliefs may not be fully internalized. This nuance extends previous research by indicating that AI-mediated environments may alter how self-efficacy is constructed and sustained.

The results also resonate with technology-enhanced writing research. Studies have reported that automated feedback and AI-supported instruction can improve writing performance and learner confidence (Sari & Han, 2024; Wei et al., 2023; Liu et al., 2024). Participants in this study similarly valued AI for grammatical accuracy and clarity. However, consistent with Song and Song (2023), the effectiveness of AI appears contingent upon pedagogical integration. Students primarily used AI for translation and sentence-level correction rather than iterative dialogue or reflective revision, which contrasts with findings by Nguyen et al. (2024) and Wang (2025) that emphasize the benefits of dialogic human–AI collaboration.

The theme of overreliance corresponds closely with concerns raised in the literature regarding metacognitive laziness (Fan et al., 2025) and reduced critical engagement. Participants' statements about becoming "lazier" or dependent reflect these theoretical cautions. At the same time, the ambivalent trust toward AI and stronger confidence in human feedback echoes findings by Barrett and Pack (2023) and Widiati et al. (2023), who reported instructor and contextual concerns about originality and independence. Thus, the present findings support existing scholarship while adding context-specific insight into ESP Business English writing in a Polytechnic setting.

The study contributes to knowledge about AI-mediated writing by highlighting how dependency interacts with writing self-efficacy. While prior research emphasizes AI's potential to enhance motivation and self-regulation, the present findings suggest that excessive reliance may externalize efficacy beliefs rather than strengthen internal strategic competence. This indicates a need to reconceptualize writing self-efficacy in AI-rich environments, where perceived competence may be co-constructed with technological tools.

The findings also extend scholarship on human–AI interaction by demonstrating that students differentiate between technical authority and pedagogical authority. AI is positioned as a linguistic validator, whereas lecturers and peers remain central to meaning-making and evaluative legitimacy. This supports perspectives that frame AI as a collaborative but not replacement agent in educational contexts.

For ESP educators, the findings underscore the importance of structured AI integration. Rather than discouraging AI use, instructors may design tasks that require iterative interaction, critical evaluation of AI output, and reflective revision. Explicit instruction on prompt design, verification, and editing could help transform AI from a translation shortcut into a dialogic partner that supports self-regulated learning.

Curriculum designers may also incorporate guidelines that clarify acceptable boundaries of AI use in Business English writing. Since students value human feedback for contextual understanding, blended feedback models that combine AI-generated suggestions with instructor commentary may optimize learning outcomes.

Institutionally, policies should move beyond prohibition and instead focus on responsible use frameworks. Ethical discussions, assessment redesign, and process-based evaluation may help balance innovation with academic integrity.

This study has several limitations. First, the sample size was limited to 25 students from a single Polytechnic context, which restricts generalizability. Second, the data were collected

through self-reported questionnaire responses, which may reflect perceived behavior rather than actual writing practices. Third, the study focused on Business English tasks within ESP, and findings may not transfer directly to other genres or disciplines. Finally, the cross-sectional design does not allow examination of long-term changes in self-efficacy or dependency patterns.

Future research should employ mixed-method or longitudinal designs to examine how AI use influences writing self-efficacy over time. Observational or experimental studies could analyze actual drafts and revision cycles to determine whether AI promotes or inhibits strategic engagement. Comparative studies across different ESP domains and institutional contexts would also clarify how disciplinary demands shape AI dependency. Additionally, research exploring instructional interventions that balance AI assistance with self-regulated learning training would provide practical guidance for curriculum development.

In summary, the findings reveal that Polytechnic students perceive AI as an efficient and linguistically supportive tool in ESP writing, yet they also demonstrate functional dependency and reduced confidence in independent writing. AI is trusted for technical accuracy, while human feedback remains central to meaningful learning. These patterns reflect both the promise and the tension of AI-mediated writing environments. Effective pedagogical integration, grounded in self-regulated learning principles and ethical clarity, is essential to ensure that AI strengthens rather than replaces students' writing competence.

5. Conclusion

This study investigated polytechnic students' dependency on AI tools in ESP Business English writing and revealed a multifaceted pattern of use. The findings show that students primarily perceive AI as a language enhancement tool. It improves vocabulary, grammar, translation accuracy, and overall clarity. AI also reduces linguistic barriers and increases efficiency, particularly by enabling rapid conversion of ideas from Indonesian into English. However, AI use extends beyond technical support. It has become functionally embedded in many students' writing routines. A dominant pattern of reliance emerged, especially at the lexical and sentence levels. Several students reported diminished confidence when writing without AI assistance. While a minority demonstrated balanced use, the overall trend indicates dependency for accuracy assurance rather than higher-order strategic development.

The study also identified ambivalent trust in AI-generated feedback. Students valued AI for its clarity and detailed explanations of linguistic errors. However, peer and lecturer feedback were generally considered more meaningful and contextually grounded. Human evaluators retained greater authority in supporting deeper understanding and aligning feedback with instructional goals. At the same time, students showed awareness of potential risks. These include dependency, reduced effort, passive copying, and ethical concerns related to excessive use. Such reflections suggest that students recognize both the benefits and limitations of AI integration in ESP writing.

Based on these findings, a structured and guided integration of AI in ESP classrooms is recommended. AI should not replace human instruction. Instead, educators should design tasks that promote critical evaluation, reflective revision, and balanced use of AI tools. Clear guidelines on acceptable AI use are essential. Blended feedback approaches that combine AI input with lecturer guidance may help maintain learning quality while reducing overreliance. Institutional policies should also emphasize responsible and transparent AI use. This is important to uphold academic integrity while still recognizing the practical value of these tools. Overall, the study highlights the dual role of AI in ESP writing. AI functions both as a

supportive scaffold and as a potential source of dependency. Its educational impact depends not only on technological capability but also on how it is integrated, guided, and critically engaged within the learning process.

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