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Exploring IT Students' Use of Generative AI for Technical Vocabulary Learning: A Qualitative Study

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Abstract: *This study explores how Information Technology (IT) students use generative Artificial Intelligence (AI) tools to support technical vocabulary learning in an English for Specific Purposes (ESP) context. Adopting a qualitative design, the study involved 20 third-year IT students at a private university in Hanoi, Vietnam. Data were collected through semi-structured interviews and analyzed using thematic analysis. The findings indicate that students use generative AI as part of a multimodal learning ecosystem, combining tools such as chatbots and coding assistants to explain technical terms, generate examples, and simplify complex concepts. AI was found to enhance conceptual understanding and promote learner autonomy. However, concerns regarding over-reliance and the accuracy of AI-generated content were also reported. The study highlights the importance of guided AI integration and the development of critical AI literacy in ESP instruction.*

Keywords: *Generative AI; Technical vocabulary; ESP; IT students; Learner autonomy.*

INTRODUCTION

In recent years, the rapid development of artificial intelligence (AI), particularly generative AI, has significantly transformed various aspects of education, including language learning. Tools such as ChatGPT and other AI-powered platforms enable learners to access instant explanations, generate examples, and interact with language in more dynamic and personalized ways. As a result, AI is increasingly being integrated into English language teaching and learning contexts, reshaping how learners engage with linguistic input and construct knowledge (Dwivedi et al., 2023; Kasneci et al., 2023). Although previous studies have emphasized the efficiency and accessibility of AI-supported learning, much of the existing literature tends to focus on the technological benefits of AI rather than critically examining how learners meaningfully interact with these tools in specific educational contexts.

Within the field of English for Specific Purposes (ESP), vocabulary acquisition plays a crucial role, especially for students in technical disciplines such as Information Technology (IT). Technical vocabulary is often complex, abstract, and highly context-dependent, making it difficult to acquire through traditional methods. Nation (2022) emphasizes that vocabulary knowledge is fundamental to language proficiency, and insufficient lexical knowledge can significantly hinder both comprehension and communication. However, vocabulary instruction in many ESP classrooms continues to rely heavily on textbooks, teacher explanations, and translation-based approaches, which may not adequately support deep understanding, contextualized learning, or long-term retention of specialized terminology. This suggests a need for more interactive and learner-centered approaches to ESP vocabulary development.

The emergence of generative AI offers new possibilities for addressing these limitations. AI tools can provide immediate definitions, contextualized examples, and simplified explanations of technical terms, thereby supporting more effective vocabulary learning (Zhai, 2022). More importantly, generative AI enables interactive and adaptive learning experiences, allowing learners to actively engage with content and tailor input to their individual needs. Previous research has highlighted the potential of AI to enhance learner engagement and facilitate personalized learning pathways (Dwivedi et al., 2023; Kasneci et al., 2023). However, existing studies have largely explored AI use in general language learning contexts, while limited attention has been paid to how students use AI in discipline-specific vocabulary learning processes. In many cases, learners are treated as passive recipients of AI support rather than active agents who strategically combine multiple digital tools to construct knowledge.

In addition, learners increasingly use multiple AI tools, such as chatbots, coding assistants, and translation systems, in combination, forming what can be described as an "AI Learning Ecosystem." This multimodal use of AI reflects a shift toward more autonomous learning practices, where students actively manage their own learning processes. From a theoretical perspective, this aligns with Benson's (2011) concept of learner autonomy, as AI tools provide on-demand support, immediate feedback, and opportunities for self-directed exploration. At the same time, the use of interconnected AI

resources suggests that learning emerges through continuous interaction among learners, technologies, and disciplinary knowledge rather than through isolated tool use alone.

In the Vietnamese context, research on AI in ESP learning is still emerging. Doan (2025) highlights ongoing challenges in ESP instruction, including students' limited vocabulary knowledge and the need for more flexible learning approaches. Dang (2025) reports that students perceive ChatGPT as a useful tool in ESP writing, although concerns about over-reliance are evident. Similarly, Dang et al. (2025) find that students generally hold positive attitudes toward AI-assisted learning but remain cautious about the reliability of AI-generated content. From the teachers' perspective, Nguyen (2025) reveals that Vietnamese EFL lecturers generally hold positive attitudes toward AI integration, but also express concerns related to ethics, pedagogical adaptation, and the potential impact on students' critical thinking. Overall, these studies suggest that AI is increasingly viewed as a valuable educational resource in Vietnamese higher education contexts.

Despite these contributions, several important gaps remain. First, limited attention has been paid to the learning of technical vocabulary, a core component of ESP instruction for IT students. Second, many previous studies have relied primarily on surveys or broad reflections on AI use, providing limited qualitative insight into how students actually engage with AI tools in authentic learning contexts. Third, the specific experiences and practices of IT students, whose learning involves the integration of language development and domain-specific knowledge, remain underexplored.

More importantly, existing studies have often examined AI tools as isolated learning supports rather than as interconnected components within broader learning processes. To address this gap, the present study introduces the concept of an "AI Learning Ecosystem" to explain how IT students combine generative AI tools, technical knowledge, and self-directed learning practices in ESP vocabulary development. In doing so, the study contributes a more holistic understanding of AI-assisted vocabulary learning in discipline-specific contexts.

To address these gaps, this study aims to explore how third-year IT students at a private university in Hanoi use generative AI tools to learn technical vocabulary in an ESP course. It also examines students' perceptions of the effectiveness of these tools in supporting their learning.

The study is guided by the following research questions (RQs):

1. How do IT students use generative AI tools for learning technical vocabulary?
2. What are students' perceptions of the effectiveness of these tools?

RESEARCH METHOD

Research Design

This study adopts a qualitative research design to explore in depth how students use generative AI tools in learning technical vocabulary. A qualitative approach is appropriate

as it allows for a detailed understanding of learners' experiences, practices, and perceptions within a specific educational context. Data were analyzed using thematic analysis as proposed by Braun and Clarke (2006). This method involves a rigorous six-phase process: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.

Research Context

The study was conducted at a private university in Hanoi, Vietnam, in 2025. The participants were third-year IT students enrolled in an ESP course. The course is a three-credit module consisting of 45 instructional periods, aiming to develop students' four language skills (listening, speaking, reading, and writing), with a strong emphasis on technical vocabulary relevant to the IT field. The course primarily uses *Career Paths: Information Technology* (Evans et al., 2011) as the core textbook. This material introduces key IT-related topics, including programming, computer systems, networking, and data management, while integrating vocabulary development with communicative tasks. The use of this textbook reflects a practice-oriented approach to ESP instruction, in which language learning is closely aligned with domain-specific knowledge.

Participants

Purposive sampling was used to recruit third-year IT students enrolled in an ESP course at a private university in Hanoi, Vietnam. The participants were selected because they had prior experience using generative AI tools, such as ChatGPT and coding assistants, to support technical English vocabulary learning. As third-year students, they had already developed foundational IT knowledge and were actively engaging with discipline-specific terminology in both academic coursework and technical practices. This sampling strategy ensured that participants could provide relevant and information-rich insights related to the research objectives.

A total of 20 students participated in the study. Data were collected through semi-structured interviews conducted via Zoom, which allowed flexibility and convenience for participants. Each interview lasted approximately 30 minutes and was conducted in Vietnamese to ensure that participants could express their ideas comfortably and in detail. The interview questions focused on students' use of generative AI tools for learning technical vocabulary and their perceptions of the effectiveness of these tools. All interviews were audio-recorded with participants' consent.

Interview Questions

The interview protocol was developed in alignment with the research objectives and guided by the two RQs of the study. It aimed to explore (1) how IT students use generative AI tools for technical vocabulary learning and (2) their perceptions of the effectiveness of these tools.

To ensure content relevance and theoretical grounding, the questions were informed by previous research on vocabulary acquisition and AI-assisted language learning (e.g., Dwivedi et al., 2023; Kasneci et al., 2023; Nation, 2022; Zhai, 2022), as well as recent

studies in the Vietnamese context (Dang, 2025; Dang et al., 2025; Doan, 2025; Nguyen, 2025).

A semi-structured format was adopted to ensure consistency while allowing flexibility for in-depth exploration. The protocol consisted of eleven main questions, each accompanied by follow-up probes. The questions were organized into four thematic sections. The first section explored participants' background and familiarity with AI tools. The second section focused on how students use AI for technical vocabulary learning, including purposes, tools, and strategies (e.g., requesting definitions, generating examples, simplifying concepts, or learning through coding activities). The third section examined students' perceptions of the effectiveness of AI tools. The final section addressed challenges and limitations, including over-reliance, accuracy, and verification practices.

The interview questions were developed in Vietnamese to ensure clarity and allow participants to express their experiences naturally. The protocol was piloted with two students, and minor revisions were made to improve clarity and flow.

Data Processing and Analysis

The recorded interviews were transcribed using TurboScribe.ai, a speech-to-text tool that facilitated efficient and accurate transcription. The transcripts were then manually reviewed and corrected to ensure accuracy. Data coding was conducted using Taguette, a qualitative data analysis tool. Relevant segments of the data were assigned initial codes based on their meanings. These codes were then grouped into broader categories and themes.

The analysis followed Braun and Clarke's (2006) six-phase thematic analysis procedure. The researcher first familiarized themselves with the data by repeated reading, then generated initial codes. Next, potential themes were identified and subsequently reviewed and refined to ensure coherence and consistency. Finally, the themes were clearly defined, named, and reported in the findings and discussion section.

Trustworthiness

To enhance the credibility and trustworthiness of the study, several strategies were employed. First, pilot interviews were conducted to refine the interview protocol and improve question clarity. Second, all interview transcripts were manually reviewed and checked against the recordings to ensure transcription accuracy. Third, the coding and theme development followed a systematic and transparent process based on Braun and Clarke's (2006) thematic analysis framework. In addition, themes were reviewed and refined carefully to improve consistency and reduce potential researcher bias. Finally, representative excerpts were included in the findings to support data interpretation and enhance the credibility of the analysis.

Ethical Considerations

Participants were informed about the purpose of the study, and their participation was voluntary, with the right to withdraw at any time. All personal information was kept

confidential, and participants' identities were anonymized using pseudonyms (e.g., Student 1, Student 2) in the reporting of the data.

RESULT AND DISCUSSION

This section presents the findings based on thematic analysis (Braun & Clarke, 2006). Four main themes were identified: (1) AI tools as a multimodal learning ecosystem, (2) functions of AI in technical vocabulary learning, (3) perceived benefits in terms of understanding and learner autonomy, and (4) concerns and limitations. These themes correspond to the two RQs, with the first two focusing on usage and the latter on perceptions. Interview excerpts are presented in Vietnamese with English translations, using anonymized labels (e.g., Student 1, Student 2).

To provide an overview of the thematic structure and analytical interpretations, Table 3.1 summarizes the key themes, illustrative evidence, and their theoretical implications.

Table 3.1. Thematic Summary of AI Use in Technical Vocabulary Learning

Theme	AI-Mediated practices	Illustrative evidence	Analytical interpretation	Theoretical link
AI Tools as a Multimodal Learning Ecosystem	Combining ChatGPT, Copilot, and other tools for complementary purposes	Students 3; 7	Vocabulary learning integrated with technical tasks and practices	AI-supported learning (Dwivedi et al., 2023; Kasneci et al., 2023)
Functions of AI in Technical Vocabulary Learning	Explaining, contextualizing, simplifying technical terms	Students 2; 5; 9	Supports deeper processing and conceptual understanding of technical vocabulary	Depth of vocabulary knowledge (Nation, 2022)
Perceived Benefits: Understanding and Learner Autonomy	Enhancing understanding, autonomy, and efficiency	Multiple participants	Facilitates self-directed and flexible learning	Learner autonomy (Benson, 2011)
Concerns and Limitations in AI Use	Over-reliance, inaccuracy, need for verification	Students 1; 10; 14	Requires critical evaluation and responsible AI use	Critical awareness in AI use (Dang, 2025; Nguyen, 2025)

AI Tools as a Multimodal Learning Ecosystem

The findings show that students use multiple AI tools in combination, forming what can be described as an "AI learning ecosystem." Rather than relying on a single platform, students strategically select different tools to serve complementary functions in their learning process. ChatGPT was the most frequently used tool due to its clarity and accessibility. As Student 3 noted, "Em dùng ChatGPT nhiều nhất để tra từ chuyên ngành, vì nó giải thích dễ hiểu hơn Google" [I use ChatGPT the most to look up technical terms because its explanations are easier to understand than Google].

In addition to chatbots, students also integrated AI-powered coding assistants into their learning practices. For example, Student 7 explained, "Khi code em dùng Copilot, nó vừa

gợi ý code vừa có comment nên em hiểu thêm từ chuyên ngành như algorithm, deployment hay API" [When coding, I use Copilot; it suggests code and includes comments, so I learn more technical terms such as algorithm, deployment, or API]. This indicates that vocabulary learning occurs incidentally alongside technical task completion rather than as a separate activity.

Such practices suggest that vocabulary learning is not merely supported by AI but is increasingly embedded within authentic disciplinary activities where technical terms are encountered, interpreted, and applied simultaneously. From the perspective of ESP learning, this indicates that language development and technical competence are becoming more closely interconnected through AI-mediated practices. Rather than memorizing isolated terminology, students appear to construct vocabulary knowledge through contextualized engagement with real technical tasks.

In this ecosystem, different AI tools perform distinct but interconnected roles. Chatbots mainly support explanation and clarification, while coding assistants embed vocabulary within real-time technical workflows. This reflects a shift from traditional and decontextualized vocabulary learning toward a more integrated and practice-oriented model, which is particularly relevant in ESP contexts for IT students.

This finding extends previous research (Dwivedi et al., 2023; Kasneci et al., 2023) by demonstrating that AI-assisted learning involves coordinated interaction across multiple tools and learning purposes rather than dependence on a single platform. It also supports the concept of an "AI Learning Ecosystem," in which learners actively integrate different AI resources into their self-directed learning processes. From a theoretical perspective, these practices reflect Benson's (2011) notion of learner autonomy, as students independently select tools, evaluate outputs, and adapt learning strategies according to their disciplinary needs. This suggests that AI functions not only as a source of information but also as a mediating resource that reshapes how learners manage knowledge construction in ESP contexts.

Functions of AI in Technical Vocabulary Learning

Students reported using AI primarily to explain, contextualize, and simplify technical vocabulary. For instance, Student 5 stated that she often asked ChatGPT to explain terms like API or database because its explanations were more detailed than those provided in the textbook.

Students also valued contextualized examples. As Student 9 explained, "Nó cho ví dụ cụ thể, ví dụ như cách dùng từ database hay server trong code hoặc hệ thống thực tế nên em dễ hiểu hơn" [It gives specific examples, such as how terms like database or server are used in code or real systems, so I understand them more easily]. In addition, they frequently requested simplified explanations: "Em bảo nó giải thích kiểu đơn giản, giống như cho người mới học" (Student 2) [I ask it to explain in a simpler way, like for beginners].

These practices suggest that AI supports deeper processing of technical vocabulary by moving beyond surface-level definitions toward conceptual understanding. This is particularly significant in IT contexts, where technical terminology is closely connected to

underlying systems, procedures, and disciplinary practices. The findings therefore support Nation's (2022) argument that vocabulary knowledge involves more than memorizing meanings and requires contextualized understanding and meaningful use.

At the same time, the findings demonstrate the adaptive affordances of generative AI identified by Zhai (2022), particularly its capacity to adjust explanations according to learners' needs and levels of understanding. Unlike traditional vocabulary learning resources, AI tools allow students to request clarification, simplification, or additional examples instantly, creating a more interactive learning process. This extends previous research (Dwivedi et al., 2023; Kasneci et al., 2023) by showing how AI-mediated interaction can support discipline-specific vocabulary development rather than general language learning alone.

Perceived Benefits: Understanding and Learner Autonomy

Students generally perceived AI as beneficial for enhancing both conceptual understanding and learner autonomy. As Student 4 explained, "Dùng AI thì em hiểu bản chất của từ, không chỉ là nghĩa" [With AI, I understand the concept behind the term, not just its meaning]. This suggests that students value AI not only for quick access to information but also for supporting deeper comprehension of technical concepts.

AI also supported independent learning. For example, Student 8 noted that he could study anytime without waiting for the teacher. This reflects Benson's (2011) concept of learner autonomy, in which learners take greater control over their learning processes, resources, and strategies. Through AI tools, students were able to personalize explanations, review materials independently, and manage their own learning pace according to individual needs.

In addition, several students emphasized efficiency when working with English technical materials, supporting the findings of Dang (2025). However, the findings also suggest that efficiency should not be viewed only in terms of saving time. Instead, AI appears to function as a cognitive support tool that reduces barriers to understanding complex technical concepts, thereby enabling learners to engage more actively with disciplinary content. This highlights the role of AI as both a linguistic and cognitive mediator in ESP learning environments.

Concerns and Limitations in AI Use

Despite the reported benefits, students expressed concerns about over-reliance and the accuracy of AI-generated content. As Student 14 stated, "Dùng nhiều quá thì em bị phụ thuộc, không tự suy nghĩ nữa" [If I use it too much, I become dependent and stop thinking independently]. This suggests a tension between efficiency and cognitive engagement, particularly in IT learning contexts that require strong analytical and problem-solving skills. While AI can support comprehension and productivity, excessive dependence may reduce opportunities for critical thinking and independent reasoning. This concern echoes issues raised by Dang (2025) and Nguyen (2025) regarding the pedagogical risks of AI integration.

Students also noted that AI may provide inaccurate or contextually inappropriate explanations. As Student 10 explained, "Có lúc nó giải thích sai hoặc không đúng với ngữ cảnh IT" [Sometimes it gives incorrect explanations or is not suitable for IT contexts]. In discipline-specific contexts such as IT, inaccurate explanations may lead not only to vocabulary misunderstandings but also to misconceptions about technical concepts and applications.

To address these limitations, students reported adopting verification strategies. For example, Student 1 shared that he often double-checked AI-generated information using Google or other learning materials. This indicates an emerging awareness of the limitations of generative AI and the importance of evaluating information critically. The findings, therefore, align with Dang et al. (2025) in suggesting that effective AI use depends not only on access to technology but also on learners' critical digital literacy and evaluative skills. From a pedagogical perspective, this highlights the need for educators to support students in developing responsible and reflective AI use practices in ESP contexts.

Direct Responses to the Research Questions

This study provides clear answers to both RQs based on the thematic findings.

Regarding RQ1 (How do IT students use generative AI tools for learning technical vocabulary?), the results demonstrate that students adopt a multimodal and context-integrated approach. They combine various AI tools, including chatbots and coding assistants, to perform functions such as explaining terminology, generating examples, simplifying concepts, and learning vocabulary incidentally through technical tasks. This indicates that vocabulary learning is embedded within both linguistic and disciplinary practices, reflecting the integrated nature of ESP learning for IT students. The findings extend previous research on AI-supported learning (Dwivedi et al., 2023; Kasneci et al., 2023) by showing that learners actively coordinate multiple AI resources as part of a broader learning ecosystem.

Regarding RQ2 (What are students' perceptions of the effectiveness of these tools?), the findings reveal generally positive perceptions. Students believe that AI enhances conceptual understanding, supports autonomous learning, and improves efficiency in handling English-language technical materials. However, they also express concerns about over-reliance and the reliability of AI-generated content. This is consistent with previous studies (Dang, 2025; Dang et al., 2025; Nguyen, 2025), suggesting that while AI is perceived as a valuable learning resource, its effectiveness depends on learners' ability to use it critically, strategically, and responsibly.

CONCLUSION

This study explored how third-year IT students at a private university in Hanoi, Vietnam, use generative AI tools to support technical vocabulary learning in an ESP course. The findings reveal that students adopt a flexible and multimodal approach, forming an "AI learning ecosystem" in which chatbots, coding assistants, and other tools

are used in combination. Through this ecosystem, vocabulary learning is embedded within disciplinary practices such as programming and engaging with technical materials rather than being treated as an isolated activity.

In terms of perceptions, students generally viewed generative AI as an effective support for enhancing conceptual understanding, learning efficiency, and learner autonomy. However, concerns regarding over-reliance, reduced independent thinking, and the accuracy of AI-generated content were also evident. These findings suggest that while AI offers significant pedagogical potential, its effectiveness depends on learners' ability to use it critically and strategically.

Theoretically, this study contributes to the growing literature on AI-assisted language learning by proposing the concept of an "AI Learning Ecosystem" to explain how learners coordinate multiple AI tools, disciplinary practices, and self-directed learning strategies in ESP vocabulary development. The findings also extend Benson's (2011) concept of learner autonomy by demonstrating that autonomy in AI-supported learning involves not only independent access to information but also the strategic evaluation and integration of AI-mediated resources. In addition, the study contributes to ESP research by showing that technical vocabulary learning is increasingly situated within authentic disciplinary activities rather than separated from domain-specific practice.

Pedagogically, the findings suggest that AI should be integrated as a guided and discipline-specific learning tool rather than used independently without support. In IT-focused ESP contexts, teachers can design tasks that embed AI use within authentic technical practices, such as interpreting code comments, generating explanations for programming concepts, simplifying technical documentation, or analyzing error messages. This enables students to learn vocabulary in context while simultaneously engaging with disciplinary knowledge and problem-solving processes.

In addition, teachers can support students in developing prompting strategies tailored to technical queries, as well as critical evaluation skills to assess the accuracy and relevance of AI-generated outputs. Given the risks of over-reliance, students should also be encouraged to verify AI-generated information using authoritative sources such as official documentation or technical resources. These findings highlight the importance of integrating AI literacy and critical digital literacy into ESP instruction.

This study is subject to several limitations. The relatively small sample size and single institutional context may limit the generalizability of the findings. In addition, the reliance on self-reported interview data may not fully capture students' actual learning behaviors. Future research could adopt mixed-methods or longitudinal designs to examine the impact of AI use on vocabulary development over time and explore how different AI tools contribute to specific aspects of language learning.

Overall, this study underscores the growing role of generative AI in ESP learning and highlights the need for a balanced approach that leverages its benefits while addressing its limitations.

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