IDEAS
Journal of Language Teaching and Learning, Linguistics and Literature
ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)
Volume 14, Number 1, June 2026
pp. 498 - 516

Issued by English study program of UIN Palopo

A Needs Analysis for Developing an AI-Supported EAP Learning Website in a Non-English Language Program

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Article Info

Received: 2026-03-04
Revised: 2026-03-08
Accepted: 2026-03-13

Keywords:
AI-Supported EAP;
English for Academic Purposes website;
needs analysis;
research development;
learner autonomy

DOI:
10.24256/ideas. v14i1.9849

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Abstract

English for Academic Purposes (EAP) is essential in higher education because it helps students understand academic texts and communicate effectively in academic contexts. However, students in non-English programs often struggle with academic reading and writing, and traditional lecture-based teaching provides limited support. Despite the growing use of educational technology, few studies have examined students' academic English needs and their readiness to use AI-based learning tools in EAP. This study employed a descriptive exploratory mixed-methods design involving 48 undergraduate students from the Faculty of Language and Arts at the State University of Medan. Quantitative data were collected through a Likert-scale questionnaire with very high reliability (Cronbach's alpha = 0.991), and qualitative data were gathered through semi-structured interviews. The results show a high level of perceived need (M = 4.07; 81.4%). Students reported strong needs related to academic literacy development, professional communication skills, structured learning support, and digital learning readiness. They also expressed positive attitudes toward AI features such as adaptive learning and personalized feedback. These findings support the development of a context-sensitive web-based EAP platform integrating adaptive AI features for academic language learning.

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

1. Introduction

The increasing attention to academic English proficiency in higher education (Lin & Lei, 2021; Mouvet & Taverniers, 2022) reflects its crucial role in enabling students to engage with academic texts (Oubibi, 2025), participate in written academic communication (Birhan & Nurie, 2024), and develop critical and analytical thinking skills (Batdi et al., 2024; Rodriguez-Escobar & Saldías, 2025). As English continues to function as the dominant language of global academic communication, competence in academic English has become an essential requirement for students' academic success. However, insufficient academic English proficiency remains a major barrier for many university students (Chemir & Kitila, 2022), particularly in contexts where English is learned as a foreign language.

These challenges are especially evident among students enrolled in non-English language programs. Empirical studies in English for Academic Purposes (EAP) consistently report that such students experience difficulties in comprehending academic texts and producing effective academic writing, which often limits their academic performance (Wahyuningsih, 2019; Anwar & Sailuddin, 2022; Pasaribu et al., 2024; Sakkir et al., 2025; Li, 2025; Romrome, in press). In the Indonesian context, these challenges are further shaped by the rapid integration of digital technologies and artificial intelligence in education (Wadipalapa et al., 2024; Jannah et al., 2025). While AI tools offer new opportunities for language learning support, their effective use requires pedagogically grounded instructional design that aligns with students' learning needs.

Recent studies have explored the integration of digital technologies to support language learning in higher education (Selfa-Sastre et al., 2022; Hidayat et al., 2022; Qizi, 2025). In particular, advances in artificial intelligence have enabled adaptive learning, personalized feedback, and automated language support (George & Wooden, 2023; Sajja et al., 2024; Demartini et al., 2024). Empirical evidence also suggests that AI-assisted language learning can enhance learners' motivation, self-regulation, and language development (Mohebbi, 2025; Hou et al., 2025; Zhang et al., 2025).

Despite these technological developments, the effectiveness of technology-enhanced language learning largely depends on how well instructional design aligns with learners' actual needs. Needs analysis is therefore widely recognized as a critical step in instructional design because it provides empirical evidence to ensure that learning interventions address genuine learner challenges rather than relying on assumptions. However, much of the existing literature tends to focus either on technological affordances or learning outcomes (Alotaibi & Alshehri, 2023; Abubakar, 2025; Bai & Wang, 2025; Molerov et al., in press), or separately on EAP learning challenges and AI-assisted language learning (Du & Alm, 2024; Chen & Gong, 2025; Ngo & Hastie, 2025).

However, relatively few studies have examined students' academic English needs, digital readiness, and expectations toward AI-supported learning within an integrated framework, particularly among students in non-English language programs. Without such evidence, the design of AI-supported EAP learning environments risks overlooking learners' actual needs. Therefore, this gap highlights the importance of conducting context-sensitive needs analysis to inform the development of pedagogically relevant and technology-enhanced English learning resources in higher education.

In response to this gap, the present study investigates students' academic English learning needs and their perceptions of AI-supported instructional features in a non-English language program. The study aims to provide empirical evidence that can guide the design of context-sensitive, web-based English learning platforms.

Based on this objective, the study addresses the following research questions:

1. What are the perceived academic English learning needs and linguistic challenges experienced by undergraduate students in a non-English language program?
2. How do students perceive the relevance and potential effectiveness of AI-supported instructional features in addressing their academic English needs?

The significance of this study lies in its contribution to EAP research and technology-enhanced language learning. By identifying students' academic English needs and their perceptions of AI-supported instructional features, the study provides empirical insights for designing context-sensitive digital learning resources. The findings may also support lecturers and institutions in developing AI-integrated EAP instruction that strengthens students' academic literacy.

2. Method

Research Design

This study employed a descriptive exploratory mixed methods design to examine students' academic English needs at Universitas Negeri Medan (UNIMED), particularly among undergraduate students in the Faculty of Language and Arts. Quantitative and qualitative data were collected during the same period to provide a comprehensive understanding of students' learning needs. A structured Likert-scale questionnaire was used to identify students' EAP-related needs, learning challenges, digital readiness, and perceptions of AI-supported learning environments.

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In addition, the questionnaire included open-ended questions that allowed students to elaborate on their learning difficulties and expectations for a web-based AI-assisted EAP learning platform. The quantitative and qualitative data were analyzed separately and then integrated to support a more comprehensive interpretation of students' learning needs.

Participants

Participants were selected using convenience sampling due to their accessibility and relevance to the research objectives. However, this approach may limit the representativeness of the sample and introduce potential sampling bias; therefore, the findings should be interpreted within the context of the studied institution. A total of 48 undergraduate students participated in the survey, representing different years of study and varying levels of prior English learning experience. Eligibility criteria required participants to be actively enrolled at the university and to have completed at least one English-related course. Ethical procedures were followed throughout the study, including informed consent, voluntary participation, and the protection of participants' confidentiality through coded identifiers.

In addition, ten participants provided responses to open-ended questions included at the end of the questionnaire. These responses were used to gain deeper insights into students' academic English needs, learning challenges, and preferred learning models, complementing the quantitative findings. To ensure confidentiality, the respondents were identified using coded initials (e.g., AAS, HDP, SAP, WAR, FA, ARL, YM, MMS, KFS, and MS).

Data Collection

Data were collected through an online questionnaire distributed via Google Forms during the academic semester. The online format allowed participants to complete the survey asynchronously, providing flexibility and reducing time constraints. The questionnaire consisted of closed-ended Likert-scale items and several open-ended questions. The Likert-scale items captured students' perceptions of English language learning, academic English needs, and learning model preferences, while the open-ended questions allowed participants to provide additional explanations about their academic English learning challenges and their expectations for a web-based AI-assisted learning platform.

Instruments

The primary research instrument was a structured questionnaire consisting of 24 Likert-scale items measured on a five-point scale (1 = strongly disagree to 5 = strongly agree). The instrument was organized into four main domains:

1. Perception of English language importance (4 items)
2. Academic English needs (EAP) (5 items)

3. English language needs for future employment (5 items)
4. Learning model preferences, including digital and AI-supported learning features (10 items)

In addition, several open-ended questions were included to gather qualitative insights into students' academic English learning experiences and expectations. The questionnaire was adapted from established needs analysis frameworks in EAP research (Chemir & Kitila, 2022; Tang, 2023) and relevant literature on technology-enhanced language learning.

Data Analysis

Quantitative data were analyzed using descriptive statistics with the assistance of Jamovi software. Exploratory factor analysis was conducted using maximum likelihood extraction with promax rotation. The analysis included frequencies, mean scores, and standard deviations to identify patterns in students' perceptions, learning needs, and preferences. Instrument reliability was assessed using Cronbach's alpha to examine the internal consistency of the Likert-scale items.

The open-ended responses were analyzed using thematic analysis to identify recurring ideas and patterns related to students' academic English challenges and their expectations for AI-supported learning environments. The qualitative findings were used to complement and help interpret the quantitative survey results. Finally, insights from both data types were integrated to provide a more comprehensive understanding of students' academic English learning needs and to inform the design of a web-based AI-assisted EAP learning platform.

3. Result

Reliability Analysis

The internal consistency of the questionnaire was assessed using Cronbach's alpha. The results indicated excellent reliability, with a Cronbach's alpha value of 0.991 and McDonald's omega of 0.992, suggesting that the items consistently measured the intended constructs. As shown in Table 1, the questionnaire demonstrated high internal consistency and was therefore considered suitable for further analysis.

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Table 1. Reliability Statistics

Scale	Mean	SD	Cronbach's α	McDonald's ω
Overall Questionnaire	4.07	1.03	0.991	0.992

Exploratory Factor Analysis

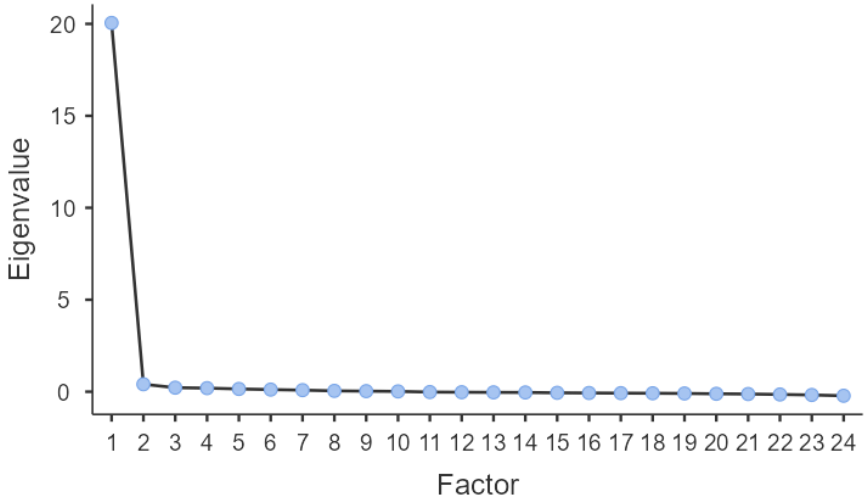
An exploratory factor analysis (EFA) was conducted to examine the underlying structure of the questionnaire items. The analysis identified five factors that together explained 88.7% of the total variance, indicating that the instrument captured several related dimensions of students' English learning needs and learning preferences. Table 2 presents the summary of the extracted factors and the proportion of variance explained by each factor. The first factor accounted for the largest proportion of variance (44.5%), followed by Factor 2 (21.1%). The Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 2143$, $p < .001$), indicating that the dataset was suitable for factor analysis.

Table 2. Summary of Exploratory Factor Analysis

Factor	Description	Variance Explained
Factor 1	Academic and professional English needs	44.5%
Factor 2	Interactive learning preferences	21.1%
Factor 3	Digital learning engagement	8.7%
Factor 4	Learning structure and feedback	7.6%
Factor 5	Learning support features	6.6%

The scree plot also supported the retention of five factors. As shown in Figure 1, the plot displays a clear elbow after the fifth factor, supporting the five-factor solution. The scree plot shows a clear decline after the first factor, followed by a more gradual slope across the remaining factors. While the first factor explains a substantial proportion of the variance, the scree plot together with the Kaiser criterion supports the retention of a five-factor solution.

Figure 1. Scree Plot of Eigenvalues



Students' Learning Needs

The findings indicate that students demonstrate strong needs for academic English (EAP) skills, particularly in understanding academic texts and developing academic writing abilities. Students reported a high need for English to access academic resources such as journal articles, books, and other scholarly materials. Participants also indicated that they require support in understanding academic instructions and completing assignments in English.

As shown in Table 3, the highest mean scores were observed in the domains of Perception of English Importance (M = 4.16, SD = 1.17) and English Needs for Future Work (M = 4.15, SD = 1.14), indicating that students strongly recognize the role of English for both academic and professional purposes. The mean score for Academic English Needs (EAP) was also relatively high (M = 3.92, SD = 1.12), suggesting substantial demand for academic language support. In addition, students expressed positive preferences toward structured and digitally supported learning models (M = 4.06, SD = 1.11).

Table 3. Students' English Learning Needs by Domain

Domain	Mean	SD
Perception of English Importance	4.16	1.17
Academic English Needs (EAP)	3.92	1.12
English Needs for Future Work	4.15	1.14
Learning Model Preferences	4.06	1.11

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Students' English Needs for Future Work

Students strongly agreed that English proficiency is essential for future career development. They indicated that English learning should support professional communication, including writing emails, participating in discussions, and delivering presentations. Students also expressed the need to understand workplace documents, such as manuals, reports, and standard operating procedures (SOPs). In addition, participants preferred English instruction that is relevant to their academic discipline and applicable to real-world professional contexts.

As shown in Table 4, the highest mean score was observed for the item indicating the importance of English for career development (M = 4.25, SD = 1.12), followed by the need for professional communication skills (M = 4.23, SD = 1.15). Students also reported a strong need to understand workplace documents (M = 4.13, SD = 1.16) and to receive English instruction that is contextualized to their field of study and professional contexts.

Table 4. Students' English Needs for Future Work

Item	Mean	SD
English proficiency is important for future career development	4.25	1.12
English is needed for professional communication (email, presentations, discussions)	4.23	1.15
English is needed to understand workplace documents (manuals, reports, SOPs)	4.13	1.16
English learning should be relevant to students' field of study	4.04	1.18
English learning should be applicable to real-world work contexts	4.10	1.13

Students' Perceptions of AI-Supported Learning

The results indicate that students generally reported positive perceptions of digital and AI-supported learning environments. Many students expressed interest in learning English through web-based platforms that provide flexible and independent access to learning materials. Participants also emphasized the importance of structured learning sequences, contextualized exercises, and interactive learning activities. In addition, students highlighted the need for feedback mechanisms that help them evaluate their understanding and improve their language skills.

As presented in Table 5, students reported relatively high mean scores across most items. The highest mean score was observed for the preference for structured and gradual English learning (M = 4.19, SD = 1.14). Students also reported strong agreement regarding the need for independently accessible learning materials (M = 4.13, SD = 1.12) and the importance of concept introduction before core material (M = 4.13, SD = 1.08). Other items, such as the need for feedback to evaluate

understanding (M = 4.08, SD = 1.09) and interactive staged learning (M = 4.04, SD = 1.15), also received relatively high scores.

Table 5. Students' Perceptions of AI-Supported Learning

Item	Mean	SD
Interest in learning English through digital platforms/websites	3.98	1.10
Need for independently accessible learning materials	4.13	1.12
Need for contextualized examples and exercises	4.10	1.08
Preference for structured and gradual English learning	4.19	1.14
Need for feedback to evaluate understanding	4.08	1.09
Importance of concept introduction before core material	4.13	1.08
Preference for interactive and staged learning	4.04	1.15
Importance of peer interaction in learning	3.98	1.12
Need for guided practice with feedback and reflection	4.04	1.09
Importance of project-based learning activities	3.94	1.12

4. Discussion

This study aimed to explore undergraduate students' academic English learning needs and their perceptions of web-based and AI-supported learning environments in a non-English language program. The findings reveal that students demonstrate strong needs for academic English proficiency and express positive attitudes toward technology-supported learning. By integrating quantitative survey results with open-ended responses from ten participants, the study provides a comprehensive understanding of students' language learning needs and expectations.

Academic and Professional English Needs

The quantitative results indicate that students recognize the importance of English for both academic and professional purposes. The mean score for the Perception of English Importance was relatively high (M = 4.16), while English Needs for Future Work also received a high score (M = 4.15). In addition, the mean score for Academic English Needs (EAP) was 3.92, suggesting that students perceive academic English skills as essential for their studies. These results correspond with the findings of the exploratory factor analysis, in which Factor 1

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(Academic and Professional English Needs) accounted for the largest proportion of variance (44.5%), indicating that academic and professional language requirements constitute the most dominant dimension of students' English learning needs.

Consistent with prior research in English for Academic Purposes (EAP), students in this study identified substantial difficulties in academic reading, writing, and formal communication, reinforcing the view that academic English remains a persistent barrier to academic success (Li, 2025). The preference for web-based and autonomous learning modalities aligns with findings by numerous scholars who emphasize that flexibility, accessibility, and learner autonomy are central to effective language learning in higher education (Xu & Wang, 2024). This suggests that students perceive traditional classroom instruction as insufficient in fully supporting their academic language development, particularly given the diverse linguistic demands of tertiary study.

The open-ended responses further support these findings. Several students highlighted the importance of English for accessing academic resources and participating in academic activities. For example, one participant stated:

> "Reading is important because most scientific journals and reference textbooks are available in English. Writing is also necessary because students often must write abstracts, essays, or formal emails." (AAS)

Another participant emphasized the importance of academic vocabulary in understanding lectures and academic materials:

> "Many academic vocabulary words in lectures are already at B2 or even C1 level." (HDP)

These responses indicate that students perceive English not only as a communication tool but also as a critical academic resource for accessing knowledge and completing academic tasks. This finding is consistent with research in English for Academic Purposes, which highlights the importance of academic language proficiency for university students in non-English language programs.

Students also associated English proficiency with future professional opportunities. One respondent explained:

> "Learning English can broaden our knowledge and help students who want to study or work abroad in the future." (WAR)

Similarly, another participant emphasized the practical value of English learning for career preparation:

> "I hope learning English at this university can improve students' practical skills for academic and work contexts." (MMS)

These findings support previous studies suggesting that English proficiency has become an important component of global employability and professional communication in many disciplines.

Interactive Learning Preferences

The results also indicate that students prefer learning environments that encourage interaction and active participation. The exploratory factor analysis identified Factor 2 (Interactive Learning Preferences), which explained 21.1% of the total variance, suggesting that interactive learning is an important dimension of students' learning expectations.

The quantitative results also reflect this tendency. Students reported relatively high levels of agreement with items related to interactive learning activities, including peer interaction, project-based learning, and staged learning processes.

The open-ended responses provide further insights into these preferences. For example, one participant suggested that English learning should incorporate interactive activities such as discussions and presentations:

"The ideal learning model is interactive learning such as discussions, presentations, and role-play supported by videos and online platforms." (YM)

Another participant recommended integrating project-based learning activities to make English learning more relevant and engaging:

"The ideal learning model combines classroom learning with project-based activities that use real-life tasks." (ARL)

These responses indicate that students expect English learning to move beyond traditional lecture-based approaches and include more interactive and collaborative activities. Such preferences align with contemporary pedagogical perspectives that emphasize active learning and student engagement in language education.

Digital Learning Engagement

Another important finding concerns students' positive attitudes toward digital learning environments. The exploratory factor analysis identified Factor 3 (Digital Learning Engagement), which explained 8.7% of the total variance. This finding suggests that digital learning plays an important role in shaping students' language learning experiences. The quantitative results indicate that students are interested in learning English through digital platforms and web-based resources. The mean score for the item related to learning English through digital platforms was relatively high (M = 3.98), indicating that students are generally receptive to

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technology-supported learning environments.

Students' open-ended responses also highlight the importance of digital resources for language learning. For instance, one participant emphasized the role of online learning platforms and multimedia resources:

> "Digital platforms and videos can help students understand English better because the learning process becomes more interesting." (MS)

Another participant suggested that online resources can provide additional learning opportunities outside the classroom. These findings indicate that students perceive digital learning environments as valuable tools for expanding learning opportunities and supporting independent practice.

Learning Structure and Feedback

The results further show that students value structured learning sequences and feedback mechanisms in the learning process. The exploratory factor analysis identified Factor 4 (Learning Structure and Feedback), which explained 7.6% of the variance. This finding is also reflected in the quantitative results. Students strongly agreed with items related to structured and gradual learning (M = 4.19), concept introduction before core material (M = 4.13), and the importance of feedback to evaluate understanding (M = 4.08). These results suggest that students expect English learning to be organized in a clear and systematic manner. Structured learning pathways and feedback mechanisms may help students monitor their learning progress and improve their language skills more effectively.

The positive perceptions of AI-supported tutoring features observed in this study further underscore the pedagogical promise of intelligent learning environments. Features such as adaptive learning materials, personalized feedback, and automated language support were viewed favorably by students, which resonates with meta-analytic evidence demonstrating the effectiveness of AI-assisted learning tools in enhancing language learning outcomes (Xu & Wang, 2024). These findings also support the theoretical notion that AI can facilitate self-regulated learning by providing immediate, individualized feedback and by scaffolding learner autonomy beyond the constraints of conventional instruction.

From a theoretical perspective, this finding can be interpreted through the concept of self-regulated learning. According to Barry J. Zimmerman, self-regulated learning involves learners' ability to monitor their progress, evaluate their understanding, and adjust their learning strategies. Feedback mechanisms and structured learning sequences can therefore play an important role in supporting students' independent learning processes.

Learning Support Features and AI-Supported Learning

The final factor identified in the exploratory factor analysis was Factor 5 (Learning Support Features), which explained 6.6% of the total variance. This factor includes elements such as guided practice, reflection activities, and technology-supported learning features.

The quantitative findings indicate that students reported strong agreement regarding the need for guided practice with feedback and reflection (M = 4.04) and contextualized learning examples (M = 4.10). These results suggest that students expect learning environments that provide both instructional support and opportunities for independent practice.

Pedagogical Implications

The findings of this study have several implications for English language education in higher education. First, universities should recognize the importance of providing academic English support for students in non-English language programs. Second, English instruction may benefit from incorporating interactive and technology-supported learning environments that encourage student engagement and independent learning. Third, the integration of AI-supported learning tools may provide additional opportunities for personalized learning and continuous feedback.

These findings also help explain students' positive perceptions of AI-supported learning features observed in the survey results. Students appear to perceive AI technologies as tools that can support independent practice, provide feedback, and help them overcome specific linguistic difficulties. This perception can be interpreted through the Technology Acceptance Model proposed by Fred D. Davis (1989), which suggests that users are more likely to adopt new technologies when they perceive them as useful and beneficial for their tasks.

Another important implication of the findings lies in their contribution to the ongoing discussion about the role of artificial intelligence in language education. Rather than perceiving AI as a replacement for teachers, students appear to view AI-based tools as complementary learning support systems. This perspective aligns with research suggesting that AI technologies are most effective when used as assistive pedagogical tools that enhance feedback and personalize learning experiences rather than replacing human instructors (Ouyang & Jiao, 2021).

At the institutional level, the findings suggest that universities should consider expanding academic language support for students in non-English language programs. The increasing demand for AI-supported learning environments indicates that digital platforms may serve as scalable solutions for providing academic English support across different academic disciplines.

ISSN 2338-4778 (Print)
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Limitations and Future Research

Nevertheless, this study has several limitations that should be acknowledged. The sample was drawn from a single department within one university, which may limit the generalizability of the findings. In addition, the qualitative data were obtained from a limited number of interview participants. Future studies may involve larger participant samples and incorporate additional qualitative methods such as classroom observations or learning analytics data.

Despite its contributions, this study has several limitations. The participants were drawn from a single academic program, which may limit the generalizability of the findings. Additionally, the qualitative data were obtained from open-ended responses from a relatively small number of participants. Future studies may involve larger samples and additional qualitative methods to gain deeper insights into students' learning experiences. Future research may also investigate the effectiveness of AI-supported learning platforms in improving students' academic English proficiency through experimental or longitudinal research designs.

Future research may also examine the implementation of AI-supported EAP learning platforms in real educational settings to evaluate their effectiveness in improving students' academic literacy development over time.

5. Conclusion

This study examined the academic English learning needs of students in a non-English language program as a preliminary step toward the development of an AI-supported English learning website. The findings indicate that students demonstrate a high level of need for academic English instruction, particularly in understanding academic texts, producing scholarly writing, and engaging in formal academic communication. The quantitative results revealed a high overall mean score (M = 4.07) and a substantial proportion of respondents expressing preference for web-based and self-directed learning environments, suggesting strong support for technology-enhanced learning approaches.

The findings also indicate that students hold positive perceptions toward AI-supported learning features, including adaptive learning materials, personalized feedback, and automated language support. These results suggest that AI-integrated digital platforms may provide valuable opportunities to support students' academic English development beyond traditional classroom settings.

This study contributes to the growing body of research on academic English learning needs in higher education by providing empirical evidence from students in non-English language programs, a context that has received limited attention in previous studies. The findings highlight the pedagogical potential of integrating AI-supported web-based learning systems to promote flexible, learner-centered, and accessible academic English instruction.

Limitations and Future Research

Despite its contributions, this study has several limitations that should be acknowledged. First, the study relies on self-reported data collected through questionnaires and open-ended responses. While this approach is appropriate for needs analysis, students' responses may reflect perceived importance rather than actual language proficiency. Future studies may incorporate diagnostic assessments or performance-based measures to provide a more comprehensive evaluation of students' academic English competencies.

Second, although the instrument demonstrated very high internal consistency, the strong reliability coefficients and inter-factor correlations may indicate potential construct overlap. Future studies are recommended to conduct further validation using confirmatory factor analysis (CFA) with independent samples to test alternative structural models.

Third, the qualitative component involved a relatively small number of participants, which may limit the diversity of perspectives captured in this study. Future research could involve larger qualitative samples, such as focus group discussions or longitudinal interviews, to explore students' evolving language learning needs in greater depth.

Finally, this study focused primarily on identifying learning needs as a foundation for designing an AI-supported English learning platform. Future research should extend this work by implementing and evaluating the proposed system through experimental or design-based research approaches to examine its effectiveness in improving students' academic English proficiency.

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