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Nursing Students' Acceptance of AI-Based Language Learning Tools in ESP Learning: A Technology Acceptance Model (TAM) Approach

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A B S T R A C T

The urgency of this study lies in the increasing demand for English proficiency among nursing students in response to the globalization of healthcare services. This study aims to analyze nursing students' acceptance of AI-based language learning tools using the Technology Acceptance Model (TAM). The research employed a quantitative approach with a descriptive and explanatory design. Data were collected through a Likert-scale questionnaire distributed to 180 nursing students and analyzed using validity, reliability, and multiple linear regression tests. The results indicate that 7 out of 8 questionnaire items are valid and reliable, with a Cronbach's Alpha value of 0.715, showing good internal consistency. Furthermore, the regression analysis reveals that the independent variables, namely perceived usefulness and intention to use, significantly influence the dependent variable, namely students' acceptance of AI-based learning tools (p-value < 0.05). These findings suggest that the higher the perceived benefits and the stronger the intention to use the technology, the higher the level of acceptance among students. This study implies that successful implementation of AI in ESP learning for nursing students depends on enhancing perceived usefulness and encouraging continuous usage through relevant content, training, and institutional support.

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INTRODUCTION

The advancement of digital technology has led to significant transformations across various aspects of life, including the education sector, which is increasingly shifting toward more modern, flexible, and technology-driven learning systems (Whalley et al., 2021). This transformation not only changes the way educators deliver learning materials but also reshapes the learning paradigm into a more interactive and student-centered approach. The integration of digital technology enables learning activities to move beyond conventional classrooms, allowing students to access materials independently through various online platforms anytime and anywhere (Widiyan et al., 2025).

Digital transformation in education has encouraged the emergence of various technological innovations that support the learning process (Oliveira & De Souza, 2022). Technology is no longer merely a supporting tool but has become the primary medium for delivering content and facilitating interaction between students and learning resources. This development creates a more dynamic learning environment and provides greater opportunities for students to develop their competencies independently (Hanipah et al., 2022). In addition, digital technology enables more flexible and personalized learning experiences, where students can learn according to their individual needs and pace. Features such as

interactive platforms, multimedia content, and adaptive learning systems have been shown to enhance student engagement and motivation, making the learning process more meaningful and effective. Moreover, technology facilitates collaboration through online discussions, virtual classrooms, and shared digital spaces, encouraging active participation and knowledge exchange among learners (Pamungkas et al., 2025).

One of the most rapidly growing innovations in this context is the use of Artificial Intelligence (AI) in education (Limna et al., 2022). AI technology enables the creation of personalized learning environments by adapting materials based on individual needs, abilities, and learning speed. This approach allows students to achieve more effective learning outcomes compared to traditional methods (Meizar et al., 2025). In addition, AI systems are capable of providing automatic and immediate feedback, allowing students to identify their mistakes and receive improvement suggestions without having to wait for teacher evaluation (Alfiansyah, 2024). This capability supports continuous learning and makes the learning process more responsive to student needs.

In the context of language learning, the integration of AI opens new opportunities to enhance students' communication skills. Technologies such as chatbots, speech recognition, and automated error analysis allow learners to practice more frequently and intensively without time constraints (Pasaribu et al., 2024). However, these technologies should not be viewed merely as general "AI tools," but rather as systems built on specific computational mechanisms. For example, applications such as ChatGPT and Google Gemini utilize Natural Language Processing (NLP) and transformer-based Large Language Models (LLMs) to process and generate text through contextual understanding and probabilistic prediction. Meanwhile, speech recognition tools such as Google Speech-to-Text operate using Automatic Speech Recognition (ASR) technology based on deep neural network models to convert speech into text and evaluate pronunciation accuracy. Writing assistance tools such as Grammarly and QuillBot apply NLP-based error detection and correction algorithms to analyze sentence structure and provide real-time feedback. These technological features enable low latency interaction, real-time feedback, and personalized learning, which significantly enhance the effectiveness of language learning.

The need for English proficiency in the nursing field continues to increase along with the globalization of healthcare services (Lotulung & Purnawinadi, 2025). Nursing professionals are required to communicate effectively with patients from diverse cultural backgrounds and understand medical information that is predominantly presented in English. Therefore, English language competence becomes a crucial factor in supporting professionalism in healthcare services (Solihin, 2024). Nursing students, as future healthcare professionals, must be equipped with specialized and context-based English skills, including mastery of medical terminology, the ability to interpret scientific literature, and effective clinical communication (Juliana et al., 2025).

The English for Specific Purposes (ESP) approach has been widely recognized as an effective solution in language learning for nursing students. ESP emphasizes the use of language tailored to specific professional contexts, making learning materials more relevant, practical, and applicable to real-world situations (Badawi et al., 2025; Syukur & Nugraha, 2019) . However, traditional learning methods often remain teacher-centered and provide limited opportunities for active communication practice, which can hinder optimal learning outcomes (Hajar et al., 2024). This limitation highlights the need for more interactive and technology-based learning approaches.

AI-based language learning tools offer a promising alternative to overcome these limitations by providing interactive features that enhance student engagement and motivation. These tools support independent learning through flexible access and continuous practice opportunities, making them highly relevant in modern education contexts (Hardiansah & Fanani, 2024). Nevertheless, the successful implementation of such technologies is not solely determined by their technical sophistication but also by the level of user acceptance. Students, as primary users, play a crucial role in determining whether the

technology can be effectively utilized. Low acceptance levels may hinder the adoption of technology despite its high potential (Ango & Tallutondok, 2025).

This study adopts the Technology Acceptance Model (TAM), which explains that perceived usefulness and perceived ease of use influence users' attitudes and behavioral intentions toward technology adoption. In this study, perceived usefulness becomes a key variable, as it reflects the extent to which students believe that AI-based tools can enhance their learning performance.

Despite the increasing use of AI in education, previous studies have largely focused on user perceptions without sufficiently examining how these perceptions are influenced by the underlying technological mechanisms of AI systems. There is still a lack of understanding of whether students perceive AI as useful due to its actual technical performance, such as low latency response, real-time feedback, and contextual accuracy enabled by NLP and ASR technologies.

Although previous studies have explored the implementation of Artificial Intelligence (AI) in education and language learning, most of them mainly focused on general student populations and broad learning contexts. Limited studies specifically investigate the acceptance of AI-based language learning tools among nursing students within the English for Specific Purposes (ESP) framework. In addition, previous research has largely emphasized users' perceptions without sufficiently examining how specific AI technological features, such as Natural Language Processing (NLP), Automatic Speech Recognition (ASR), and adaptive feedback systems, contribute to students' acceptance and learning experiences. Therefore, there is still a gap in understanding how nursing students perceive and accept AI-powered language learning technologies in relation to their professional communication needs.

Nursing students represent an important population in this context because they require English communication skills that are directly connected to healthcare practices, including clinical interaction, understanding medical terminology, and interpreting scientific information. Unlike students in general academic settings, nursing students need context-specific language competence to support patient care and professional responsibilities in increasingly globalized healthcare environments. Consequently, understanding their acceptance of AI-based language learning tools is essential for developing effective, technology-supported ESP learning strategies tailored to healthcare education.

This study aims to analyze nursing students' acceptance of AI-based language learning tools in the ESP context using the TAM framework, while also linking perceived usefulness with the specific technological features of AI systems. The novelty of this research lies in integrating user acceptance analysis with a technological perspective, particularly by examining how AI mechanisms such as NLP, speech recognition, and machine learning contribute to learning effectiveness. This study is expected to provide a more comprehensive understanding of the role of AI in supporting ESP learning for nursing students and contribute to the development of more effective and technology-driven learning strategies.

The novelty of this research lies in the integration of the use of Artificial Intelligence (AI)-based language learning tools in the context of English for Specific Purposes (ESP) which is specifically aimed at nursing students. This research not only examines the use of AI technology in language learning in general, but specifically places it in the professional needs of the nursing field which demands mastery of medical terminology and clinical communication in English.

METHOD

This research uses a quantitative approach with a descriptive and explanatory design to analyze nursing students' acceptance of the use of Artificial Intelligence (AI)-based language learning tools in the context of English for Specific Purposes (ESP). This approach was chosen to examine the relationship between variables in the Technology Acceptance Model (TAM) framework, specifically perceived usefulness, ease of use, attitudes towards use, and intention to use technology.

The population in this study were nursing students who had used or had experience in utilizing AI-based language learning tools. The sampling technique was carried out using a purposive sampling method, with the criteria for respondents being active students who have used AI applications or platforms in learning English, especially those related to nursing needs.

The participants in this study consisted of 180 nursing students selected using a purposive sampling technique. The sampling criteria included active nursing students who had experience using AI-based language learning tools in English learning activities, particularly in the context of English for Specific Purposes (ESP). The respondents were drawn from health-related higher education institutions in Indonesia, including students from different academic levels and semesters to obtain broader perspectives regarding technology acceptance. Based on gender distribution, 99 participants (55%) were male and 81 participants (45%) were female. Most participants were in the second to fourth academic years, indicating that they had already been exposed to ESP-related learning activities and clinical communication practices relevant to nursing education.

The research instrument is a questionnaire prepared based on the TAM construct which has been modified according to the ESP learning context. The questionnaire consists of several statement items that measure perceived usefulness, perceived ease of use, attitudes towards use, and intentions to use AI-based learning tools. Measurements were carried out using a five-point Likert scale, ranging from strongly disagree to strongly agree.

In this study, the AI-based language learning tools used by students include applications featuring chatbot interaction, speech recognition, and automated grammar correction. These tools utilize Artificial Intelligence techniques such as Natural Language Processing (NLP) to process text or speech input, as well as machine learning models to provide adaptive feedback. The chatbot feature allows students to simulate conversations in English, particularly in nursing-related contexts. Speech recognition enables pronunciation practice by analyzing spoken input and providing corrective feedback. Meanwhile, automated error analysis helps identify grammatical and lexical errors in writing tasks. These functionalities are relevant to ESP learning as they support the development of communication skills needed in professional healthcare settings.

Data collection in this research was carried out online through the use of a digital platform to facilitate the process of distributing questionnaires to respondents who were nursing students. This method was chosen because it is able to reach respondents more widely, is efficient, and is in accordance with the characteristics of technology use in the context of Artificial Intelligence (AI) based research. The process of filling out the questionnaire was carried out independently by the respondent while still paying attention to the clarity of the instructions given by the researcher. The initial stage after data collection is to carry out data cleaning which aims to ensure the quality of the data to be analyzed. This process includes checking the completeness of answers, identifying inconsistent responses, and eliminating data that does not meet the research criteria. This step is taken so that the data used in the analysis is truly valid, reliable and able to represent actual conditions, so that the research results obtained can be justified scientifically.

Data analysis was carried out in several stages. The first stage is a validity and reliability test to ensure the research instrument is suitable for use. The next stage is descriptive statistical analysis to describe the characteristics of respondents. The final stage is multiple linear regression analysis which is used to test the influence of the independent variables in the TAM model on the acceptance of the use of AI-based language learning tools by nursing students in the ESP context.

FINDINGS AND DISCUSSION

In the data collection process, the researchers initially obtained responses from 180 nursing students who had experience using Artificial Intelligence (AI)-based language learning tools. To ensure data quality and reliability, a data screening and cleaning procedure

was conducted. This process involved checking for incomplete responses, response consistency, and potential outliers. The results of the screening indicated that one response was incomplete and showed inconsistent answer patterns; therefore, it was excluded from further analysis. As a result, the final dataset consisted of 180 valid respondents.

This sample size meets and exceeds the minimum requirements for statistical analysis using the Technology Acceptance Model (TAM), particularly in multivariate analysis approaches such as Partial Least Squares Structural Equation Modeling (PLS-SEM), which generally requires a minimum of 10 times the largest number of structural paths directed at a construct. Thus, the final sample of 180 respondents is considered adequate and representative for analyzing the acceptance of AI-based language learning tools among nursing students.

Respondent profile

Gender

Table 1. Respondent's Gender.

Gender	Frequency	Percentage
Male	99	55
Female	81	45
Total	180	100%

The distribution of respondents showed that there were 99 male nursing students (55%), while there were 81 female nursing students (45%). This proportion shows that male participation is slightly higher than female in the use of AI-based language learning tools.

Age

Table 2. Respondents' Age

Age	Frequency	Percentage
<20	65	36%
20-25	113	63%
>25	2	1%
Total	180	100%

Based on table 2, the majority of responses were in the 20–25-year age range, 113 (63%), respondents (36%) were under 20 years old and only 2 people (1%) were over 25 years old. This shows that the majority of respondents are students of productive age.

Validity and Reliability Test

Validity tests were carried out to ensure that each item in the questionnaire was able to measure the constructs in the TAM model, namely perceived usefulness, ease of use, attitudes and intention to use. Testing was carried out using Pearson correlation with a significance level of 0.05.

Table 3. Validity Test.

Konstruk	**rHitung**	**rTabel**	**Description**
P01	0.548	0.423	Valid
P02	0.472	0.423	Valid
P03	0.124	0.423	Tidak Valid
P04	0.596	0.423	Valid
P05	0.749	0.423	Valid
P06	0.659	0.423	Valid
P07	0.764	0.423	Valid
P08	0.654	0.423	Valid

The test results show that of the total of 8 statement items, 7 items were declared valid because they had a calculated r value greater than the r table. One item, namely P03, was declared invalid because the correlation value was lower than the r table (0.124 < 0.423). This item was not used in further analysis because it was not able to represent the construct significantly.

Reliability Test

The reliability test in this study aims to ensure that the questionnaire instrument used is capable of producing consistent and stable data in measuring the variables studied, especially in the context of nursing students' acceptance of Artificial Intelligence (AI)-based language learning tools with the Technology Acceptance Model (TAM) approach. Reliability testing is carried out to assess the extent to which each statement item in the questionnaire has a good level of internal consistency in representing the construct being measured. A research instrument is declared reliable if the Cronbach's Alpha value obtained is greater than 0.7, which indicates that the items in the questionnaire have a strong level of interrelationship and are able to produce reliable data. Thus, instruments that meet the reliability criteria can be used appropriately in the further analysis process because they are able to provide consistent measurement results (Pujiharti & Isnaini, 2025).

Table 4. Reliability Test.

Variable	Nilai Alpha (α)	rTabel	Description
P01-P08	0,715	0,423	Reliabel

The Cronbach's Alpha value of 0.715 indicates that the research instrument has a good level of reliability. This value has exceeded the minimum limit of 0.7 so that all questionnaire items are declared consistent and can be used in further analysis.

Multiple Linear Regression Analysis

Multiple linear regression analysis in this study was used to test the extent to which variables in the Technology Acceptance Model (TAM) framework, such as perceived usefulness, perceived ease of use, attitudes towards use, and intention to use, influence nursing students' acceptance of Artificial Intelligence (AI)-based language learning tools in the context of English for Specific Purposes (ESP). This approach allows researchers to determine the contribution of each independent variable simultaneously or partially to the dependent variable, namely the level of technology acceptance. Through this analysis, it can be identified which variables have the most significant influence. thus, providing a more comprehensive understanding of the factors that determine the successful implementation of AI-based learning tools in supporting English language learning that meets the needs of the nursing field (Parn et al., 2025).

Table 5. Multiple Linear Regression Analysis Results

Variable	Koefisien (β)	Nilai p (Sig.)	Description
X1	0,160	0,020	Significant
X2	0,120	>0,05	Not significant
X3	0,116	>0,05	Not significant
X4	0,090	>0,05	Not significant
X5	-0,048	>0,05	Not significant
X6	0,078	>0,05	Not significant
X7	0,258	0,019	Significant

The regression equation obtained is as follows:

$$Y = 0{,}739 + 0{,}160X1 + 0{,}120X2 + 0{,}116X3 + 0{,}090X4 - 0{,}048X5 + 0{,}078X6 + 0{,}258X7 + e$$

The results of this study indicate that perceived usefulness (X1) and intention to use (X7) have a significant influence on the acceptance of AI-based language learning tools among nursing students in the ESP context. Among these variables, perceived usefulness plays a crucial role in shaping students' attitudes toward technology adoption, as reflected by its statistically significant coefficient ($\beta = 0.160$, $p < 0.05$). This finding suggests that students are more likely to accept AI-based tools when they perceive clear and tangible benefits that directly support their academic and professional needs (Hidayanto et al., 2024.

The perceived usefulness identified in this study can be strongly associated with the specific capabilities of the AI systems utilized by students. These systems are not merely

generic artificial intelligence tools, but are composed of several integrated technologies, including Natural Language Processing (NLP)-based chatbots, Automatic Speech Recognition (ASR), and machine learning-driven adaptive learning systems.

The chatbot feature, which is typically powered by transformer-based large language models, enables students to engage in interactive and context-aware conversations. Through NLP mechanisms such as tokenization, semantic understanding, and contextual response generation, the system is capable of simulating real-life communication scenarios, particularly in nursing-related contexts. This allows students to practice English for clinical communication without being constrained by time or instructor availability. One of the key technical advantages of this feature is its low latency response, which provides near real-time interaction. This immediacy creates a more dynamic learning environment and contributes significantly to students' perception of usefulness, as they can receive instant answers and continuously engage in learning activities.

The integration of Automatic Speech Recognition (ASR) technology enables students to practice pronunciation and speaking skills. ASR systems, which rely on deep neural network-based acoustic and language models, convert spoken input into text while simultaneously evaluating pronunciation accuracy. This feature provides immediate corrective feedback, allowing students to identify and improve errors in real time. Such a real-time feedback loop is particularly beneficial in language learning, as it accelerates the iterative learning process and enhances speaking proficiency in a more efficient manner compared to traditional methods.

Automated grammar and error correction systems contribute to the perceived usefulness by utilizing NLP-based error detection and correction algorithms. These systems analyze sentence structure, identify grammatical and lexical errors, and provide suggested revisions. This capability allows students to improve their writing skills independently while receiving consistent and objective feedback. The combination of these features supports continuous learning and reduces reliance on manual instructor evaluation.

Another important technological component is the use of machine learning algorithms in adaptive learning systems. These systems analyze user performance data and dynamically adjust learning content based on individual needs, proficiency levels, and learning progress. This personalization enhances learning relevance, particularly in the ESP context, where students require domain-specific vocabulary and communication skills related to healthcare. As a result, students perceive the system as more useful because it aligns closely with their professional learning objectives.

The significant influence of intention to use (X7) further supports the importance of system performance and user experience. Although intention to use is conceptually a behavioral variable, it is indirectly influenced by technical aspects such as system responsiveness, interaction quality, and perceived accuracy. Systems that provide fast, accurate, and contextually relevant responses are more likely to encourage continued usage, which in turn strengthens overall technology acceptance.

Despite these strengths, this study has several limitations from a technological evaluation perspective. While the findings successfully capture user perceptions through the TAM framework, they do not include objective measurements of system performance. Key technical indicators such as response latency, speech recognition accuracy (e.g., Word Error Rate), and NLP output quality were not assessed. This limits the ability to fully evaluate how well the AI systems perform in practice. Additionally, many AI tools used by students are based on general-purpose models rather than domain-specific medical models, which may affect the accuracy and relevance of the generated outputs in specialized contexts.

Future research is recommended to integrate user acceptance models with system performance evaluation to provide a more comprehensive understanding of AI effectiveness in education. Combining subjective measures (e.g., perceived usefulness) with objective technical metrics (e.g., accuracy, latency, and robustness) would allow researchers to better assess not only how much students value the technology, but also how well the system actually performs in supporting learning outcomes.

In conclusion, the findings of this study demonstrate that the perceived usefulness of AI-based language learning tools is closely linked to their underlying technological capabilities. Features such as low latency interaction, real-time feedback, contextual understanding, and personalized learning significantly contribute to students' positive perceptions and acceptance of the technology. However, a more rigorous evaluation of system performance is necessary to complement these findings and ensure the reliability and effectiveness of AI implementation in ESP learning for nursing students.

CONCLUSIONS

Based on the findings, this study concludes that nursing students generally demonstrate positive acceptance of Artificial Intelligence (AI)-based language learning tools in the context of English for Specific Purposes (ESP). Of the eight questionnaire items tested, seven were found to be valid and reliable, with a Cronbach's Alpha value of 0.715, indicating good internal consistency of the research instrument. The results of multiple linear regression analysis revealed that perceived usefulness and intention to use significantly influenced students' acceptance of AI-based learning tools, as indicated by p-values below 0.05. These findings suggest that students are more likely to adopt AI technologies when they perceive clear benefits and have a strong willingness to use them. This study contributes to the literature by extending the application of the Technology Acceptance Model (TAM) to AI-assisted language learning in nursing education. It highlights the role of AI features, such as Natural Language Processing, speech recognition, real-time feedback, and adaptive learning, in supporting ESP learning and professional communication development. The findings imply that educational institutions should promote effective AI integration through training, guidance, and relevant learning content. Future research is recommended to incorporate additional variables, such as social influence, user experience, and system quality, while involving larger and more diverse participant groups to enhance the generalizability of the findings.

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