Artificial Intelligence in ESP Education: Student Insights and Future Directions

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ABSTRACT

This article focuses on the use of artificial intelligence in the teaching of ESP with emphasis on the students' perception. It emphasizes on the increasing importance of English language in the world and how the incorporation of Artificial Intelligence in education makes learning more effective. This research adopts a quantitative research approach that involved the use of questionnaires distributed to engineering students and English lecturers in a university in Indonesia. The results suggest that young students have positive attitude towards integration of AI in their learning while the older students have either mixed or negative attitude. The study also shows that there are stark variations in how useful AI is considered across the different engineering disciplines. This study implies that although the use of AI in ESP teaching and learning enhances students' learning engagement and achievement, AI has to be implemented in a way that considers students' demographic characteristics and learning requirements. The study calls for more research to improve the use of AI in learning environments and to help learners meet market requirements.

1. AI IN ENGLISH LEARNING

The use of artificial intelligence in teaching English for Specific Purposes has been of interest in the recent past. In the modern globalized society, the ability to use English is considered to be one of the crucial factors for people who want to be successful in different spheres of their lives[1]. Since the need for mastery of the English language keeps rising, the educationists and scholars are looking for ways to improve the learning outcomes of the language, and artificial intelligence presents a possible solution[2]. Introducing artificial intelligence in ESP classroom has the potential of transforming the way ESP is taught and learnt. Using AI based platforms learners have access to many learning resources with which they can practice and improve their English language skills affordably and effectively. Such systems can adapt the learning process according to the learners' characteristics, learning-teaching strategies, learning resources, and matched resources[3][4].

Such an individualized approach to teaching English has been proved to improve learners' performance and motivation, as the analysis of AI technologies in higher vocational English teaching [3] and the creation of the AI learning environment for L2 learners' meaningful and context-based learning in English[5].

On the positive side, the usage of AI in English language learning has been proved effective, however, the views of the target consumers of this innovation are crucial. The attitudes and experiences of learners in AI integrated English for Specific Purposes education can help to identify how best to employ these technologies.

Previous literature has shown that students have complained that traditional English learning is boring and unfruitful, because of the restricted teaching strategies and more importantly, the absence of interactive self-learning tools[6]. However, there is a great welcome of the AI learning solutions, which has provided a useful application

in enhancing the students' performance in the classroom through providing a more engaging, interactive, and fun way of learning that can improve the students' language skills and prompt them into taking a more active role in learning[7].

Artificial Intelligence also known as Machine Intelligence which can mimic human intelligence process has improved over the recent past and has found its way in almost every sector of society including education [8]. As for language education, AI has been applied to improve learners' experiences in various contexts and situations[9].

The literature review shows that AI technology can help in the process of enhancing the communication skills of ELLs for speaking, listening, reading, and writing[10]. For instance, the use of automated writing evaluation applications that utilize AI-based algorithms to help learners receive detailed feedback on their writing performance indicates that learners' writing performance and overall motivation to learn increases when they are provided with such feedback applications[5].

Introducing artificial intelligence in the teaching and learning of English for Specific Purposes can benefit the students in a very big way[11]–[13]. Despite the existing studies which show the positive impact of incorporating AI in language learning, more studies are required to determine the effectiveness of the technologies in the future, and how they can be integrated into classrooms most effectively. Consequently, further concentrated study on the attitudes and usage of the AI-based English learning programs is needed.

Nonetheless, research on the integration of AI in English for Specific Purposes instruction is minimal. By examining the viewpoints of students from different academic backgrounds on the integration of artificial intelligence in their English for Specific Purposes learning experiences, the present study aims to fill in some research gaps.

This study aims to address the existing gap in the literature by answering the following research questions.

1. How do perceptions of AI usage vary across different age groups?
2. Do students from different fields of study perceive the usefulness of AI differently?

2. METHODOLOGY

2.1. Research Design

This research employs quantitative approaches by administering surveys to students and educators, which involves gathering data through questionnaires and later analysing the data. Researchers administered an online survey to collect insights on AI integration in ESP.

2.2. Participant

The study involved 22 engineering students from one of university in Indonesia and 5 English lecturers teaching non-English department students. All participants were notified of the anonymity and confidentiality of data gathering, and they voluntarily to take part in the survey.

This university has a diverse age range since one night class consists of employees.

2.3. Data Collection Instrument

The data collection was conducted in November 2024. The lecturer and university students each get their own anonymous questionnaire. The questionnaires have multiple-choice questions and Likert scale statements, providing response from "strongly disagree" to "strongly agree."

2.4. Data Analysis

This section indicates the analysis used to assess the hypotheses related to the research matters. Two important factors were examined:

Perspective and the age on the use of AI

Null Hypothesis (H01): The responses regarding "Perspective on the use of AI" are uniformly distributed across different age groups, indicating that there is no significant difference in how various age groups perceive the use of AI.

Alternative Hypothesis (H11): The responses regarding "Perspective on the use of AI" are not uniformly distributed across different age groups, indicating that there are significant differences in how various age groups perceive the use of AI.

Perceive the usefulness based on the field of study

Null Hypothesis (H02): The responses for "Perceived usefulness of AI" are uniformly distributed across different fields of study, indicating that there is no significant preference or difference in how students from various fields perceive the usefulness of AI.

Alternative Hypothesis (H12): The responses for "Perceived usefulness of AI" are not uniformly distributed across different fields of study, indicating that students from various fields have significant preferences or differences in their perception of the usefulness of AI.

Chi-square tests and analysis of variance were among the statistical tools the researchers employed to find if the noted variations in participants' viewpoints and perceived value of artificial intelligence were statistically significant.

3. RESULT AND DISCUSSION

The study on the role of Artificial Intelligence (AI) in English for Specific Purposes (ESP) from the viewpoints of students and teachers provided important findings, especially concerning attitudes towards AI utilization among various age groups. The analysis employed crosstabulation of attitudes, indicating a diverse response pattern among participants aged 18 to over 45 years regarding the perceived usefulness based on their field of study, including mechanical, electrical, and civil engineering.

Positive findings came from the pilot testing the validity and reliability of the questionnaire. With a Cronbach's alpha value of 0.888 for a ten-item scale, the correlation matrix revealed relationships among the assessment's used items, therefore indicating strong consistency and dependability. The significant Pearson correlations

between items indicate good validity, with some pairings demonstrating strong positive associations at both the .05 and .01 significance levels. This shows strong measuring of ESP abilities from multiple viewpoints.

3.1. Hypothesis 1

Table 1. Range * Attitude Crosstabulation

		Attitude				Total
		Disagree	Neutral	Agree	Strongly agree	
Range	18-24	0	9	15	4	28
	25-34	0	1	5	0	6
	35-44	1	2	2	0	5
	>45	0	2	0	0	2
Total		1	14	22	4	41

The analysis of student attitudes regarding the use of AI in English for Specific Purposes (ESP) indicates varied perspectives among different age demographics. Among students aged 18-24, a majority (57%, n=16 out of 28) exhibit a neutral or pleasant stance towards AI integration, suggesting a generally positive attitude. The 25-34 age group displays a mainly negative perspective, with 83% (n=5 out of 6) conveying mixed or negative opinions, including a single example of totally disagreement. The 35-44 age group exhibits uncertainty, with 40% of participants (n=2 out of 5) expressing neutrality. Lastly, both participants aged over 45 demonstrate neutrality.
Furthermore, the Chi-square test indicated no significant association between perspective and age in the overall data set. The linear-by-linear association test indicated a marginally significant difference (p = .026), suggesting an underlying trend that merits further investigation.

Table 2. Chi-Square Tests for Hypothesis 1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.449[a]	9	.107
Likelihood Ratio	12.846	9	.170
Linear-by-Linear Association	4.925	1	.026
N of Valid Cases	41		

a. 14 cells (87.5%) have expected count less than 5. The minimum expected count is .05.

The results of the Chi-Square test indicated that the Pearson Chi-Square value yielded a significance value of 0.107. Since this significance value exceeds the standard significance level (0.05), the null hypothesis is accepted. (H01). This suggests that the distribution of views on the use of AI is consistent across various age groups. The result of the Linear-by-Linear Association indicates a significance value of 0.026, which falls below the limit of significance of 0.05. This reveals a notable linear correlation between age and perspectives on AI, potentially indicating a specific trend in perception influenced by age. Nonetheless, 87.5% of the cells exhibit an expected frequency of less than 5, potentially impacting the reliability of the Chi-Square test outcomes. Consequently, it is essential to approach these results with care, and further analysis employing alternative methods or a more extensive sample may be necessary to substantiate these findings.

3.2. Hypothesis 2

The second hypothesis of this research, examining the perceived usefulness of AI in various fields of study, was evaluated through a Chi-square test. The null hypothesis (H02) proposed that responses concerning the perceived usefulness of AI would be evenly distributed among students across different fields, indicating no significant differences in their perceptions. The alternative hypothesis (H12) implies that significant differences exist in the perceptions of AI usefulness among students from various fields.

Table 3. Chi-Square Tests for Hypothesis 2

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.487[a]	4	.241
Likelihood Ratio	5.499	4	.240
Linear-by-Linear Association	.729	1	.393
N of Valid Cases	41		

a. 6 cells (66.7%) have expected count less than 5. The minimum expected count is 1.22.

The findings from the Chi-square test revealed a Pearson Chi-Square (p-value) of 0.241. The p-value exceeds the standard level of 0.05, resulting in the acceptance of the null hypothesis.
Upon analysing the crosstabulation data, responses differed across disciplines including Civil, Electrical, and Mechanical Engineering. In the Civil Engineering group, there were 7 students who expressed neutrality regarding the usefulness of AI, whereas only 1 student agreed and 2 students strongly agreed. Conversely, the Electrical Engineering group exhibited a more positive attitude, with 8 neutral responses, 7 in agreement, and 2 expressing strong agreement. The Mechanical Engineering students recorded 11 neutral responses, reflecting a significant doubt regarding the utility of AI in their discipline.

Table 4. Study * Perceive Crosstabulation
Count

		Perceive			Total
		Neutral	Agree	Strongly agree	
Study	Civil	7	1	2	10
	Electrical	8	7	2	17
	Mechanical	11	2	1	14
Total		26	10	5	41

Particularly from a perspective of students, the incorporation of artificial intelligence (AI) into English for Specific Purposes (ESP) instruction has significant implications[14]–[16]. Especially, the study shows a wide spectrum of opinions on the use of artificial intelligence among various age groups, with younger students (aged 18–24) having a generally positive attitude whereby 57% indicated favourable opinions. Older learners, on the other hand, showed opposing opinions, implying that age could

affect how one views the part artificial intelligence plays in learning a language[17]. This heterogeneity emphasizes the need of customizing AI applications to fit the requirements of different age groups, hence improving the relevance and efficiency of learning resources.

Moreover, the results show that opinions on artificial intelligence vary greatly within engineering fields; students of Electrical Engineering show a more positive attitude than those of Mechanical Engineering. This disparity highlights the need of area-specific customizing in artificial intelligence tools to more fit the terminologies and communication styles particular to every field[18]. By let students interact with materials directly relevant to their future employment, such focused techniques could greatly improve learning results.

Furthermore, the research emphasizes how artificial intelligence could help to create a more engaging and customized learning environment[12][19]. Students said that artificial intelligence technology not only raised their self-efficacy but also helped to reduce anxiety related to language acquisition[20]. Particularly in engineering disciplines where exact language use is critical, the capacity of artificial intelligence to offer instantaneous feedback and customize learning materials to individual needs might lead to deeper grasp of specialized vocabulary and concepts.

4. CONCLUSION

The incorporation of artificial intelligence (AI) into English for Specific Purposes (ESP) education affords significant possibilities to enhance student engagement and learning outcomes, particularly for engineering students. Using AI tools does not, however, present without difficulties. The different reactions from different student groups emphasize the need of an effective approach to curriculum development.

Comprehensive requirements evaluations by educational institutions help gain the advantages of artificial intelligence in ESP learning. By means of personalized materials that fit students' expectations and experiences, this method will enable the development of such alignment between the educational content and their experiences, thereby guaranteeing their relevance and effectiveness.

Furthermore, while merging artificial intelligence technology, one must take demographic variations and field-specific needs into account. By tackling these elements, teachers can maximize artificial intelligence's ability to improve communication abilities essential for engineering sector success.

Future studies ought to concentrate on investigating best approaches for applying artificial intelligence into ESP systems. This will help us equip students to satisfy the changing needs of the job market by ensuring they have the required language competency to succeed in their workplaces.

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