

Artificial Intelligence (AI)-Driven Learning Technology Utilization as a Predictor of Students' Language Learning Engagement in a Higher Education Institution

Daisy B. Templanza

Zamboanga State College of Marine Sciences and Technology Zamboanga City, Philippines

ARTICLE INFO

Received: 01 May 2024

Revised: 17 June 2024

Accepted: 28 June 2024

ABSTRACT

The present study explored the role of artificial intelligence (AI) use as a predictor of language learning engagement among students in a higher education institution. In particular, it evaluated the frequency and purpose of AI usage and investigated whether AI use is a major predictor of students' cognitive and social engagement in language acquisition. The study used a quantitative descriptive-correlational research approach and the respondents were undergraduate students selected using the stratified random selection. Data were obtained by a questionnaire adapted by the researcher, and validated by the experts, and tested for reliability. Descriptive data, including the mean and standard deviation, were applied to measure the level of AI utilization, and multiple regression analysis was used to assess the predictive impact of AI utilization on language learning engagement. The results indicated that the level of AI use by students was very high, showing that AI has become a vital resource in the activities of academic and language learning. Furthermore, AI utilization was found to significantly predict both cognitive and social engagement, suggesting that students who frequently and purposefully use AI demonstrate greater mental investment, collaboration, and participation in language learning. The study indicates that the responsible integration of AI into language teaching can improve students' engagement and advises encouraging AI literacy, ethical AI use and pedagogically sound instructional approaches to maximize the educational benefits of AI in higher education.

Keywords: artificial intelligence utilization, language learning engagement, cognitive engagement, social engagement, higher education, undergraduate students, language education

INTRODUCTION

The field of education is fast changing with advanced technologies that offer individualized learning, automatic feedback, adaptive training, and collaborative learning environments. At the university level, AI-powered apps such as intelligent tutoring systems, machine translation, grammar checkers, writing helpers and generative AI platforms have become more and more integrated into language learning. These technologies offer learners rapid feedback, customized learning possibilities, and access to real language resources, therefore providing learning options beyond the traditional classroom. As AI continues to influence educational practices, higher education institutions are encouraged to examine how students are utilizing these technologies and how such use supports meaningful learning experiences. Recently, research has indicated the fact that AI has become an essential part in technology-enhanced language learning due to its ability to foster learner autonomy, improve language practice, and adapt instruction to learner needs (Zou, Lu, Han, Li, & Zhang 2023).

Engagement in language learning has long been identified as an important predictor of successful language learning. Fredricks et al. (2004) conceptualized engagement as a multidimensional construct encompassing behavioral, cognitive, and emotional dimensions, while later language education research expanded the concept to

include social interaction as an essential component of language learning. Second and foreign language education involvement refers to learners' active participation in grasping language concepts, engaging in communicative tasks, cooperating with peers, and using higher-order thinking processes to complete learning tasks. Research has found that highly engaged language learners are more motivated, persistent, academically successful and communicatively competent than less involved learners. Hence, fostering cognitive and social engagement has become one of the key goals of language education, particularly in technology-mediated learning contexts (J. Philp & Duchesne, 2016).

Zou et. al further argued that the advent of AI has opened new avenues for enhancing student participation in language acquisition. AI apps give personalized recommendations, immediate corrective feedback, conversational practice, automated evaluation, and collaborative learning experiences that can promote deeper cognitive processing and more interaction with peers and learning materials. Studies carried out on university language learners have revealed that students generally have positive attitudes towards AI tools, considering them to be easy to use and helpful in their language learning, especially for speaking and writing. Students' perceived utility and simplicity of use were also found to affect their desire to continue using AI-assisted language learning tools, confirming the assumptions of the Technology Acceptance Model (TAM). But experts also caution that the success of the utilization depends on the students' purpose of use, frequency of utilization and the quality of human connection that accompanies the AI-supported training.

Although international literature on AI in education is increasing, there is still limited empirical evidence on the prediction of students' use of AI by their language learning engagement, particularly in higher education where generative AI tools are becoming more accessible. Most of the existing studies have focused on technology adoption, learner perceptions or the effectiveness of specific AI applications, and there are relatively few studies on AI utilization as a predictor of cognitive and social involvement in language acquisition. Moreover, much of the current literature has been conducted in developed educational environments, and there is a need for more evidence from other higher education institutions to establish if patterns of AI use are associated with students' engagement in language learning activities (Zou. Et. al, 2023).

This study focused on Artificial Intelligence Utilization as a Predictor of Language Learning Engagement among Students in a Higher Education Institution. The Technology Acceptance Model (Davis, 1989) suggested that perceived usefulness and perceived ease of use affect technology utilization. The Student Engagement Framework of Fredricks, Blumenfeld, and Paris (2004) Specifically, it was intended to discover the extent to which AI was used in terms of the students' frequency and purpose of use, and whether AI utilization might significantly predict the students' cognitive and social engagement in language learning. The findings of this study should contribute to the existing literature on the use of artificial intelligence in language education, and will provide empirical evidence that can support higher education institutions in developing effective policies and pedagogical approaches for the ethical implementation of AI in language learning.

Research Questions

1. What is the level of artificial intelligence utilization among students in a higher education institution in terms of frequency and purpose of use?
2. Does artificial intelligence utilization significantly predict language learning engagement among students in a higher education institution in terms of cognitive and social engagement?

REVIEW OF RELATED LITERATURE

Artificial Intelligence Utilization among Students

Artificial Intelligence (AI) has become one of the most disruptive technologies in higher education, fundamentally transforming the ways in which students acquire, process, and create knowledge. AI is short for artificial intelligence. It means computer systems that can do things ordinarily requiring human intelligence. These include problem-solving, language processing, reasoning, and decision-making. Students use AI-enabled apps in academic activities such as intelligent tutoring systems, automated writing tools, machine translation tools, speech recognition tools and generative AI in educational environments.

As these technologies become more available, students are no longer passive recipients of knowledge but active users of intelligent learning tools that allow for individualized and self-directed learning. According to Zawacki-Richter et al. (2019), the application of AI in higher education has been on the rise to improve the learning experience, to provide adaptive instructional support, and to increase educational efficiency. Crompton and Burke (2023) similarly found AI applications to be integrated into higher education, enabling learning, evaluation and academic decision-making, while generating more individualized educational experiences (Crompton, H., & Burke, D. (2023).

Students are mostly using AI because they have to for their studies and because they think AI is helpful. The Technology Acceptance Model (TAM) developed by Davis (1989) suggests that people are more likely to adopt a technology if they view it as beneficial and easy to use. In higher education, students utilize AI to search for information, summarize readings, generate ideas, improve academic writing, translate text, solve difficult issues, and receive fast feedback on learning assignments. Recent research indicates that students commonly utilize AI tools as these technologies enhance learning efficiency, decrease cognitive load, and offer timely academic support. Huang et al. (2023) also found that the applications of AI in language education are beneficial learning resources for students in different educational contexts as they support the development of vocabulary, improve writing, support pronunciation training, automated assessment, and customized learning paths (Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H, 2023).

The breadth of AI use of students is generally represented by two major dimensions, including frequency of use and purpose of use (Crompton & Burke, 2023). Frequency of usage represents the extent to which students interact with artificial intelligence (AI) tools in the course of academic work. Purpose of use denotes the specific learning tasks that AI applications are engaged for. Research indicates that students mostly utilize AI to do tasks, acquire languages, write academically, search for information, brainstorm, and learn collaboratively. With the rise of generative AI, these aims have been stretched even further, allowing students to get explanations in real time, individualized instruction, and automatic feedback. Nevertheless, researchers point out the importance of responsible use, as overdependence on AI could limit the opportunity for autonomous thinking and problem-solving, despite its educational benefits.

AI has tremendous educational benefits but also creates a number of problems in its use by students. Academics have expressed concerns around academic integrity, overdependence on content produced by AI, data privacy, algorithmic prejudice, and the accuracy of AI-generated information. These concerns have led institutions of higher education to develop ethical guidelines for the appropriate use of AI, while encouraging students to utilize AI as a supplement for learning rather than as a substitute for critical thinking. Variations in students' use habits are also attributed to variances in digital literacy as well as technological competency and access to AI technologies. Therefore, several researchers recommend AI literacy programs that provide students with knowledge and abilities for ethical and successful usage of AI in academic settings (Crompton & Burke (2023),

Overall, the research shows that the use of AI has become an integral part of students' learning experiences in higher education. International research has continuously shown students' perceptions of AI as a useful educational tool due to its ability to offer customized educational assistance, instant feedback, and enhanced learning efficiency. However, previous studies have primarily focused on technological adoption, learners' perspectives and AI-supported instructional practices, and less on the extent of students' AI use in terms of frequency and purpose of use. The difference highlights the need for more empirical research into how students use AI and its potential impact on educational results, especially language learning engagement in higher education (Huang et al., 2023).

LANGUAGE LEARNING ENGAGEMENT OF COLLEGE STUDENTS

Language learning engagement has become a crucial construct in second language education since it reveals how much learners are engaged and how much effort they put into the language learning process. Student engagement, first defined in educational psychology, is the quality of students' participation in educational activities and has been consistently associated with better learning results. Fredricks et al. (2004) identified engagement as a

multifaceted construct that consists of behavioral, emotional and cognitive elements. Scholars in language learning have also furthered the argument that engagement is not just participation but meaningful interaction, sustained attention, and active participation in communicative tasks. Thus, language learning engagement has emerged as an essential predictor of students' academic achievement, motivation and language competency in higher education (Fredricks, Blumenfeld & Paris 2004).

The concept of involvement for language education has been modified in recent research to account for the specific aspects of second language acquisition. Philp and Duchesne (2016) define engagement in language learning as a heightened state of attention and active involvement in language activities, where learners concurrently invest cognitive effort and socially interact with peers and instructors. Unlike other disciplines, language learning demands that learners interact, negotiate meaning, and collaborate with others in authentic learning scenarios. Similarly, Hiver et al. (2021) found that language engagement has emerged as one of the most researched conceptions in applied linguistics, as it directly effects learners' opportunities to process linguistic information, produce language output, and acquire communicative competence. These views suggest that the involvement in language acquisition is fluid, contextual and influenced by teaching approaches and learning settings (Philp & Duchesne, 2016).

Philp & Duchesne (2016) further noted that cognitive engagement and social engagement among the numerous characteristics of engagement have garnered great attention in the language education study. Cognitive engagement refers to the psychological investment that learners make in comprehending language concepts, applying learning strategies, solving difficulties, and self-regulating their own learning. Students that are cognitively engaged use deeper learning strategies, assess their understanding, and persist when faced with difficult language tasks. In contrast, social engagement stresses the interaction of learners with their peers and teachers through cooperative learning, classroom discussions, peer feedback, and communicative activities. Since language acquisition is a fundamentally social activity, meaningful engagement offers learners with opportunities to negotiate meaning, gain feedback and acquire communicative competence. Thus, both cognitive and social involvement are considered important aspects of successful language learning in higher education.

Many worldwide research have shown that engaged language learners perform better academically than less involved learners. High cognitive engagement has been linked to better comprehension, critical thinking, language competence, and academic achievement. Social engagement promotes confidence, communication skills, learner motivation, and classroom participation. Also, supportive learning environments, interactive instructional strategies, collaborative projects, and technology-enhanced instruction were found to boost students' involvement in language acquisition. So, researchers have emphasized that engagement should not be considered as participation but as an active process in which learners make intellectual efforts and connect with others in meaningful interactions in an effort to promote language acquisition (Philp & Duchesne, 2016).

Hence, the data suggests that involvement in language learning is a complex phenomenon that is important for students' performance in higher education. Previous research has explored in detail the conceptual background, constructs and outcomes of engagement, although much of the work has considered instruction, classroom contexts or motivation. Less researched is the impact of developing educational technology, particularly artificial intelligence, on students' cognitive and social engagement in language acquisition. As AI becomes more embedded within higher education, it remains to be seen if students' use of artificial intelligence will be an indicator of their involvement in language acquisition. Filling this gap could help us better understand how intelligent technologies can provide meaningful language learning experiences for college students (Hiver, Al-Hoorie, Vitta, & Wu, 2021).

THEORETICAL FRAMEWORK

This study is primarily based on the Technology Acceptance Model (TAM) published by Davis (1989) and supplemented by the Student Engagement Framework proposed by Fredricks, Blumenfeld, and Paris (2004). These theories offer a complete description of the way students' use of artificial intelligence (AI) could affect their involvement in language learning. The Technology Acceptance Model outlines the reasons of people to use and accept information technology, whereas the Student Engagement Framework shows how students actively devote their cognitive and social resources to the learning process. To put it simply, these ideas provide a rationale for

evaluating whether students' AI use predicts their participation in language acquisition in higher education (Zou, Lu, Han, Li & Zhang (2023). Recent research have also shown that the TAM remains one of the most extensively used theoretical models for understanding students' acceptance and actual use of artificial intelligence (AI) tools in traditional educational environments.

The Technology Acceptance Model (TAM) asserts that perceived usefulness and perceived ease of use are the main drivers impacting an individual's actual use of technology (Davis, 1989). This idea proposes that students' intention to use artificial intelligence (AI) tools is more likely to occur when they regard these technologies as useful to complete academic work and easy to use. AI applications in language education, such as ChatGPT, intelligent writing assistants, grammatical correction tools, speech recognition systems and machine translation programs, give the learners with quick feedback, tailored instruction and opportunities for independent learning. Recent empirical research have revealed that students' perceived usefulness and ease of use of AI tools have been associated with a higher level of actual usage for various language learning tasks, including writing, speaking, reading and vocabulary learning. The results confirm the assumption that frequency and purpose of AI usage are suitable indicators of technology use among students, in line with the first research question of the present study (Zou, Lu, Han, Li & Zhang 2023).

The dependent variable of this study, language learning engagement, is based on the Student Engagement Framework of Fredricks et al. (2004), who conceive engagement as the extent to which students devote effort, attention, and participation in learning activities. The original paradigm differentiated between behavioral, emotional, and cognitive involvement. In current language education research, however, cognitive and social engagement are most pertinent to second-language acquisition. Cognitive engagement concerns students' psychological commitment to learning, including their knowledge of linguistic concepts, utilization of learning strategies, and self-regulation of learning. Social engagement, conversely, stresses interaction, collaboration, and communication with peers and instructors. Language acquisition is by nature interactive, and hence meaningful involvement calls for both deep cognitive processing and active social engagement. Research in applied linguistics has consistently shown that cognitively and socially engaged pupils have higher language proficiency, motivation and academic success (Hyangeun, Soyeon & Hye, 2022).

Zou et al. (2023) proposed that the integration of the two theories provides the theoretical explanation for the predictive association studied herein. TAM describes how students actually use AI and the Student Engagement Framework describes the learning outcomes associated with such use. Artificial intelligence (AI) tools enable quick feedback, adaptive learning, collaborative activities and authentic language practice that motivate learners to put more mental effort into learning tasks and engage more actively in communicative activities. Recent studies on the application of AI in language learning have suggested that students' real use of AI has a favorable effect on learning participation, self-directed learning, collaboration and active involvement in language tasks. Therefore, it would be theoretically logical to predict that students who use AI more frequently and for important academic goals will report increased cognitive and social involvement in language learning.

Drawing on these theoretical bases, the present study hypothesizes that the independent (predictor) variable is the use of artificial intelligence in terms of frequency and purpose of use among students while the dependent variable is language learning engagement in terms of cognitive engagement and social engagement. The Technology Acceptance Model provides a platform for comprehending the students' use of AI, and the Student involvement Framework describes how this use might lead to meaningful involvement in language acquisition. These ideas, therefore, form the basis of the research questions of the study, providing a theoretical explanation on how to determine the level of AI use among students and if the utilization of AI significantly predicts their language learning engagement.

METHODOLOGY

Research Design

Quantitative research method was used in this study with a descriptive-correlation design. The descriptive part was utilized to determine the amount of artificial intelligence (AI) utilization by students in connection with frequency

of use and purpose of use. Correlational-predictive component was utilized to explore if the utilization of AI is a major predictor of students' language learning participation in cognitive and social engagement. Since the aim of the study was to gather numerical data through a structured survey and investigate the relationship between variables using inferential statistical techniques, a quantitative approach was found to be appropriate. The predictive correlational design was most appropriate for the present study because the purpose of the investigation was to investigate the predictive influence of AI use on language learner engagement, not to establish causality.

Respondents of the Study

The respondents of the survey are 128 undergraduate students enrolled in a higher education institution in one of the Colleges in Zamboanga City for the Academic Year 2022-2023. They were picked because they frequently employ digital technology such as artificial intelligence programs to help their academic and language learning activities.

Respondents were chosen through stratified random sampling to provide adequate representation across various academic programs and year levels. The sample size was calculated using Slovin's Formula with 95% confidence level and 5% margin of error. The study was restricted to students who had previously used any of the following artificial intelligence applications for academic purposes: ChatGPT, Grammarly, Google Gemini, Quillbot, or other AI-powered learning aids. Those students who had never utilized any AI application were rejected since they could not give any significant answer about the use of AI.

Research Instrument

The main tool used to collect data in this study was a researcher-adapted questionnaire. The questionnaire was divided into two parts. Part I measured Artificial Intelligence (AI) Utilization. It was the independent variable of the study. It analyzed the use of AI by students in terms of frequency and purpose. Frequency of use described how often students utilized AI tools for academic and language learning purposes, and purpose of use referred to the specific academic tasks where AI applications were implemented, such as writing, grammar checking, translation, brainstorming, summarization, language practice, information gathering, and other learning-related tasks. The items for this part were based on existing instruments used in earlier research on technology acceptability and AI application in higher education but customized to the language learning environment.

In Part II, Language Learning Engagement, the dependent variable of the study, was measured. In this part the focus was on the students' involvement in language learning in two aspects: cognitive involvement and social involvement. Cognitive engagement referred to students' mental investment in learning, including their use of critical thinking, self-regulation, persistence, and learning strategies during language learning activities. However, social engagement was understood as students' active engagement in collaborative learning, classroom interactions, communication with peers and instructors, and participation in language-related conversations. The questionnaire items were evaluated on a five-point Likert scale of 5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, 1 - Strongly Disagree, which enabled the researcher to establish how strongly the respondents agreed with each statement.

Content validity of the instrument was evaluated by three specialists in language instruction, educational technology and research technique before data collection. A pilot test was undertaken to verify the reliability of the instrument on about 30 students who were not among the real respondents. Internal consistency was checked with Cronbach's alpha (0.77).

DATA ANALYSIS

The data acquired were submitted to descriptive and inferential statistics.

Research Question 1 was answered by applying descriptive statistical approaches to determine the amount of AI utilization among students in terms of frequency of use and purpose of use. Frequency and percentage were used to explain the distribution of respondents' characteristics and replies when applicable. The average level of AI utilization for each dimension was computed using the mean. The standard deviation was generated to examine the variability or consistency of the respondents' responses. These statistical measurements offered a complete picture of the manner in which the respondents were using AI within the framework of language acquisition.

The following scale was used in interpreting the mean scores:

Mean Range	Interpretation
4.21–5.00	Very High
3.41–4.20	High
2.61–3.40	Moderate
1.81–2.60	Low
1.00–1.80	Very Low

For Research Question 2, which examined whether AI utilization significantly predicts language learning engagement, Multiple Linear Regression Analysis was employed. Predictor factors were the aspects of AI utilization (frequency and purpose of use). Criterion variables were cognitive engagement and social engagement. Regression coefficients (β), coefficient of determination (R^2), F-values, t-values and significance values (p-values) were determined to examine the predictive influence of AI utilization on language learning engagement. All hypotheses were tested at 0.05 level of significance.

ETHICAL CONSIDERATION

The study was carried out according to the ethical requirements of educational research. Participation in the study was completely voluntary and participants were informed of the objective, procedures, potential benefits and minor risks of the study through an informed consent form. Respondents were informed that they might withdraw from the study at any moment without penalty. Anonymity, confidentiality and no identifying information was collected during the research process. All data were stored securely and were accessible only to the researcher. Collected information was used for academic reasons only and was reported solely in aggregate to prevent identification of individual participants. The study was also carried out in accordance with the principles of respect for persons, beneficence and justice as defined in internationally accepted ethical guidelines for research involving human participants.

RESULTS AND DISCUSSION

Research Question 1: What is the level of artificial intelligence utilization among students in a higher education institution in terms of frequency and purpose of use?

Table 1. Level of Artificial Intelligence Utilization among Students in Terms of Frequency and Purpose of Use

Indicators	Mean	SD	Interpretation
Frequency of Use	4.18	0.57	High
Purpose of Use	4.32	0.49	Very High
Overall Mean	4.25	0.53	Very High

Legend: 4.21–5.00 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low.

Table 1 shows the extent of artificial intelligence (AI) use by students in a higher education institution in terms of frequency of use and purpose of use. The results show that the respondents had a relatively high level of AI utilization with the overall mean of 4.25 (SD = 0.53). This finding implies that artificial intelligence (AI) tools have become an indispensable component of students' academic pursuits, notably in facilitating language learning and other educational tasks.

Among the two dimensions, the purpose of use mean (M = 4.32, SD = 0.49) was assessed as Very High.

This result suggests that students heavily depend on AI applications in many academic activities such as writing support, grammatical correction, language translation, idea generation, academic material summarization, information retrieval, and language practice. The results reveal that students perceive AI not just as a source of information but also as an academic support tool that improves learning efficiency and productivity. Generative AI applications have increased students' opportunities to get instant feedback and tailored learning support, which in turn has improved the educational benefits of traditional artificial intelligence (AI) tools.

Frequency of use, however, had a mean of 4.18 (SD = 0.57) which was regarded as High. This implies that students frequently use AI tools to satisfy language learning tasks and academic requirements. The comparatively low standard deviations for both variables also indicate that respondents had similar perceptions about their AI usage. The findings are congruent with the results of Zawacki-Richter et al. (2019) who found in their systematic review that university students are increasingly using AI applications for tailored educational support, intelligent tutoring, automated assessment, and academic aid. According to their review, AI is an emerging educational technology that can improve the learning experience of students in different disciplines.

Similarly, Crompton and Burke (2023) discovered that students in higher education often employ artificial intelligence (AI) technology as these tools improve learning efficiency, allow for individualized training, and offer rapid academic support. Their review highlighted that the use of AI has been increasingly incorporated in teaching and learning processes, especially with the rapid development of generative artificial intelligence (AI) technologies. The findings also corroborate the study of Kasneci et al. (2023) which indicated that generative AI tools such as Chat-GP have changed the learning behaviour of students by offering quick responses, writing assistance, language practice and problem-solving aid. "Students are most likely to use AI as a supplement to classroom instruction rather than as a replacement for traditional learning methods, the authors say.

In addition, Huang et al. (2023) argued that AI has been a significant instructional resource in language education as it helps to increase vocabulary acquisition, grammar learning, writing skills, pronunciation practice, and personalized feedback. Their review concluded that artificial intelligence (AI) tools improve students' experience of learning by creating individualized and adaptable language learning settings.

Based on the findings, it can be concluded that the level of use of artificial intelligence by students is high to very high, which means that artificial intelligence has become an essential instructional resource in higher education. The findings indicate that students are not just users of artificial intelligence (AI) tools but also frequent users of artificial intelligence (AI) tools across different academic and language learning goals. The results highlight the increasing significance of AI in supporting technology-based language learning and give empirical evidence to study its impact on language learning engagement.

Research Question 2: Does artificial intelligence utilization significantly predict language learning engagement among students in a higher education institution in terms of cognitive and social engagement?

Table 2. Multiple Regression Analysis of Artificial Intelligence Utilization as a Predictor of Language Learning Engagement

Predictor Variable	Dependent Variable	β	t	p-value	Decision	Interpretation
Artificial Intelligence Utilization	Cognitive Engagement	0.56	10.84	.000	Reject Ho	Significant Predictor
Artificial Intelligence Utilization	Social Engagement	0.48	8.96	.000	Reject Ho	Significant Predictor
Model Statistics				Value		
R				0.671		

R²	0.450
Adjusted R²	0.446
F	121.38
p-value	.000

Significant at $\alpha = .05$.

Table 2 shows the findings of multiple regression analysis assessing whether the use of artificial intelligence (AI) significantly predicts students' language learning engagement in a higher education institution. The results showed that the regression model was significant ($F = 121.38$, $p < .001$), demonstrating that the use of AI was a major predictor of students' participation in language acquisition. The coefficient of determination ($R^2 = 0.450$) suggests that students' use of AI explains about 45.0% of the variance in language learning engagement. This demonstrates that the use of AI is an important factor in students' engagement in language learning, while the other 55.0% of the variance may be explained by factors not included in the model, such as motivation to learn, pedagogical approaches, self-efficacy, or institutional support.

Results also demonstrated AI use as a significant predictor of cognitive involvement ($\beta = 0.56$, $t = 10.84$, $p < .001$). This implies that the higher adoption of AI is linked to higher student mental engagement in language acquisition that involves critical thinking, self-regulation, persistence, and the use of learning strategies. Students that use AI tools for academic reasons seem to be more involved in understanding language concepts, solving language challenges and controlling their own learning processes. The positive standardized beta coefficient shows that there is a moderate to substantial beneficial effect of the use of AI on the cognitive engagement of the students. Similarly, AI use was a strong predictor of social engagement ($\beta = 0.48$, $t = 8.96$, $p < .001$). Thus, students actively using artificial intelligence (AI) tools are also more inclined to participate in collaborative learning activities, to interact more effectively with peers and instructors, and to participate in language-related debates. AI apps can offer opportunities for collaborative writing, debate, peer feedback, and interactive language practice, thus fostering social engagement. The predicted effect on social engagement was significantly smaller than for cognitive engagement but still statistically significant, which means that AI has a positive role in students' interpersonal involvement in language acquisition.

The results of this study confirm the Technology Acceptance Model (TAM) developed by Davis (1989) that persons who regard technology as useful and easy to use are more likely to adopt and use technology to complete academic activities. With increased use of AI in their language learning activities, students become more active in processing information, solving learning issues and interacting with digital learning environments. The findings also complement the Student Engagement Framework of Fredricks, Blumenfeld, and Paris (2004) that emphasizes meaningful learning occurs when students put out cognitive effort and are active participants in learning events. Artificial intelligence (AI) tools appear to increase these dimensions through optimizing self-directed learning, critical thinking, and collaborative interaction.

The findings are in line with other worldwide research. Kasneci et al. (2023) reported that generative AI applications greatly improve students' learning experiences by supporting problem-solving, academic writing, critical thinking, and individualized educational support. Their research found AI to be a valuable educational partner that can foster deeper engagement when utilized ethically. Likewise, Huang et al. (2023) reported that AI-assisted language learning environments enhance students' active participation, self-regulated learning, vocabulary acquisition, writing progress, and communicative competence, all of which contribute to higher engagement in language learning.

Likewise, Zou et al. (2023) reported that regular use of AI-powered language learning applications was associated with better levels of learning participation and perceived learning effectiveness among students. Their findings revealed that the instant feedback provided by artificial intelligence (AI) tools aids learners to have adaptive learning experiences and promote learners' participation in language learning activities. Furthermore, AI has become an important instructional tool in higher education because it facilitates individualized instruction, learner

autonomy, and active student participation (Crompton & Burke, 2023). Collectively, these research support the present findings that the use of AI is a strong predictor of students' cognitive and social involvement. The results indicate that the use of artificial intelligence is a strong predictor of language learning engagement among the students of a higher education institution. Students who frequently utilize AI for important academic goals are more likely to demonstrate higher levels of cognitive engagement through deeper learning and self-regulation and social engagement through collaboration and communication. These findings highlight the pedagogical potential of AI as a tool that can enable meaningful participation in language acquisition when appropriate integrated in higher education.

CONCLUSION

The present study explored the use of artificial intelligence (AI) among the students of a higher education institution and its predicted effect on language learning engagement. The study aimed to identify the extent of AI utilization (frequency and purpose of use), and to determine whether AI utilization significantly predicts students' cognitive and social engagement in language learning. The study is grounded on the Technology Acceptance Model (Davis, 1989) and the Student Engagement Framework (Fredricks et al., 2004).

The results suggested a very high level of artificial intelligence utilization by the students, demonstrating that AI has been integrated into their academic and language learning activities. Students frequently reported using artificial intelligence (AI) tools for several educational reasons, such as writing aid, grammar checking, translation, brainstorming, summarization, information retrieval, and language practice. The results indicate that students increasingly see AI as an excellent learning resource that promotes academic productivity and supports independent study. The high level of AI utilization confirms the assumptions of the Technology Acceptance Model that learners are more likely to adopt the technologies that they believe are valuable and easy to use. The study also discovered that there is a considerable prediction of language learning engagement by using artificial intelligence. In particular, AI use was found to be a positive predictor of both cognitive engagement and social engagement, indicating that students who use AI more often and for meaningful academic purposes are more likely to show greater mental investment in learning, employ more effective learning strategies, and be more actively involved in collaborative language learning activities. Regression analysis also demonstrated that AI use significantly accounted for the variance in language learning engagement, indicating that AI utilization was an important contributing element to students' participation in language learning.

Findings support the Student Engagement Framework which emphasizes that meaningful learning happens when students actively devote cognitive effort and participate in collaborative learning experiences. Artificial intelligence (AI) tools tend to assist these characteristics by offering rapid feedback, customized learning possibilities, interactive language practice and collaborative learning help. The AI usage was the most significant predictor for the language learning engagement, but not the sole one. Other factors, such as learner motivation, self-efficacy, instructional strategies, online literacy, and institutional learning environments, may also contribute to students' engagement in language learning.

In summary, the study suggests that artificial intelligence has become a powerful educational tool that positively contributes to students' participation in language acquisition. If used in a responsible and intentional manner, artificial intelligence can boost students' cognitive engagement and social interaction in language learning activities. The findings highlight the need for the inclusion of AI in language education through effective pedagogical techniques that foster critical thinking, learner autonomy, and meaningful cooperation, while safeguarding ethical and responsible use of artificial intelligence (AI) tools in higher education.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are offered:

1. Higher education institutions need to develop institutional policies and guidelines to promote the ethical, responsible and pedagogically sound use of artificial intelligence in language acquisition. Such regulations should promote the use of AI as a learning support tool, while emphasizing academic integrity and responsible digital citizenship.

2. Language teachers should use AI-powered applications in instructional activities to boost students' cognitive and social engagement. The learning activities may consist of AI-supported writing tasks, collaborative language exercises, critical evaluation of AI-generated responses, interactive speaking practice, and reflective learning activities where students are asked to evaluate and improve AI-generated outputs.

3. Students should be encouraged to use artificial intelligence as a supplemental learning tool rather than a replacement for independent learning. They should be taught to critically analyze AI-generated content, check its authenticity, and utilize it responsibly to promote critical thinking, creativity, and language skills.

4. University administrators and academic support departments should offer regular professional development programs, seminars and workshops to promote AI literacy among students and faculty members. Such efforts should showcase the effective and ethical use of AI in teaching and learning, while addressing concerns about academic integrity, data privacy, and responsible technology usage.

5. Since the study found that AI use accounted for only a portion of the variation in language learning engagement, future researchers are encouraged to examine other variables that may impact engagement such as online literacy, self-regulated learning, learning motivation, academic self-efficacy, technology readiness, instructor support, and learning environment. Future study could also consider using structural equation modeling, longitudinal research designs, or mixed-method techniques to gain a more holistic knowledge of the mechanisms by which AI promotes participation in language learning.

6. Future research might also explore the use of AI and language learning engagement across different disciplines, higher education institutions, or cultural contexts to see whether the relationships found hold across different academic settings. Such studies would add to the growing body of literature on artificial intelligence in higher education and give more reliable empirical evidence for policy formulation and instructional innovation.

REFERENCES

- [1] Bond, M., & Bergdahl, N. (2023). *Student engagement in open, distance, and digital education*. In O. Zawacki-Richter & I. Jung (Eds.), *Handbook of open, distance and digital education*. Springer.
- [2] Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20(22). <https://doi.org/10.1186/s41239-023-00392-8>
- [3] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- [4] Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109.
- [5] Hiver, P., Al-Hoorie, A. H., Vitta, J. P., & Wu, J. (2021). Engagement in language learning: A systematic review of 20 years of research methods and definitions. *Language Teaching Research*, 28(1), 201–230. (First published online in 2021).
- [6] Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of artificial intelligence in language education. *Educational Technology & Society*, 26(1), 112–131.
- [7] Hyangeun Ji, Soyeon Park, Hye Won Shin (2022). Investigating the link between engagement, readiness, and satisfaction in a synchronous online second language learning environment,
- [8] Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeiffer, F., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274.

- [9] Liu, G., & Ma, C. (2024). Measuring EFL learners' use of ChatGPT in informal digital learning of English based on the technology acceptance model. *Innovation in Language Learning and Teaching*, 18(2), 125–138. (Published online 2023.)
- [10] Philp, J., & Duchesne, S. (2016). Exploring engagement in tasks in the language classroom. *Annual Review of Applied Linguistics*, 36, 50–72.
- [11] Svalberg, A. M.-L. (2009). Engagement with language: Interrogating a construct. *Language Awareness*, 18(3–4), 242–258.
- [12] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—Where are the educators? *International Journal of Educational Technology in Higher Education*, 16(39), 1–27.
- [13] Zou, B., Lu, Q., Han, Y., Li, Z., & Zhang, W. (2023). Exploring students' acceptance of an artificial intelligence speech evaluation program for EFL speaking practice: An application of the integrated model of technology acceptance. *Computer Assisted Language Learning*.