Assessing Pedagogical Strategies Integrating ChatGPT in English Language Teaching: A Structural Equation Modelling-Based Study

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Abstract

This research investigates the impact of AI-powered ChatGPT technology on current pedagogical strategies, focusing on student engagement, language proficiency, and perceived usability. Data was collected through structured surveys from 301 English language learners at Ajman University (49.9%) and University of Hail (50.1%) in the United Arab Emirates and Saudi Arabia respectively. Grounded in constructivist learning theory, the results reveal strong positive outcomes. The integration of ChatGPT into pedagogical strategies significantly enhances student engagement, improves language proficiency ($\beta=0.698$, $p<0.000$), and increases perceived usability among English language learners in higher education institutions in the UAE and Saudi Arabia. Respondents reported that these strategies made lessons more engaging and interactive, improved their language skills, and provided a user-friendly learning interface. These findings underscore the potential of AI tools like ChatGPT to revolutionize language education by offering interactive, personalized, and effective learning experiences. Additionally, the study supports the principles of constructivist learning theory, highlighting students' positive attitudes and perceptions towards the integration of ChatGPT-enhanced pedagogical strategies,. Practical recommendations and study limitations are also discussed.

Keywords: Artificial Intelligence (AI), ChatGPT, Engagement, Language Proficiency, Perceived Usability, Pedagogical Strategies

1. Introduction

The Internet of Things (IoT) has shown itself as a highly cost-effective method for educating young minds and offering a world-class learning experience to all companies in the educational technology sector are consistently developing innovative solutions to increase education accessibility for those lacking adequate facilities (Uleanya & Naidoo, 2023). Today, many online platforms have evolved significantly as learning tools, becoming integral to the pedagogical experiences of many teachers and students who stop themselves as a critical platform for obtaining education and opportunities that can lead to social activities and potential employment. Traditional classroom instruction often fails to offer immediate learning environments, quick evaluation, and high levels of engagement (Uleanya & Naidoo, 2023). Digital learning tools and technologies effectively bridge this gap, offering efficiencies that traditional methods cannot match. With the widespread adoption of smart devices, it makes sense for educational institutions to integrate technology into the pedagogy. Today's students handle their academic and personal lives within a technologically enhanced environment, mainly driven by Artificial Intelligence (AI). ChatGPT, a notable recent development, has acquired significant attention in pedagogy and learning (Berendt Bettina & Littlejohn Allison, 2023; Mureșan, 2023; Paek & Kim, 2021).

According to Farhi et al.(2023), ChatGPT stands for Chat Generative Pre-trained Transformer as an exceptional chatbot, one of the most impactful AI-driven chatbots. Its emergence has generated strong interest among educators across different fields. ChatGPT offers unique language pedagogy and learning opportunities by providing interactive and authenticated responses, thus facilitating effective and meaningful language development. This technology plays a crucial role in enhancing learners' motivation for autonomy as a leading technological advancement in language learning (Kostka & Toncelli, 2023a). ChatGPT uses AI-powered chatbots that use natural language processing and machine learning techniques to engage learners in interactive dialogs as it adapts to learners' proficiency levels, offers instant feedback, and encourages self-correction and independent learning mode (Vaccino-Salvadore, 2023). Accordingly, the effectiveness of ChatGPT in enhancing English language learners' proficiency goes beyond traditional teaching methods, encouraging a more interactive and dynamic educational setting. Existing literature also witnesses that ChatGPT has the potential to transform pedagogical approaches by personalizing learning experiences and serving learners' diverse needs and preferences. As a result, the importance and impact of ChatGPT on English language pedagogy and learning is profound (Vaccino-Salvadore, 2023). Notably, integrating ChatGPT into education as a

supportive tool further expands the pedagogy process, improving the learning journey. As noted by Al-thresher (2024), OpenAI developed ChatGPT as a sophisticated, intelligent tool that researchers deem potentially transformative for language pedagogy. Its capabilities include stimulating human-like conversations, offering immediate linguistic feedback, and adapting to learners with different proficiency levels. Considering the role, importance, and effect of ChatGPT in English language teaching and learning using different pedagogical strategies: blended learning, flipped classroom, and guided practices. This study seeks to investigate how these approaches influence key educational outcomes, including student engagement, language proficiency, improvements, perceived usability, and satisfaction. Notably, e-learning was widely adopted during the Covid-19 pandemic (Alarabi et al., 2023; Li et al., 2022; Uleanya & Naidoo, 2023; Zakarneh et al., 2021), indicating a difference between technology in education before, and during the pandemic. Today, when the pandemic is over, this research indicates and fills the gap of examining the technology-enhanced learning during the post-pandemic era.

A. Significance

As this research focuses on ChatGPT in pedagogical strategies, it will provide Intelligence (AI) that can effectively engage studies and language proficiency and enhance overall learning outcomes. Also, examining the ChatGPT in the pedagogical strategies helps highlight how modern technology can facilitate students' educational journey in the United Arab Emirates. Providing these significant insights will help readers comprehend the importance of technology in education and guide students, teachers, and educational policymakers to use and integrate AI technology for positive, constructive purposes. Investigating the ChatGPT use under the Constructivism Learning Theory will further enhance the insights regarding how theoretical propositions fit relevant to current research, further adding a single contribution to both empirical and theoretical literature.

2. Review of Literature

A. Theoretical Underpinning

This research is supported by the constructivism learning theory, which proposes that learners actively construct their understanding through interaction and reflection (Hatmanto & Sari, 2023; Huang et al., 2024a). Constructivism emphasizes the role of learners in actively processing and integrating new information into their existing knowledge framework, leading to deeper learning and comprehension. Considering the current research study problem, the relevant theory helps highlight the importance of interactive and personalized learning experiences that ChatGPT can provide (Rasul et al., 2023a). ChatGPT aligns with constructivist principles through its AI-driven nature by facilitating active learner engagement, personalized feedback, and adaptive learning pathways (Efgivia et al., 2021). Using pedagogical strategies, i.e., blended learning, flipped classrooms, and guided practices, this study shows how ChatGPT supports a constructivist approach, encouraging students to engage the content dynamically and autonomously. Constructivism's focus on the internal processing of information and the active role of learners is directly related to the current study aims, focusing on improving language proficiency, student engagement, and satisfaction through innovative AI integration in pedagogical strategies and practices. This consistency highlights the relevance and potential impact of using ChatGPT to promote an environment facilitative to active learning and critical thinking (Hasanein & Sobaih, 2023) among students in the UAE (Farhi et al., 2022). Effective English language learning is important as it is not merely a discipline; it also improves intercultural competence. ChatGPT can significantly help students attain English language proficiency. Also, its ability to adapt to different proficiency levels ensures that learners acquire significant support, promoting steady progress. Consequently, an active adoption of ChatGPT among English language learners indicates a robust interaction between them and AI (Kim & Adlof, 2024), further supporting the inclusion of AI in current pedagogical approaches.

B. Pedagogical Strategies and ChatGPT

Existing literature shows that pedagogy is important as it gives teachers an in-depth insight and understanding of the best practices in a classroom environment (Kelly et al., 2023; Rahman & Watanobe, 2023). As a result, teachers can design and implement pedagogical strategies that fit the needs of the learners well. Today, with the rise and integration of technology in education, pedagogical strategies are even more refined and planned based on human-technology interaction and coordination (Rahman & Watanobe, 2023). AI-enabled systems have greatly facilitated educational institutions and teachers to reconsider the approaches to cater to leaders' needs (de Winter et al., 2023; Sharma et al., 2023; Wu, 2024a). Today, the educational sector stands on the brink of a significant transformation, with AI at its core and ChatGPT as a significant example of this transformation. Current academic debates highlight complex educational infrastructure and strategic implementation of ChatGPT, representing it as a multifaceted tool to redesign the educational field. The integration of ChatGPT into education expands beyond just improving traditional pedagogical approaches. Rather, it represents a reimagining of pedagogical engagement. Its effectiveness and efficacy in different pedagogical aspects highlight Its diverse usefulness. ChatGPT's significant performance in language learning signals the advent of an AI-driven pedagogical environment to extend and strengthen learning modalities. In specialized fields, i.e., English language teaching and instruction, ChatGPT's ability to facilitate information sharing, improve the learning process, and enhance student educational initiatives position eight as a valuable pedagogical adjunct, helping teachers and learners through complex narratives. Accordingly, recent progress in AI signifies the complex field of linguistic education and has come significantly up with diverse patterns and cultural complexities. Natural language processing, a vital branch of AI, has designed models that can comprehend and generate language with efficient contextual accuracy. ChatGPT has shown this progress. Unlike basic chatbots, ChatGPT excels in apprehending context, sustaining coherent conversations, and adjusting its answers to the complexities of user interactions. Concerning English language teaching and learning, ChatGPT is exceptionally useful as it can customize interactions to meet learners' requirements, stimulate realistic communication scenarios, and provide immediate feedback

grounded in effective pedagogical principles. Therefore, ChatGPT heralds a new era where technology is improving language learning by enhancing experiences that are adaptable, accessible, and authentic.

C. Student Engagement

The integration of ChatGPT into English language instruction and learning aligns with several critical theoretical frameworks in modern language education. Communicative language teaching theory supports this integration, emphasizing the importance of authentic and meaningful communication and full language acquisition. ChatGPT enables learners to interact with genuine language, improving their communicative competence and fluency (Al-thresher, 2024b). Furthermore, incorporating chart GPT compliance with best practices in English language teaching and learning as technology-enhanced approaches has boosted student engagement, motivation, and learning outcomes. The relevant technology offers interactive and personalized practices designed to learners' needs and preferences. Also, AI enhances learning and encourages learners' autonomy and independence, enabling students to take control of their language-learning journey (Kostka & Toncelli, 2023). A study by Rao (2024) examined the impact of ChatGPT on the engagement and motivation of students learning English as a foreign language. The research data was gathered from 50 EFL students using a quasi-experimental pretest-post-test design. The experimental group had access to ChatGPT, a supplementary academic resource beyond their regular lectures. The results showed that the experimental group indicated significantly higher engagement and motivation levels than the control group. Feedback from respondents demonstrated that ChatGPT was a useful, engaging, and user-friendly tool for enhancing English proficiency. These findings indicate ChatGPT 's potential as an effective supplementary tool in EFL courses, suggesting promising prospects for AI driving language learning tools.

D. Language Proficiency Improvement

Writing instruction typically involves activities focused on specific skills, i.e., vocabulary building and grammar practices, to improve students' language writing and proficiency. However, these activities can be time-consuming and may only partially involve or benefit some students (Baskara, 2023)**.** Thus, language instructors face the challenges of developing innovative and practical approaches to support students' language proficiency development. Incorporating technology like ChatGPT presents a possible solution and is an important language education and pedagogy area. A significant challenge in torsional language learning pedagogy is personalized feedback and support (Songsiengchai et al., 2023). Effective language writing instructions need detailed feedback to help students enhance their writing skills; this can be labor-intensive and time-consuming, particularly in larger or more diverse classes. ChatGPT, as an advanced learning model, represents a possible transformative tool in language education. Capable of generative human-like text based on user input, ChatGPT can provide real-time support for learners (Balcı, 2024)**.** The use of ChatGPT technology in education has increased significantly in recent years, providing various tools and platforms, including language learning software, online dictionaries, translation tools, and language learning applications. However, ChatGPT stands out as a groundbreaking technology in the relevant field due to its ability to generate human-like text and deliver real-time feedback. The possible benefits of using ChatGPT in language education include providing feedback to the language learners, providing communication and interaction, further improving their language skills, and providing useful suggestions (İnci Kavak et al., 2024)**.**

E. Perceived Usability

Many studies indicate that AI in education is perceived to provide beneficial outcomes for students. For example, Chatbots have become increasingly famous for language learning because they can engage in one-on-one conversation using natural language processing (NLP) in different target languages (Mulia et al., 2023). Users employ Chatbots for daily language prices, including conversations, question generation, and assessments like vocabulary tests (Slamet, 2024). Research by Almulla (2024) shows that relevant technology can provide different types of interactive exercises for learners to produce more language output in low-anxiety environments. Thus, using ChatGPT in language learning offers three primary advantages: providing 24/7 support, possessing extensive language knowledge, and assisting with repetitive tasks like answering frequently asked questions and practicing language skills. A study by Shaikh et al. (2023) examined the usability of ChatGPT for formal English language learning. Data gathered from different educational institutions in Norway revealed that ChatGPT is perceived as an effective tool for formal English language learning. Further, to continue exploring the importance of AI in education, a study by Okonkwo and Ade-Ibijola (2021) involved a systematic review of the use of Chatbots in education. Results also showed that perceived usability was strongly linked to ChatGPT use among students. Thus, based on the cited literature, this research proposes the following hypotheses.

H1. Pedagogical Strategies Using ChatGPT positively affects student engagement.

H2. Pedagogical Strategies Using ChatGPT positively affects language proficiency improvement.

H3. Pedagogical Strategies Using ChatGPT positively affects perceived usability.

3. Research Methodology

This research study employs a cross-sectional design, which is particularly effective for capturing a snapshot of data at a specific point in time (Olsen & George, 2004). Due to limited resources and time constraint, cross-sectional design is deemed suitable to acquire generalizable results in a shorter time period. This design allows for the assessment of relationships between variables and facilitates the collection of generalizable results within a relatively short duration (Olsen & George, 2004). The study is conducted over a period from March 2024 to July 2024. Following data collection, the data is evaluated, coded, and analyzed using SPSS and Structural Equation

Modeling (SEM) to ensure comprehensive statistical analysis and reliable interpretation. Notably, Structural Equation Modelling (SEM) to conduct an in-depth analysis of gathered data based on cause and effetc relationships. The relevant technique provides additional details, i.e., path values, that further help specify the strength of relationships between study variables (Barrett, 2007).

A. Population and Sampling

The study focuses on English language students from a higher education institution in the United Arab Emirates, specifically Ajman University and University of Hail. The stratified sampling technique is utilized to ensure that the sample is representative of various study majors. Based on Yamane's sampling calculation method (OLONITE, 2022), a sample size of 304 is determined to be appropriate for achieving reliable and valid results. After data collection, it was found that three questionnaires were either missing or incomplete. Therefore, 301 valid questionnaires were used for data analysis, resulting in a high response rate of 99.0%.

B. Data Gathering Tool

Data is collected using structured questionnaires, a method valued for its consistency and accuracy in survey research. Structured questionnaires are critical because they ensure uniformity in the responses collected, minimize interviewer bias, and enhance the reliability and validity of the data. They provide a systematic approach to data collection, allowing for clear and comparable responses across participants. The questionnaire is meticulously designed and divided into five sections:

Demographic Details: This section captures respondents' gender, age, and study year, providing essential context for analyzing demographic influences on the study variables.

Pedagogical Strategies: This section contains five items focused on the independent variable pedagogical strategies, assessing various aspects of the teaching methods employed.

Student Engagement: Four items in this section evaluate the level of student engagement, providing insights into how pedagogical strategies integrating ChatGPT impact students' active participation in learning.

Language Proficiency Improvement: This section includes four items related to the enhancement of language proficiency, examining how the pedagogical strategies integrating ChatGPT affect students' language skills development.

Perceived Usability and Satisfaction: The final section comprises four items addressing perceived usability and satisfaction, exploring how students perceive the usability of the pedagogical tools integrating ChatGPT and their overall satisfaction.

Table 1 presents the resources and items included in the questionnaire, outlining the specific measures used to assess each variable.

Table 1. Questionnaire Resources And Items

Variables	Measurement Items	Sources
Pedagogical Strategies Using ChatGPT	I support the idea of incorporating ChatGPT in the education and learning process. ChatGPT has enhanced my overall academic skills. Using ChatGPT helps me understand academic concepts. English language learning is comparatively easier with the assistance of ChatGPT. ChatGPT has made English language learning more pleasant.	(Opesemowo et al., 2024)
Student engagement	ChatGPT enhances my engagement during English language lessons. ChatGPT-enabled activities help me focus more on English language lessons. I actively participate in class discussions when ChatGPT is incorporated into lessons. ChatGPT's interactive exercises increase my involvement in English language learning tasks.	(Sevnar0ayan, 2024)
Language proficiency improvement	ChatGPT helped improve my English language speaking skills. ChatGPT has enhanced my ability to write in English with better accuracy. ChatGPT has improved my understanding of English vocabulary. I feel that my overall English language proficiency has improved using ChatGPT in lessons.	(Agustini & Bali, 2023)
Perceived usability	I find the ChatGPT interface easy to navigate during the English language lessons. I am overall satisfied with the experience of English language learning through ChatGPT. ChatGPT includes all the features I require to improve my language learning capabilities. The feedback provided by ChatGPT is instant and helpful to improve my learning.	(Almulla, 2024)

C. Data Normality Test

As this research involves parametric tests, determining their selection is important to ensure the suitability of selected approaches. For the relevant purposes, normality is tested using Kolmogorov-Smirnov and Shapiro-Wilk tests. The results revealed mixed significance values

for the study variables. Table 2 presents the results of the data normality testing.

Table 2. the results of data normality testing

Construct	Kolmogorov-Smirnov [a]		Shapiro-Wilk	
	Statistic	Sig. Value	Statistic	Sig. Value
Pedagogical Strategies Using ChatGPT	0.456	0.140	0.561	0.009
Student engagement	0.402	0.562	0.478	0.079
Language proficiency improvement.	0.592	0.240	0.411	0.113
Perceived usability	0.391	0.055	0.493	0.661

The normality of the data was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. According to the Kolmogorov-Smirnov test, the significance values for "Pedagogical Strategies Using ChatGPT" (0.140), "Language Proficiency Improvement" (0.240), and "Perceived Usability" (0.055) are all above the 0.05 threshold, suggesting that these datasets are normally distributed. Additionally, the significance value for "Student Engagement" (0.562) is also above the 0.05 threshold, indicating normal distribution for this construct as well. In contrast, the Shapiro-Wilk test results present a different perspective. The significance value for "Pedagogical Strategies Using ChatGPT" (0.009) is below the 0.05 threshold, indicating that this data is not normally distributed. However, the significance values for "Student Engagement" (0.079), "Language Proficiency Improvement" (0.113), and "Perceived Usability" (0.661) are above the 0.05 threshold, suggesting that these datasets are normally distributed according to this test.

The mixed results from the Kolmogorov-Smirnov and Shapiro-Wilk tests imply that while some constructs are considered normally distributed according to one test, they do not meet normality assumptions according to the other. Specifically, "Pedagogical Strategies Using ChatGPT" is not normally distributed based on the Shapiro-Wilk test but is considered normally distributed by the Kolmogorov-Smirnov test. In contrast, "Student Engagement," "Language Proficiency Improvement," and "Perceived Usability" meet the normality criteria according to both tests.

4. Analysis and Results

A. *Respondents' Demographics*

The respondents in this study predominantly consist of females, who make up 55.1% of the sample, while males represent 44.9%. The age distribution indicates a predominantly young adult demographic, with 39.2% of respondents falling within the 17-22 age range, 33.6% in the 23-27 range, 21.6% aged 28-30, and 5.6% aged 31 or above. Regarding their academic standing, a substantial majority are undergraduate students (59.8%), followed by graduate students (24.3%), postgraduate (master's) students (12.6%), and doctorate students (3.3%). Additionally, the respondents are nearly evenly split between two institutions: 50.1% are from Ajman University and 49.9% from University of Hail.

Table 3. Summary of Respondents' Demographics

Demographic	Category	Percentage
Gender	Female	55.1%
	Male	44.9%
Age	17-22 years	39.2%
	23-27 years	33.6%
	28-30 years	21.6%
	17-22 years	39.2%
Study Level	Undergraduate	59.8%
	Graduate	24.3%
	Postgraduate (Master's)	12.6%
	Doctorate	3.3%
Institution	Ajman University	50.1%
	University of Hail	49.9%

A. *Structural Equation Modelling*

This study employs Structural Equation Modeling (SEM) following a two-step approach: measurement instrument testing and structural model testing. The first step involves assessing the validity and reliability of the measurement tool. Convergent validity is evaluated through factor loadings, Average Variance Extracted (AVE) values, Cronbach Alpha (CA) values, and Composite Reliability (CR) values. As detailed in Table 4, most factor loadings exceed the recommended cutoff value of 0.5. The AVE values are also above the 0.5 threshold for all constructs: "Pedagogical Strategies Using ChatGPT" (0.591), "Student Engagement" (0.555), "Language Proficiency Improvement" (0.593), and "Perceived Usability" (0.505). Reliability testing shows that all CA values are above the cutoff value of 0.7, with "Pedagogical Strategies Using ChatGPT" at 0.751, "Student Engagement" at 0.828, "Language Proficiency Improvement" at 0.762, and "Perceived Usability" at 0.717. Additionally, the CR values are above 0.7 for all constructs, indicating strong reliability: "Pedagogical Strategies Using ChatGPT" (0.761), "Student Engagement" (0.839), "Language Proficiency Improvement" (0.767), and "Perceived Usability" (0.791).

Table 4. Convergent Validity Testing

Variables	Items	Loadings	AVE	CA	CR
Pedagogical Strategies Using ChatGPT	CGPT1	0.701			
	CGPT2	0.597	0.591	0.751	0.761
	CGPT3	0.698			
	CGPT4	0.522			
	CGPT5	0.590			
Student engagement	ENG1	0.650			
	ENG2	0.858	0.555	0.828	0.839
	ENG3	0.874			
	ENG4	0.545			
Language proficiency improvement	LAN1	0.554			
	LAN2	1.038	0.593	0.762	0.767
	LAN3	0.228			
	LAN4	0.586			
Perceived usability	PUY1	0.223			
	PUY2	0.781	0.505	0.717	0.791
	PUY3	0.522			
	PUY4	0.884			

Items with factor loadings below 0.5 were excluded. Subsequently, the model's goodness of fit was assessed to determine how well the observed values align with the expected values (Schermelleh-Engel et al., 2003). Table 5 presents the fit indices, showing that the Standardized Root Mean Square Residual (SRMR) is 0.004, which is well below the threshold of 0.085. The d_ULS value is 0.177 and the d_G value is 0.261, suggesting a good model fit. Additionally, the Chi-square statistic is 1.502, which is below the cutoff value of 3.0, and the Non-Fit Index (NFI) is 0.976, indicating a good fit as it falls between 0 and 1.

Table 5. Model Fit Assessment

	Acquired Values
SRMR	0.004
d_ULS	0.177
d_G	0.261
Chi-square	1.502
NFI	0.976

Discriminant validity was further assessed using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). Tables 6a and 6b display the results. The Fornell-Larcker criterion indicated no cross-correlations among constructs. The HTMT values, all below the cutoff value of 0.85, confirm discriminant validity.

Table 6a. Fornell-Larcker Criterion

	ChatGPT	Learning Proficiency	Perceived Usability	Student Engagement
Pedagogical Strategies Using ChatGPT	0.626			
Learning Proficiency	0.616	0.627		
Perceived Usability	0.647	0.656	0.636	
Student Engagement	0.434	0.75	0.571	0.745

Table 6b. Hetreotrait-Monotrait Ratio Scale

	HTMT
Learning Proficiency <-> Pedagogical Strategies Using ChatGPT	0.528
Perceived Usability <-> Pedagogical Strategies Using ChatGPT	0.426
Perceived Usability <-> Learning Proficiency	0.497
Student Engagement <-> Pedagogical Strategies Using ChatGPT	0.432
Student Engagement <-> Learning Proficiency	0.583
Student Engagement <-> Perceived Usability	0.498

Before testing the study hypotheses, the predictive power of the independent variable "Pedagogical Strategies Using ChatGPT" was evaluated using coefficients of determination (R³ (Huang & Che, 2008; Zakaria et al., 2022)S. The results indicate a 48.9% variance in "Learning Proficiency," 41.7% in "Student Engagement," and 37.7% in "Perceived Usability," reflecting a moderate predictive power of "Pedagogical Strategies Using ChatGPT" on these outcomes. Table 7 displays the coefficients of determination.

Table 7. Coefficients Of Determination R^2

Variables	R^2
Learning Proficiency	0.489
Perceived Usability	0.377
Student Engagement	0.417

Finally, hypotheses were tested using path analysis and regression analysis to evaluate the proposed effects. Table 8 presents the results. The first hypothesis examined the impact of "Pedagogical Strategies Using ChatGPT" on "Student Engagement." This hypothesis was supported with a beta coefficient of 0.433 and a significance value of 0.000, indicating a statistically significant positive relationship. This means that

as the use of ChatGPT increases in pedagogical strategies, student engagement also rises, suggesting that students are more likely to participate actively and show interest in their learning activities when ChatGPT is utilized. The second hypothesis assessed the effect of ChatGPT on "Learning Proficiency." This hypothesis was similarly supported, yielding a beta coefficient of 0.698 and a significance value 0.000. This strong positive effect implies that integrating ChatGPT into learning environments significantly enhances students' proficiency in English. For instance, educators might observe improved performance in language assessments or more sophisticated language use during class discussions as students engage with the tool. The third hypothesis investigated the relationship between "Pedagogical Strategies Using ChatGPT" and "Perceived Usability." This hypothesis was also supported, with a beta coefficient of 0.775 and a significance value 0.000. Notably, the effect of pedagogical strategies using ChatGPT on perceived usability was the strongest among the three hypotheses tested. This indicates that students find ChatGPT an effective and user-friendly tool, likely contributing to their willingness to utilize it in their learning processes. High perceived usability can foster a more positive attitude towards technology in education, encouraging sustained use. Therefore, the analysis shows that the effects of pedagogical strategies using ChatGPT are significant. The strongest impact was observed on perceived usability, followed by learning proficiency and student engagement. These findings underscore the potential of integrating AI technologies like ChatGPT into educational frameworks to enhance the learning experience.

Table 8. Hypotheses Testing

	β	M	STDEV	t	P	95% Confidence Intervals	
						Lower	Upper
ChatGPT -> Student Engagement	0.433	0.433	0.064	10.643	0.000	0.307	0.559
ChatGPT -> Learning Proficiency	0.698	0.703	0.069	10.139	0.000	0.562	0.834
ChatGPT -> Perceived Usability	0.775	0.777	0.062	12.477	0.000	0.653	0.897

5. Discussion

This research highlights the importance of AI-enabled technologies, especially ChatGPT, in pedagogy. Theoretically supported by constructivist learning theory, this study highlighted an overall positive attitude of students towards ChatGPT and its educational use, further improving their learning journey. These results indicated a positive perspective regarding ChatGPT among the language learners in the UAE and affirmed the proposition by Constructivism Learning Theory, implying the students' willingness and positive opinion concerning ChatGPT as improving their language acquisition and helping them sustain this usage in pedagogy. Notably, Raja and Nagasubramani (2018) consider ChatGPT supporting self-learning an essential pillar of modern education. Its technical flexibility in personalizing the learning process, adaptive assessment, and smart tutoring system shows its role in improving educational experiences and simplifying the pedagogical process. Accordingly, ChatGPT expands from being only a repository of information; rather, it works as an interactive collaboration designed to meet the individual needs of learners, providing them with support and feedback. Results showed that respondents agreed that they support incorporating ChatGPT in the learning process as it has enhanced their overall academic skills. They also consented that using ChatGPT helps me understand academic concepts as English language learning is comparatively easier with the assistance of ChatGPT. According to the respondents, ChatGPT has made English language learning more pleasant and enjoyable. As noted by Shaikh et al. (2023), besides providing personalized learning experiences, ChatGPT provides a robust content generation and knowledge dissemination process. It is evolving as an aide to active participation in the learning process, encouraging a major shift from passive consumption to active creation. This transition is both technological and philosophical, showing a move from traditional didactic practices towards a more learner-centric, dialogic model (Huang et al., 2024b; Mukarto, 2023; Rasul et al., 2023).

Similarly, the first study hypothesis proposed a positive effect of Pedagogical Strategies Using ChatGPT on student engagement. According to the study respondents, ChatGPT enhances engagement during English language lessons and helps them focus more on English language lessons. Study respondents further consented to actively participate in class discussions when ChatGPT is incorporated into lessons. Accordingly, ChatGPT's interactive exercises increase respondents' involvement in English language learning tasks. In line with the current study, Mai et al. (2024) conducted a SWOT analysis of ChatGPT use in language learning and acquisition. Results showed that a step-by-step approach is required despite its overall importance in integration. It is suggested that from the process stage, the teachers must guide and monitor their students regarding its use to ensure its ethical and constructive use. Leveraging the ChatGPT is recommended by ensuring that pedagogical strategies are designed and each student is individually guided about the fair use of technology.

Regarding the second hypothesis, "Pedagogical Strategies Using ChatGPT positively affect language proficiency improvement," respondents agreed that ChatGPT helped improve English language speaking skills. Also, it is consented that ChatGPT has enhanced respondents' ability to write in English with better accuracy, leading to a better understanding of English vocabulary. Students further agreed that their overall English language proficiency has improved using ChatGPT in lessons. These findings are consistent with the study by Niyozov et al. (2023) as they investigated the effects of ChatGPT in language pedagogy in Uzbekistan. Data from the mixed-method approach revealed a strong positive correlation between ChatGPT use and language learning among the students. These results also highlight the significance of integrating pedagogical strategies with technological advancements, supporting ChatGPT as modifying and accelerating language learning and improving learner experiences.

Finally, the last hypothesis, "Pedagogical Strategies Using ChatGPT positively affect perceived usability," also showed a strong agreement regarding the perceived usability of ChatGPT in pedagogical strategies. Respondents opined that they find the ChatGPT interface easy to navigate during the English language lessons. According to the respondents, they are overall satisfied with the experience of ChatGPT usage for English language learning. Respondents also agreed that ChatGPT includes all the features to improve language learning capabilities as

it provides instant feedback that helps improve learning. In this relevant context, a study by Wu (2024) examined the effects of incorporating ChatGPT into modern pedagogical practices in the United States. Using a review approach, it was found that ChatGPT is widely adopted by both educators and instructors, focusing on opportunities for pedagogy and learning. Significant attributes of ChatGPT involve deep, reflective thought and intellectual engagement, emphasizing its significance for the learning process. However, Halaweh (2023) further argues that incorporating ChatGPT in language learning and acquisition associates a robust effort from all the pertinent stakeholders. Designing domain-specific applications, establishing a regulatory framework, and formulating ethical guidelines are critical to the ethical use of AI technology.

6. Recommendations

Considering the findings of this research, several recommendations are proposed for the implementation of ChatGPT in pedagogy:

1. **Teacher Training:** To maximize the benefits of ChatGPT- enable pedagogical strategies, especially in English language learning, it is crucial that teachers receive comprehensive training focused on several key areas first of first, the training should contain technical skills for AI integration, ensuring educators can use ChatGPT effectively within their curriculum. This includes understanding how to solve the problem, troubleshooting common issues common customizes functionalities to meet diverse learning needs. Second, the training should emphasize ethical AI use, guiding teachers on responsibly implementing AI technology in the classroom. This involves understanding without privacy, recognizing biases in AI- generated content, and promoting responsible use among students to promote a safe learning environment. Third, it is important to focus on promoting critical thinking skills, equipping educators with strategies to encourage students to critically evaluate the information provided by ChatGPT, promoting understanding and analytical skills. By providing teachers with these critical skills and knowledge areas, educational institutions can ensure the effective integration of ChatGPT as an educational tool, finally improving language proficiency, student engagement, and overall student learning experiences.

2. **Continuous Support and Evaluation:** Educational institutions should implement continuous support and evaluation mechanisms to monitor and supervise the effectiveness of ChatGPT in the classroom. Regular feedback from both teachers and students should be collected to identify any challenges and areas for improvement. This feedback can be used to adjust the implementation of ChatGPT, ensuring it meets the evolving needs of students. Periodic assessments of student academic performance and engagement can also help evaluate the impact of ChatGPT-enabled pedagogical strategies, enabling data-driven decisions for effective instructional planning.

3. **Collaborative Environment:** To improve the effectiveness of ChatGPT in language teaching and learning, it is important to promote a collaborative environment where teachers can share best practices and experiences. Educational institutions can take several practical steps to create such collaborative environments. First, they can establish online platforms, such as dedicated forums or social media groups, where teachers can exchange ideas, resources, and strategies related to ChatGPT use in the classroom. These platforms can facilitate discussions, provide a space for questions and troubleshooting, and show innovative teaching methods. Second, institutions can organize regular workshops and webinars focusing on collaborative learning, allowing teachers to present their successful implementations of ChatGPT and receive feedback from their peers. These events can complement my hands- on training sessions, where educators work together to develop lesson plans that incorporate ChatGPT effectively. Third, forming professional learning communities within schools can encourage ongoing collaboration. These communities can meet regularly to discuss challenges, hear insights, and brainstorm new approaches to integrate AI technologies into their teaching. Educational institutions can create a vibrant community of practice that empowers teacher, promotes innovation, and maximizes the potential of ChatGPT in educational settings by implementing these strategies.

4. **Investment in Research:** Educational institutions should invest in research to explore new applications and integrations of ChatGPT and other AI-enabled tools in academia. Staying at the forefront of technological advancements will help continually improve the quality of language instruction. Ongoing research can provide valuable insights into optimizing the use of AI in education and ensuring that pedagogical strategies remain effective and relevant.

5. **Integrated Lesson Plans and AI- assisted Activities:** teachers can design lesson plans that incorporate ChatGPT specific activities designed to enhance language skills. For example, instructors might use ChatGPT to stimulate real- life conversations, prompting students to engage in dialogue practice for fluency and comprehension. For grammar and vocabulary- building exercises, teachers could create interactive quizzes where ChatGPT provides immediate feedback and explanations, helping students better understand language rules in the context. Educators can further develop writing prompts, with ChatGPT guiding constructive feedback on students essays or assignments, highlighting areas for improvement, and suggesting advanced vocabulary.

6. **Student-Led Exploration with AI Guidance:** to promote self- directed learning, educators can encourage students to explore ChatGPT features independently under guided supervision. By assigning research topics or projects where students use attempt to collect information or generate ideas, teachers can create a structured framework for exploration extra for example, students can practice summarizing articles generated by ChatGPT, which can then be reviewed by teachers for accuracy and critical thinking. This hands-on approach not only strengthens language skills but also cultivates analytical abilities, as students learn to distinguish between AI life and generated information and independent research.

7. **Homework and Skill-Building Resources: Teachers** can use ChatGPT as a supplementary tool for after-school learning by providing AI-supported resources deigned to each student's proficiency level. Homework assingments can include ChatGPT-generated exercises that help students practice grammar, vocabulary, or writing skills outside the classroom. Educators can even personalize assignments, asking ChatGPT to generate language exercises based on individual student progress host of additionally, teachers might set up virtual office hours through chat CPT, where students can ask questions about their comments, practice language skills, and receive guidance when immediate teacher assistance is available call mark improving their confidence and reinforcing continuous learning.

Adopting these recommendations will help educational institutions ensure that ChatGPT significantly contributes to academic excellence and student success. By prioritizing teacher training, continuous support and evaluation, collaborative practices, and ongoing research, institutions can leverage the full potential of ChatGPT in enhancing language learning and overall educational outcomes.

7. Conclusion

Based on the findings, the integration of ChatGPT in language education shows significant benefits for student engagement, language proficiency, and usability. The data collected from English language learners at advance university and the university of Hail highlights the potential of AI- power tools to improve traditional pedagogical methods. The use of ChatGPT not only made lessons more engaging and interactive but also provided an accessible, their iPhone friendly platform that significantly supported language skill development. These results are consistent with constructivist learning principles, emphasizing student- centered, self-directed learning, and intellectual engagement. Thus it is concluded that this study showed the transformative impact of AI on language education, affirming chat GPT's role in promoting a dynamic, interactive, and efficient learning environment. Future research could further examine AI's potential across different educational contexts. Providing a broader understanding of its implication in the learning domain.

8. Limitations

While this research significantly contributes to existing knowledge, it does have some limitations.

1. Geographical Generalizability: The first limitation concerns the geographical generalizability of the research findings. Since this study was conducted solely at Ajman University and University of Hail, the results may not be applicable to other institutions and regions.

2. Methodological Scope: The second limitation pertains to the use of a single methodology, as this research relied exclusively on a quantitative approach.

3. Selection of Pedagogical Strategies: The final limitation involves the selection of pedagogical strategies without specifying a particular approach.

By addressing these limitations, future studies can build on the current research, offering more generalized, methodologically robust, and focused insights into the use of ChatGPT and other AI-enabled tools in educational contexts.

9. Recommendations for Furtures Studies

Thus, considering the study limitations mentioned above, future researchers can overcome them by following the recommendations. First, future researchers can address this limitation by replicating the study in different regions and institutions to gain broader insights and enhance the generalizability of the findings. Future studies could adopt more diverse methodologies, such as mixed-method designs, to provide a more comprehensive understanding and to validate the findings through qualitative data. Finally, future researchers could focus on a specific pedagogical strategy to further narrow the topic and provide more detailed contributions to the existing body of knowledge. This would allow for a more precise examination of how distinct strategies influence the integration and effectiveness of ChatGPT in language learning.

Authors' contributions

Dr. Bilal Ibrahim and Dr. Fahad Aljabr were responsible for the study design and drafting the manuscript, including initial and subsequent revisions. Dr. Nidal Alsaid, serving as the corresponding author, coordinated the research process and led the data collection and analysis. Dr. Mohamed Jlassi contributed significantly to the manuscript's final revision.

All authors have reviewed and approved the final version of the manuscript and have contributed equally to this study.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

the work reported in this paper.

Informed consent

Not Applicable

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

Not Applicable

Data sharing statement

No additional data are available.

Open access

References

Alarabi, K., Alsalhi, N., Almarashdi, H., Zakarneh, B., Alsalhi, N. R., Almarashdi, H. S., … Annamalai, N. (2023). The Role of Computer Simulations (CSs) and Artificial Intelligence on Student Learning: Moderating the Impact of the Learning Environment. *Social Space Journal*, *23*(3). Retrieved from https://www.researchgate.net/publication/376077173

Al-khresheh, M. H. (2024a). Bridging technology and pedagogy from a global lens: Teachers' perspectives on integrating ChatGPT in English language teaching. *Computers and Education: Artificial Intelligence*, *6*. https://doi.org/10.1016/j.caeai.2024.100218

Al-khresheh, M. H. (2024b). Bridging technology and pedagogy from a global lens: Teachers' perspectives on integrating ChatGPT in English language teaching. *Computers and Education: Artificial Intelligence*, *6*. https://doi.org/10.1016/j.caeai.2024.100218

Almulla, M. A. (2024). Investigating influencing factors of learning satisfaction in AI ChatGPT for research: University students perspective. *Heliyon*, *10*(11). https://doi.org/10.1016/j.heliyon.2024.e32220

Balcı, Ö. (2024). The Role of ChatGPT in English as a Foreign Language (EFL) Learning and Teaching: A Systematic Review Article History. *International Journal of Current Educational Studies*, *2024*(1), 66-82. https://doi.org/10.5281/zenodo.12544675

Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences*, *42*(5), 815-824. https://doi.org/10.1016/j.paid.2006.09.018

Baskara, F. R. (2023). Integrating ChatGPT into EFL writing instruction: Benefits and challenges. *International Journal of Education and Learning*, *5*(1), 44-55. https://doi.org/10.31763/ijele.v5i1.858

Berendt, B., & Littlejohn, A. (2023). AI in Education: learner choice and fundamental rights. *Learning, Media and Technology*, *45*(3). Retrieved from https://www.tandfonline.com/doi/abs/10.1080/17439884.2020.1786399

de Winter, J. C. F., Dodou, D., & Stienen, A. H. A. (2023). ChatGPT in Education: Empowering Educators through Methods for Recognition and Assessment. *Informatics*, *10*(4). https://doi.org/10.3390/informatics10040087

Farhi, F., Jeljeli, R., Aburezeq, I., Dweikat, F. F., Al-shami, S. A., & Slamene, R. (2023). Analyzing the students' views, concerns, and perceived ethics about chat GPT usage. In *Computers and Education: Artificial Intelligence* (Vol. 5). Elsevier B.V. https://doi.org/10.1016/j.caeai.2023.100180

Farhi, F., Jeljeli, R., & Hamdi, M. E. (2022). How do Students Perceive Artificial Intelligence in YouTube Educational Videos Selection? A Case Study of Al Ain City. *International Journal of Emerging Technologies in Learning (IJET)*, *17*(22), 61-82. https://doi.org/10.3991/ijet.v17i22.33447

Givi Efgivia, M., Rinanda, A. R., Hidayat, A., Maulana, I., & Budiarjo, A. (2021). *Analysis of Constructivism Learning Theory*. Retrieved from http://repo.iain-tulungagung.ac.id

Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology*, *15*(2). https://doi.org/10.30935/cedtech/13036

Hatmanto, E. D., & Sari, M. I. (2023). Aligning Theory and Practice: Leveraging Chat GPT for Effective English Language Teaching and

Learning. *E3S Web of Conferences*, *440*. https://doi.org/10.1051/e3sconf/202344005001

Huang, L. S., & Che, J. (2008). Analysis of variance, coefficient of determination and F-test for local polynomial regression. *Annals of Statistics*, *36*(5), 2085-2109. https://doi.org/10.1214/07-AOS531

Huang, Z., Mao, Y., & Zhang, J. (2024a). The Influence of Artificial Intelligence Technology on College Students' Learning Effectiveness from the Perspective of Constructivism-Taking ChatGPT as an Example. In *Journal of Education, Humanities and Social Sciences FMESS* (Vol. 2024).

Huang, Z., Mao, Y., & Zhang, J. (2024b). The Influence of Artificial Intelligence Technology on College Students' Learning Effectiveness from the Perspective of Constructivism-Taking ChatGPT as an Example. In *Journal of Education, Humanities and Social Sciences FMESS* (Vol. 2024).

İnci Kavak, V., Evis, D., & Ekinci, A. (2024). The Use of ChatGPT in Language Education. *Experimental and Applied Medical Science*. https://doi.org/10.46871/eams.1461578

Kelly, M. L., Yeigh, T., Hudson, S., Willis, R., & Lee, M. (2023). Secondary teachers' perceptions of the importance of pedagogical approaches to support students' behavioural, emotional and cognitive engagement. *Australian Educational Researcher*, *50*(4), 1025-1047. https://doi.org/10.1007/s13384-022-00540-5

Kim, M., & Adlof, L. (2024). Adapting to the Future: ChatGPT as a Means for Supporting Constructivist Learning Environments. *TechTrends*, *68*(1), 37-46. https://doi.org/10.1007/s11528-023-00899-x

Kostka, I., & Toncelli, R. (2023a). Exploring Applications of ChatGPT to English Language Teaching: Opportunities, Challenges, and Recommendations. *TESL-EJ*, *27*(3). https://doi.org/10.55593/ej.27107int

Kostka, I., & Toncelli, R. (2023b). Exploring Applications of ChatGPT to English Language Teaching: Opportunities, Challenges, and Recommendations. *TESL-EJ*, *27*(3). https://doi.org/10.55593/ej.27107int

Li, S., Zhang, C., Liu, Q., & Tong, K. (2022). E-Learning during COVID-19: perspectives and experiences of the faculty and students. *BMC Medical Education*, *22*(1). https://doi.org/10.1186/s12909-022-03383-x

Mai, D. T. T., Da, C. Van, & Hanh, N. Van. (2024). The use of ChatGPT in teaching and learning: a systematic review through SWOT analysis approach. In *Frontiers in Education* (Vol. 9). Frontiers Media SA. https://doi.org/10.3389/feduc.2024.1328769

Mukarto, R. X. (2023). Exploring the Implications of ChatGPT for Language Learning in Higher Education. *Language Learning in Higher Education Indonesian Journal of English Language Teaching and Applied Linguistics*, *7*(2). https://doi.org/10.21093/ijeltal.v7i2.1387

Mulia, A. P., Piri, P. R., & Tho, C. (2023). Usability Analysis of Text Generation by ChatGPT OpenAI Using System Usability Scale Method. *Procedia Computer Science*, *227*, 381-388. https://doi.org/10.1016/j.procs.2023.10.537

Mureşan, M. (2023). Impact of Artificial Intelligence on Education. *RAIS Conference Proceedings*, 81-85. https://doi.org/10.5281/zenodo.8132828

Niyozov, N., Bijanov, A., Ganiyev, S., & Kurbonova, R. (2023). The pedagogical principles and effectiveness of utilizing ChatGPT for language learning. *E3S Web of Conferences*, *461*. https://doi.org/10.1051/e3sconf/202346101093

Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence*, *2*. Elsevier B.V. https://doi.org/10.1016/j.caeai.2021.100033

OLONITE, O. A. (2022). Olonite Sampling Technique and Taro Yamane Sampling Method: The Paradigm Shift. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3994018

Olsen, C., & Marie St George, D. M. (2004). *Cross-Sectional Study Design and Data Analysis*. www.collegeboard.com.

Opesemowo, O. A. G., Abanikannda, M. O., & Iwintolu, R. O. (2024). Exploring the potentials of ChatGPT for instructional assessment: Lecturers' attitude and perception. *Interdisciplinary Journal of Education Research*, *6*, 1-12. https://doi.org/10.38140/ijer-2024.vol6.21

Paek, S., & Kim, N. (2021). Analysis of worldwide research trends on the impact of artificial intelligence in education. *Sustainability (Switzerland)*, *13*(14). https://doi.org/10.3390/su13147941

Putu Oka Agustini, N., & Putu Oka Agustini Politeknik Pariwisata Bali, N. (2023). *Examining the Role of ChatGPT as a Learning tool in Promoting Students' English Language Learning Autonomy relevant to Kurikulum Merdeka Belajar*, *4*, 921-934. https://doi.org/10.62775/edukasia.v4i2.373

Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for Education and Research: Opportunities, Threats, and Strategies. *Applied Sciences (Switzerland)*, *13*(9). https://doi.org/10.3390/app13095783

Raja, R., & Nagasubramani, P. C. (2018). Recent Trend of Teaching Methods in Education" Organised by Sri Sai Bharath College of Education Dindigul-624710. *India Journal of Applied and Advanced Research*, *2018*(3), 33-35. https://doi.org/10.21839/jaar.2018.v3S1.165

Rao, P. B. (2024). Study On Utilizing Chatgpt For Student Engagement And Educational Support. *Article in International Journal of Advance Research And Innovative*. Retrieved from https://www.researchgate.net/publication/378871298

Rasul, T., Nair, S., Kalendra, D., Robin, M., Santini, F. de O., Ladeira, W. J., Sun, M., Day, I., Rather, R. A., & Heathcote, L. (2023a). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning and Teaching*, *6*(1), 41-56. https://doi.org/10.37074/jalt.2023.6.1.29

Rasul, T., Nair, S., Kalendra, D., Robin, M., Santini, F. de O., Ladeira, W. J., Sun, M., Day, I., Rather, R. A., & Heathcote, L. (2023b). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning and Teaching*, *6*(1), 41-56. https://doi.org/10.37074/jalt.2023.6.1.29

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures. In *Methods of Psychological Research Online* (Vol. 8, Issue 2).

Sevnarayan, K. (2024). Exploring the dynamics of ChatGPT: Students and lecturers' perspectives at an open distance e-learning university. *Journal of Pedagogical Research*, *8*(2), 212-226. https://doi.org/10.33902/JPR.202426525

Shaikh, S., Yayilgan, S. Y., Klimova, B., & Pikhart, M. (2023). Assessing the Usability of ChatGPT for Formal English Language Learning. *European Journal of Investigation in Health, Psychology and Education*, *13*(9), 1937-1960. https://doi.org/10.3390/ejihpe13090140

Sharma, -Sudhansh, Sharma, S., & Yadav, R. (2023). Chat GPT-A Technological Remedy or Challenge for Education System Enterprise Information System View Point. *Global Journal of Enterprise Information Systems*, *14*. https://doi.org/10.18311/gjeis/2022

Slamet, J. (2024). Potential of ChatGPT as a digital language learning assistant: EFL teachers' and students' perceptions. *Discover Artificial Intelligence*, *4*(1). https://doi.org/10.1007/s44163-024-00143-2

Songsiengchai, S., Sereerat, B., & Watananimitgul, W. (2023). Leveraging Artificial Intelligence (AI): Chat GPT for Effective English Language Learning among Thai Students. *English Language Teaching*, *16*(11), 68. https://doi.org/10.5539/elt.v16n11p68

Uleanya, M. O., & Naidoo, G. M. (2023). The Use of E-learning During COVID-19 Pandemic Era. *Athens Journal of Education*, *10*(3), 539-558. https://doi.org/10.30958/aje.10-3-10

Vaccino-Salvadore, S. (2023). Exploring the Ethical Dimensions of Using ChatGPT in Language Learning and Beyond. *Languages*, *8*(3). https://doi.org/10.3390/languages8030191

Wu, Y. (2024a). Critical Thinking Pedagogics Design in an Era of ChatGPT and Other AI Tools — Shifting From Teaching "What" to Teaching "Why" and "How." *Journal of Education and Development*, *8*(1), 1. https://doi.org/10.20849/jed.v8i1.1404

Wu, Y. (2024b). Critical Thinking Pedagogics Design in an Era of ChatGPT and Other AI Tools — Shifting From Teaching "What" to Teaching "Why" and "How." *Journal of Education and Development*, *8*(1), 1. https://doi.org/10.20849/jed.v8i1.1404

Zakaria, A., Kwaku Gordor, B., & Kwao Nkansah, B. (2022). On the Coefficient of Determination Ratio for Detecting Influential Outliers in Linear Regression Analysis. *American Journal of Theoretical and Applied Statistics*, *11*(1), 27. https://doi.org/10.11648/j.ajtas.20221101.14

Zakarneh, B. M., Elkhattat, D., Yousef, E., & Alazab, A. (2021). Utilizing social media networks as learning tools for foreign languages among Arab Youth in UAE. *International Journal of English Language and Literature Studies*, *10*(2), 132-144. https://doi.org/10.18488/JOURNAL.23.2021.102.132.144