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# Revolutionizing language learning through ChatGPT: An analysis of English language learners

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## ABSTRACT

This research examines the effects of ChatGPT on English language learners in the United Arab Emirates (UAE). The results showed that the use of ChatGPT positively affects students' perceived improvement, time efficiency, language skills, and curiosity to learn the language. The effect of ChatGPT use on attitudes toward language learning was also positive. It was found that ChatGPT provides accurate and reliable English translation of text, leading to a belief that ChatGPT is useful to students' English language learning. Also, self-studying with ChatGPT has helped them perform well in class and has become a regular tool for English language learning. Finally, the proposed effect of ChatGPT use on the students' academic performance was positive. The respondents revealed that their English communication skills had significantly improved. ChatGPT boosted their confidence in preparing assignments in English, and their performance in English language modules also improved. Consequently, they can complete and proofread assignments on time using ChatGPT. Therefore, this research showed a strong transformative potential of ChatGPT as an AI-driven instrument in changing language education, ensuring prosperity and promising possibilities for improved educational results and personalized learning experiences among students in higher education.

**Contribution/Originality:** This research highlights the transformative impact of ChatGPT on English language learners by showing its effectiveness in improving students' language skills, efficiency, and engagement with learning. This research not only fills the existing gaps in the literature but also highlights the ChatGPT prospect to revolutionize language education through personalized and effective learning experiences.

## 1. INTRODUCTION

A generated pre-trained transformer (GPT) is a language model with a strong potential to change education in many aspects. GPTs generate human-like answers to text inputs utilizing deep learning algorithms, making it useful for educational applications. ChatGPT can mainly be used to develop chat boards and virtual language tutors

that can assist students in practicing their language abilities and skills. This AI-driven tool can produce real-life interaction and provide instant feedback on grammar, pronunciation and vocabulary. According to Ab Hamid, Maskur, and Mutalib (2023) ChatGPT can enhance students' writing skills by analyzing their writing style and providing suggestions for improvement. It can provide feedback on grammar, common spelling and punctuation. Written assignments and grading essays can also be enhanced using ChatGPT as a prominent language model. This automation can help teachers by providing students with instant feedback on their work. ChatGPT offers personalized learning experiences by analyzing individual students' learning preferences and patterns. It can also recommend learning resources, e.g., videos, textbooks and articles, consistent with a student's individual needs. Accordingly, ChatGPT can affect education by helping these students automate repetitive tasks. Farhi et al. (2023) state that ChatGPT helps students in their research projects by responding to their queries, recommending useful resources and simplifying complex topics through exact summaries (Caratiquit & Caratiquit, 2023). Also, ChatGPT generates discussion questions and prompts, further motivating students to engage in thoughtful and meaningful classroom debates to develop their critical thinking abilities. An essential aspect of ChatGPT is its ability to improve accessibility by developing chatbots and virtual assistants to directly support learners with disabilities or language barriers, ensuring that they can learn and participate effectively in educational activities (Xiao & Zhi, 2023). According to Kasneci et al. (2023) there are various benefits of ChatGPT for language learning, including helping to develop language skills, offering support for writing, improving these skills, and providing personalized practice materials and problem-solving services. Regarding language acquisition and learning among students, English is the second language in the UAE. Consequently, this research focused on the role of generative AI, especially ChatGPT, in facilitating English language learning and acquisition among higher education institutions in the UAE. It is also notable that ChatGPT is used for its strong effect on English as a foreign language study, particularly in regions that typically need more regular real-world exposure to English. ChatGPT addresses this gap by providing easy access to reliable English language resources, providing practical language exposure for meaningful engagement. Further, ChatGPT can become a practical supplement to conventional classroom instruction or an alternative by promoting learner independence (Atlas, 2023).

Therefore, despite ChatGPT being prevalent in education sectors worldwide, more research is needed on language learning and acquisition in the UAE. This research focuses on the effect of ChatGPT on English language skills, attitudes toward English language learning, and academic performance among university-level students in the UAE. One significant gap lies in the fact that the use of technology has significantly increased, especially in the post-pandemic era, indicating the use of technology among student as an effective step in improving their educational journey. Hence, considering this gap, this research aims to contribute to the existing literature on AI in education, particularly for English language learning and performance. This research primarily addresses the following three questions:

RQ1. How does ChatGPT use impact the perceived improvement in English language skills among students?

RQ2. How does ChatGPT use impact attitudes toward English language learning among students?

RQ3. How does ChatGPT use impact academic performance in English language skills among students?

### *1.1. Significance*

ChatGPT has the potential to transform language education through empirical and theoretical contributions. By investigating the effectiveness of ChatGPT in enhancing English language learning, this study aims to provide practical insights to improve learning outcomes and personalized education to cater for the diverse needs of students. It also provides theoretical implications for updating educational resources, including automating repetitive tasks to free up teachers for more consequential teaching activities. This research also highlights accessibility and inclusion, showing how ChatGPT can help students who are non-native speakers, promoting equal learning opportunities. Finally, the results of this research can guide policymakers in making informed decisions

about educational technology investments and help develop best practices for teachers when incorporating AI into educational operations.

## 2. REVIEW OF LITERATURE

ChatGPT was launched on November 30, 2022, as an advanced AI tool and quickly gained popularity, amassing over 1,000,000 users in its first week. Built on the OpenAI language model, ChatGPT utilizes a vast dataset of human conversations to handle complex tasks and generate human-like responses. It is based on the GPT family of conversational language models (Deng & Lin, 2022). It uses transformer architecture, which undergoes extensive training on large datasets to produce text that closely mimics human writing.

The primary function of ChatGPT is to generate text in response to input prompts, making it particularly effective for applications such as customer service agents and virtual assistants (Gill & Kaur, 2023). Through training on diverse conversational data from books, social media and websites, ChatGPT can produce contextually relevant and coherent text that closely resembles human-generated content. By leveraging deep learning techniques to process natural language, ChatGPT provides highly accurate and appropriate responses (Essel, Vlachopoulos, Essuman, & Amankwa, 2024). The model is trained on 300 billion words, 570 GB of data and over 176 billion parameters, marking a significant advancement in AI and providing the public with enhanced access to sophisticated language processing technology.

With the progress in AI and natural language processing (NLP), smart tutoring systems and adaptive learning venues have appeared. ChatGPT shows its ability to generate text, answer questions, and completely different language-related tasks. Its use provides different benefits and possibilities for language learners across diverse proficiency levels (Tlili et al., 2023). According to Mollick and Mollick (2022) ChatGPT can help learners obtain language skills, such as vocabulary and writing, while providing personalized practice materials and answers.

According to Guo, Wang, and Chu (2022) ChatGPT is based on a transformative structure that can learn from user interactions. Integrating feedback into training and modification can help the learners enhance this process by providing conversational examples in written form, further facilitating effective dialogue generation tasks. Bender, Gebru, McMillan-Major, and Shmitchell (2021) suggested that the potential benefits of ChatGPT for language learning are diverse, including assistance in language skill acquisition, the provision of personalized practice material, and support for writing-based assignments. According to Baskara (2023) incorporating ChatGPT into language learning, particularly in higher education, presents different prospects for research and investigation. One crucial area is the effectiveness and usefulness of ChatGPT in language learning using diverse coding and command facilities that provide an opportunity to compare language learners' progress using ChatGPT with those who do not, further indicating the positive and productive use of ChatGPT in education (Siemund, Al-Issa, & Leimgruber, 2021). The capabilities of ChatGPT for language learning involve proficiency in interactions, especially in improving literacy, reading comprehension, speaking, and grammar capabilities. However, researchers also highlight that checking the coherence and accuracy of ChatGPT-generated text and its ability to handle potential biases or stereotypes in its results can improve the validity and efficacy of using ChatGPT for learning purposes. Kostka and Toncelli (2023) further stated that ChatGPT's ability to create realistic communication and conversations can provide learners with authentic language models. Also, it can generate writing prompts and provide feedback on return work, helping to improve writing skills. ChatGPT's translation ability also offers us a strong method to learn a second language, as learners can input text in their native language and translate it into their target language. Thus, based on the discussed literature, this research hypothesizes that:

*H1: ChatGPT use significantly impacts perceived improvement in English language skills among students.*

According to Xiao and Zhi (2023) ChatGPT technology has sparked strong interest among educational practitioners across different disciplines. These instruments provide different prospects for language learners to engage with the target language by providing authentic responses and interactivity that facilitates language

development more meaningfully and effectively. Technology is crucial in enhancing learners' autonomy and motivation, enabling them to take charge of their learning process. As an exemplary technological advancement in language acquisition and learning, ChatGPT has AI-enabled chatbots, which use machine learning approaches and natural language processing to engage students in dialogue-based interactions, offering personalized and interactive language learning experiences (Annamalai et al., 2023). These chatbots adjust to learners' proficiency levels, provide immediate feedback, and motivate self-correction and autonomy (Kohnke, Moorhouse, & Zou, 2023). According to Barrot (2024) one of the basic advantages of incorporating ChatGPT into language learning is its capability to stimulate conversation. Most students practice speaking and comprehension skills by engaging in dialogue with AI in a judgment-free environment. This practice is important to ensure confidence and fluency as it helps students to experiment with vocabulary, sentence substructures, and grammar without the fear of making mistakes in front of others. Also, ChatGPT's ability to generate diverse scenarios and conversions exposes students to a wide range of linguistic contexts, improving their ability to communicate and understand foreign languages under different circumstances. For example, in their qualitative study, Dwivedi et al. (2023) witnessed that their students appreciated ChatGPT as it assisted them as individual instructors or guides by providing them with pre-designed, conveniently obtainable, and flexible responses. It also helps enhance linguistic aptitude, especially when they have analytical reasoning abilities, including adjusting prompt testing and approving the results, thereby instructing the system and further assisting in brainstorming new ideas. Accordingly, it provides an opportunity to work at their own pace and focus on a specific area where they need help, leading to a more impactful and efficient learning environment (Xiao & Zhi, 2023). Therefore, the cited literature helped hypothesize that:

*H2: ChatGPT use has a positive impact on attitudes toward English language learning.*

AI has acquired significant attention in education, especially in intelligent tutoring systems, as ChatGPT is famous for generating responses to diverse inputs. Incorporating GPT technology into education brings the possibility of changing traditional learning techniques by providing students with interactive learning experiences and personalized feedback, enhancing overall economic performance (Shanto, Ahmed, & Jony, 2024). According to Abbas, Jam, and Khan (2024) students utilize the insights provided by ChatGPT to expand their understanding of a topic, which positively impacts their performance. They depend on ChatGPT to enhance their learning experiences and modify their critical thinking abilities, further enhancing their interest. Shehri, Maham, Malik, and Saif (2023) examined the use and impact of ChatGPT among university-level students in Islamabad, Pakistan. The focus was on parameters of learning and creativity among students. The quantitative data acquired from the survey approach showed a positive relationship between ChatGPT use and enhanced academic performance among the students. The students demonstrated overall positive attitudes and opinions toward ChatGPT as a tool for education, including exam preparation. Prompt engineering remained an important mediator in the relevant relationship between ChatGPT and students' academic performance, highlighting the significance of prompt design in maximizing the benefits of ChatGPT in academia. Altarawneh (2023) examined how ChatGPT is used to overcome educational challenges and provide equitable access to high-quality education for Jordanian students. Employing the mixed methods approach, the data showed that ChatGPT ensures equal access to education and improves students' performance. According to the results, the participants' improved grades show that ChatGPT helped them understand and apply their learning to enhance their experiences. This is consistent with the study by Xiao and Zhi (2023) who proposed that new technology enables students to learn at their own pace and provide extensive answers to questions. The results also showed that ChatGPT enables students to acquire education regardless of geographical distance or logistical challenges. Hence, it is proposed that:

*H3: ChatGPT use positively impacts students' academic performance in English courses.*

### *2.1. Constructivist Learning Theory*

Constructivist learning theory supports current research, as constructivism without learning emphasizes the assertive role of human learners in improving their understanding. Rather than passively acquiring information, learners focus on their own experiences, incorporate new technology and creating mental representations, further encouraging deep understanding and learning (Hof, 2021; Huang, Mao, & Zhang, 2024). Considering this research, the constructivist approach to learning shows the incorporation of ChatGPT in education as it promotes the idea that students in the UAE can utilize short PowerPoint presentations to become actively involved with the language learning process. By incorporating ChatGPT, students can practice their language expertise in an interactive environment that may motivate them to enhance their language acquisition and learning (Guerin, 2008). This notion is consistent with the constructivist principle that learning is an active and constructive process where learners build new understanding based on their current knowledge and expertise. Furthermore, constructivist learning theory also supports personalized learning experiences according to the needs of individual learners. ChatGPT can provide design feedback and answers to create a personalized learning environment where students can work and learn according to their requirements (Huang et al., 2024). This notion further aligns with the view of constructivism that learners should be at the center of the learning process, actively building their knowledge through meaningful and relevant interactions (Rian, Rukun, Refdinal, Vitriani, & Herlandy, 2019; Zhou & Schofield, 2024). Therefore, by focusing on the constructivist approach, it is proposed that students can obtain instant feedback and clarification, which may help them to reflect and assess their learnings and make significant adjustments, further enhancing their language skills. Figure 1 shows the conceptual framework of the current study.

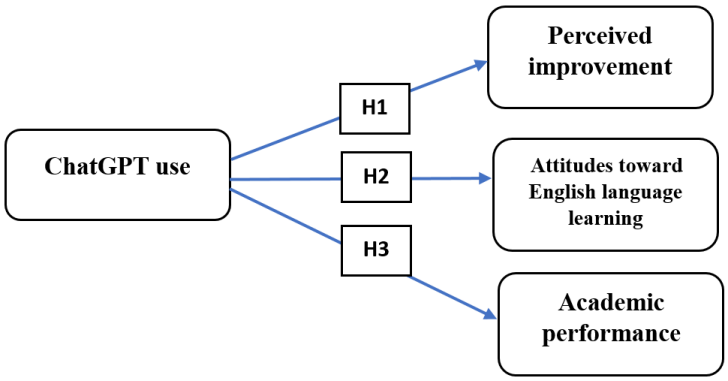


**Figure 1.** Conceptual framework of the current study.

## 3. RESEARCH METHODOLOGY

This study includes a cross-sectional design, focusing on obtaining data and acquiring results in brief and real-time settings from the respondents (Bloomfield, 2019). The relevant design was selected based on the problem and objectives of the current research. Due to the timely nature of the study problem and focus group, the relevant design is assumed to provide robust grounds for conducting the current research. A structured survey questionnaire was used to gather data from the respondents, designed on a five-point Likert scale. However, before formally gathering the data, a pilot test was conducted using a sample of 35 respondents, as suggested by Dikko (2016). Table 1 presents the pilot test results, questionnaire items, and the sources used in the current study. The results of the pilot test show that the Cronbach's alpha values related to each construct were higher than the cutoff value of 0.7, indicating that the survey instrument is reliable, and therefore the results can be generalized. The questionnaires were distributed among the respondents after their informed consent was obtained, and they were informed of the voluntary nature of their participation. Once the data was gathered, the analysis was carried out using the Statistical Package for the Social Sciences (SPSS) and structural equation modeling.

**Table 1.** Sources, items, and pilot test results.

| Construct | Items | Sources | Cronbach's alpha | Number of items |
|---|---|---|---|---|
| ChatGPT use | ChatGPT is a cutting-edge technology that is gaining rapid popularity today. | Farhi et al. (2023) | 0.792 | 5 |
| | ChatGPT is helpful for students at the higher education level. | | | |
| | ChatGPT helps students with their academic tasks, making technology a helpful assistant. | | | |
| | ChatGPT is a strong source of enhancing human productivity. | | | |
| | Students can gain several creative ideas through ChatGPT. | | | |
| Perceived improvement | ChatGPT use improves time efficiency and English language learning activities. | Fauzi, Tuhuteru, Sampe, Ausat, and Hatta (2023) and Ajlouni, Almahaireh, and Whaba (2023) | 0.835 | 4 |
| | ChatGPT has helped me improve my English language skills. | | | |
| | ChatGPT increases my motivation to learn and improves my English reading and speaking abilities. | | | |
| | ChatGPT satisfies my curiosity to learn more about the English language. | | | |
| Attitudes | ChatGPT provides accurate and reliable English translation of text. | Pham and Le (2024) | 0.800 | 4 |
| | I believe that ChatGPT is useful for my English language learning. | | | |
| | Self-studying with ChatGPT has helped me perform well in class. | | | |
| | ChatGPT has become a regular tool for English language learning. | | | |
| Academic performance | My English communication skills have significantly improved. | Sánchez (2023) and Pham and Le (2024) | 0.751 | 4 |
| | ChatGPT has boosted my confidence in preparing assignments in English. | | | |
| | My performance in English language modules has improved. | | | |
| | I can complete and proofread my assignment on time using ChatGPT. | | | |

### *3.1. Sampling Techniques*

The current research population involves students of higher education levels enrolled in Ajman University, United Arab Emirates. Based on the formal research requirements and restricted resources, Ajman University was selected as it has 5,999 students (Ajman University, 2024). Further, using the sample size calculation formula suggested by Israel (1992) a suitable sample size of 374 was calculated. Once the sample size was determined, convenience sampling was applied. Students were only selected from the Faculty of Arts and Humanities, particularly language studies and the literature department. Notably, convenience sampling has faced major criticism regarding researchers' bias, yet it is considered one of the most preferred techniques in empirical studies (Stratton, 2021). The data was gathered from April 2024 to May 2024. Once the data was gathered, each questionnaire was carefully evaluated for accuracy and clarity. Only three questionnaires were either missing or incorrectly filled out, giving a final number of 371 and a total response rate of 99.1% that was higher than the threshold value of 60% (Fincham, 2008) thus ensuring the generalizability of the results.

### *3.2. Data Normality*

As the current research aims to conduct a quantitative analysis and opts for the partial least squares structural equation modeling, the selection of parametric tests was determined using normality testing (Das & Imon, 2016; Mishra et al., 2019). As shown in Table 2, the significant values from both the Kolmogorov–Smirnov and Shapiro–Wilk tests exceed the significance value of 0.05, indicating non-normal distribution. Thus, applying the parametric tests is deemed suitable for the research.

**Table 2.** Data normality testing.

| Construct | Kolmogorov–Smirnov | | Shapiro–Wilk | |
|---|---|---|---|---|
| | Statistic | Sig. | Statistic | Sig. |
| ChatGPT use | 0.104 | 0.874 | 00.968 | 0.022 |
| Perceived improvement | 0.157 | 0.021 | 0.919 | 0.448 |
| Attitude | 0.111 | 0.450 | 0.943 | 1.398 |
| Academic performance | 0.097 | 0.423 | 0.946 | 0.937 |

## 4. DATA ANALYSIS AND STUDY RESULTS

### *4.1. Respondents' Demographics*

The descriptive data of the respondents' demographics are explained in Table 3. The majority, 73.9%, were male, while 26.1% were female. Regarding age, 50.4% of respondents were between 17 - 20 years old, 27.2% were between 21 - 24 years old, 17.8% were between 25 - 30 years old, and 4.6% were 31 or older. Regarding education level, 50.9% of the respondents were undergraduate students, 25.1% were postgraduate students, 21.3% were graduate students, and 2.7% were pursuing a doctorate.

**Table 3.** Descriptives of respondents' demographics.

| Variables | Construct | N | % |
|---|---|---|---|
| Gender | Women | 97 | 26.1 |
| | Man | 274 | 73.9 |
| Age | 17–20 | 187 | 50.4 |
| | 21–24 | 101 | 27.2 |
| | 25–30 | 66 | 17.8 |
| | 31 or above | 17 | 4.6 |
| Education level | Undergraduate | 189 | 50.9 |
| | Graduate | 79 | 21.3 |
| | Postgraduate | 93 | 25.1 |
| | Doctorate | 10 | 2.7 |

### *4.2. Validity and Reliability Testing*

First, the convergent validity of the measurement was tested to examine the internal consistency between the study variables (Hoyle, 2000). The findings revealed that most of the factor loadings are above the threshold value of 0.5, while the average variance extracted (AVE) values are also above the threshold value of 0.5 (ChatGPT use = 0.526, perceived improvement = 0.671, attitude = 0.608, and academic performance = 0.663). Concerning construct reliability, the Cronbach's alpha values surpass the threshold of 0.7 (ChatGPT use = 0.798, perceived improvement = 0.839, attitude = 0.749, and academic performance = 0.755). Finally, the composite reliability values also exceeded the threshold value of 0.7 (ChatGPT use = 0.815, perceived improvement = 0.891, attitude = 0.799, and academic performance = 0.854). These results demonstrate that convergent validity exists among the study variables (see Table 4).

**Table 4.** Internal consistency testing.

| Construct | Item | Factor loading | AVE | CA | CR |
|---|---|---|---|---|---|
| ChatGPT use | GPT1 | 0.701 | 0.526 | 0.798 | 0.815 |
| | GPT2 | 0.526 | | | |
| | GPT3 | 0.696 | | | |
| | GPT4 | 0.475 | | | |
| | GPT5 | 0.636 | | | |
| Perceived improvement | PI1 | 0.646 | 0.671 | 0.839 | 0.891 |
| | PI2 | 0.847 | | | |
| | PI3 | 0.876 | | | |
| | PI4 | 0.559 | | | |
| Attitude | ATT1 | 0.452 | 0.608 | 0.749 | 0.799 |
| | ATT2 | 1.038 | | | |
| | ATT3 | 0.230 | | | |
| | ATT4 | 0.665 | | | |
| Academic performance | AP1 | 0.219 | 0.663 | 0.755 | 0.854 |
| | AP2 | 0.784 | | | |
| | AP3 | 0.549 | | | |
| | AP4 | 0.912 | | | |

The goodness of fit was tested after removing items with lower loading values (less than 0.5) (Chwialkowski, Strathmann, & Gretton, 2016). First, the standardized root mean square values for both saturated and estimated models are relatively low (less than 0.08) (Demler, Paynter, & Cook, 2015), indicating a good fit. The chi-square values for both models were less than 3.0 (Mérigot, Durbec, & Gaertner, 2010). However, a slight increase in d_ULS and d_G values indicates minor discrepancies. However, these values have no significant effect on the overall model validity. Finally, the non-fit index value was 0.893 (Tenenhaus, Amato, & Esposito Vinzi, 2004), indicating a good fit. Overall, these findings indicate a well-fitting model. Figure 2 shows the final measurements of the current study.

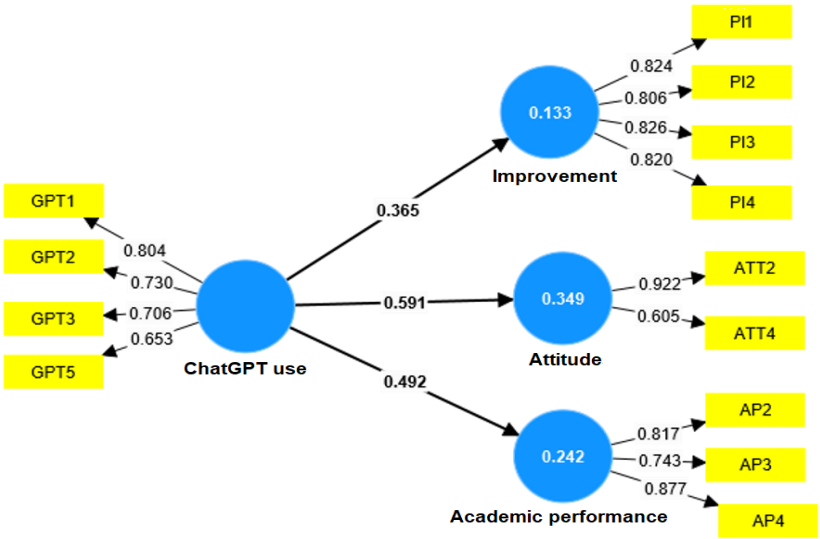


**Figure 2.** Goodness of fit.

Discriminant validity was tested using criterion-based approaches, including the Fornell–Larcker criterion and the heterotrait-monotrait (HTMT) ratio scale (Rasoolimanesh, 2022). First, the results of the Fornell–Larcker criterion indicate adequate discriminant validity for the constructs in the model. The square root values of the AVE for each construct—academic performance (0.814), attitude (0.78), ChatGPT use (0.725), and improvement (0.819)—are greater than the correlations between these constructs and others in the model. The correlations between academic performance and the other constructs are 0.541 (attitude), 0.492 (ChatGPT use), and 0.414 (improvement); the correlations between attitude and the other constructs are 0.591 (ChatGPT use) and 0.599

(improvement); and the correlations between ChatGPT use and improvement is 0.365. These values confirm that each construct is more closely linked to its indicators than others, suggesting robust discriminant validity (see Table 5a).

**Table 5a.** Discriminant validity testing (Fornell–Larcker scale).

| Construct | Academic performance | Attitude | ChatGPT use | Improvement |
|---|---|---|---|---|
| Academic performance | 0.814 | | | |
| Attitude | 0.541 | 0.78 | | |
| ChatGPT use | 0.492 | 0.591 | 0.725 | |
| Improvement | 0.414 | 0.599 | 0.365 | 0.819 |

The HTMT ratios show good discriminant validity between most constructs, as the values are typically below the threshold of 0.90. The HTMT ratio is 0.033 between attitude and academic performance, 0.640 between ChatGPT use and academic performance, 0.023 between ChatGPT use and attitude, 0.533 between improvement and academic performance, and 0.458 between improvement and ChatGPT use, implying that these constructs are distinctive from each other. Also, the ratio between improvement and attitude is 0.013, which indicates a decreased value (see Table 5b).

**Table 5b.** Discriminant validity testing (HTMT ratio scale).

| | (HTMT) |
|---|---|
| Attitude <-> Academic performance | 0.033 |
| ChatGPT use <-> Academic performance | 0.640 |
| ChatGPT use <-> Attitude | 0.023 |
| Improvement <-> Academic performance | 0.533 |
| Improvement <-> Attitude | 0.013 |
| Improvement <-> ChatGPT use | 0.458 |

The results of the effect size (f-square) and coefficient of determination (R-square) also provide insights into the predictive power of the relationships between the study constructs (Campus & Adyar, 2018; Selya, Rose, & Dierker, 2012). For perceived improvement, the f-square value was 0.154, showing a small to medium effect size, with an R-square of 0.133 and an adjusted R-square of 0.131, indicating that the model explains about 13.1% of the variance in perceived improvement. For attitude, the f-square value was 0.537, suggesting a large effect size, with an R-square of 0.349 and an adjusted R-square of 0.348, showing that the model explains about 34.8% of the variance in attitude. For academic performance, the f-square was 0.320, suggesting a medium effect size, with an R-square of 0.242 and an adjusted R-square of 0.24, indicating the model explains 24% of the variance in academic performance. These findings show that attitude has the highest explanatory power, as observed by academic performance and perceived improvement (see Table 6).

**Table 6.** Effect size testing and coefficient of determination ($R^2$).

| Construct | f-square | R-square | Adjusted R-square |
|---|---|---|---|
| Perceived improvement | 0.154 | 0.133 | 0.131 |
| Attitude | 0.537 | 0.349 | 0.348 |
| Academic performance | 0.320 | 0.242 | 0.24 |

The hypotheses were tested using path and linear regression analysis, which provided p-values, t-statistics, and beta coefficients (see Table 7). The first hypothesis (H1), which examined the effect of ChatGPT on perceived improvement, was supported with a path coefficient of 0.365 and a significance value of 0.000. The second hypothesis, which investigated the impact of ChatGPT use on attitude, was also significant, with a path coefficient

of 0.591 and a significance value of 0.000. Lastly, the ChatGPT use and academic performance hypothesis was supported with a path coefficient of 0.492 and a significance value of 0.000. The detailed results of the path analysis are presented in Table 7.

**Table 7.** Hypotheses testing (Path analysis, regression weights).

| Hypothesis | Mean | St. dev. | Path coefficient | t statistic | P value | Decision |
|---|---|---|---|---|---|---|
| ChatGPT use → Perceived improvement | 0.471 | 0.074 | 0.365 | 6.348 | 0.000 | Supported |
| ChatGPT use → Attitude | 0.970 | 0.094 | 0.591 | 10.309 | 0.000 | Supported |
| ChatGPT use → Academic performance | 0.652 | 0.058 | 0.492 | 11.145 | 0.000 | Supported |

## 5. DISCUSSION OF RESULTS

This research focused on AI-enhanced technology, ChatGPT, in facilitating English language students in the United Arab Emirates (Eltahir et al., 2023; Eltahir, Annamalai, Zyoud, Al Salhi, & Zakameh, 2023). Today, ChatGPT is an effective tool that benefits students on almost every level. Despite some studies also highlighting negative aspects (Essel et al., 2024), particularly restricting the critical thinking abilities of students (Hasanein & Sobaih, 2023) the positive impacts outweigh the negative. Another notable benefit offered by ChatGPT is the users' awareness of its unethical aspects, further making ChatGPT a positive technology that helps students and keeps them mindful about its constructive uses (Akastangga, Harmonis, & Hafidz, 2023; Guo & Lee, 2023). Theoretically supported by constructivist learning theory, this research helped gain insight into how ChatGPT helps higher education students in the UAE, leading them to continue using it and sharing their cognitive load. These insights also imply how relevant technology is having a positive impact on students' academic performance (Alarabi et al., 2023). Based on the responses to each survey item, a precise and clear agreement was found among the study respondents regarding their perceptions of its benefits in education. Table 8 provides a summary of the descriptive calculations for the current study. The respondents widely agreed that ChatGPT is a cutting-edge technology that is acquiring rapid popularity as it is helpful for students at the higher education level. The respondents agreed that ChatGPT helps students with their academic tasks, making technology a helpful assistant as it strongly enhances human productivity. Consequently, students can acquire many creative ideas through ChatGPT. These results are consistent with the existing literature, which shows ChatGPT as an evolving technology that facilitates different aspects of life and effective education. For instance, Guo and Lee (2023) evaluated the effect of a ChatGPT-based activity on students' confidence, critical thinking skills, and understanding of complex concepts in introductory educational courses. Through three stages (account setup and exposure, essay composition, and result revision and validation), students significantly enhanced their capability to ask insightful questions, examine information, and understand complex topics. They found that ChatGPT provided myriad viewpoints and challenged their thinking, leading to inflated use and tool recommendations. However, an important aspect highlighted in the relevant study is the need for comprehensive educator training and dependable resources. In addition, the current research finding is that the benefits of ChatGPT remain prevalent and mutually beneficial for English language learners in the UAE.

Focusing on the hypotheses, the first proposition is based on the impact of ChatGPT on English language skills among students. As stated, "ChatGPT use has a significant impact on perceived improvement in English language skills among students." The respondents agreed that ChatGPT use improves time efficiency and English learning activities and has helped them improve their English skills. According to the respondents, it increases their motivation to learn, improves their English reading and speaking abilities, and satisfies their curiosity to learn more about the English language. A study by Pham and Le (2024) witnessed similar outcomes among Vietnamese and Korean students. Data obtained from the surveys revealed that the students found ChatGPT effective for vocabulary accession, grammar checking, translation, and paraphrasing. Students mainly used ChatGPT for prompt solutions to language learning difficulties. These results indicate that students actively consider ChatGPT as a tool

for improving their language learning as a primary and supplementary part of their academic journey in non-English speaking countries.

**Table 8.** Descriptive calculations.

| Item | Range | Mean | Std. deviation | VAR. |
|---|---|---|---|---|
| ChatGPT is a cutting-edge technology that is gaining rapid popularity today. | 4.00 | 3.71 | 0.903 | 0.815 |
| ChatGPT is helpful for students at the higher education level. | 3.00 | 4.03 | 0.855 | 0.731 |
| ChatGPT helps students with their academic tasks, making technology a helpful assistant. | 4.00 | 4.29 | 0.792 | 0.629 |
| ChatGPT is a strong source of enhancing human productivity. | 3.00 | 4.05 | 0.769 | 0.592 |
| Students can gain several creative ideas through ChatGPT. | 4.00 | 3.49 | 1.22 | 1.509 |
| ChatGPT use improves time efficiency and English language learning activities. | 4.00 | 3.58 | 1.08 | 1.179 |
| ChatGPT has helped me improve my English language skills. | 4.00 | 3.95 | 1.00 | 1.019 |
| ChatGPT increases my motivation to learn and improve my English reading and speaking abilities. | 4.00 | 3.73 | 1.03 | 1.061 |
| ChatGPT satisfies my curiosity to learn more about the English language. | 4.00 | 3.57 | 1.07 | 1.148 |
| ChatGPT provides accurate and reliable English translation of text. | 4.00 | 3.65 | 1.13 | 1.287 |
| I believe that ChatGPT is useful for my English language learning. | 4.00 | 4.31 | 0.929 | 0.864 |
| Self-studying with ChatGPT has helped me perform well in class. | 4.00 | 3.56 | 1.15 | 1.333 |
| ChatGPT has become a regular tool for English language learning. | 4.00 | 3.83 | 1.00 | 1.001 |
| My English communication skills have significantly improved. | 4.00 | 3.60 | 1.08 | 1.179 |
| ChatGPT has boosted my confidence in preparing assignments in English. | 4.00 | 4.05 | 0.916 | 0.840 |
| My performance in English language modules has improved. | 4.00 | 3.95 | 0.975 | 0.952 |
| I can complete and proofread my assignment on time using ChatGPT. | 4.00 | 4.30 | 0.876 | 0.768 |

Concerning the second study hypothesis, "ChatGPT use positively impacts attitudes toward English language learning," the findings revealed that the respondents agreed that ChatGPT provides them with accurate and reliable English translation of text, leading to the belief that ChatGPT is useful to their English language learning. According to the respondents, self-studying with ChatGPT has helped them perform well in their classes. As a result, ChatGPT has become a regular tool for English language learning, as noted by Acosta-Enriquez, Arbulú Ballesteros, Huamaní Jordan, López Roca, and Saavedra Tirado (2024). Rather than stay passive, students actively opt for effective sources such as ChatGPT and gain the required advantages. A study by Ajlouni, Wahba, and Almahaireh (2023) assessed attitudes toward ChatGPT use as an educational tool in Jordan. The data from the tool focused on affective, cognitive and behavioral components and showed a positive attitude toward ChatGPT, with high behavioral and cognitive components and moderate affective components.

The respondents suggested that ChatGPT facilitates learning, although some raised concerns about data accuracy, and an equal percentage felt uncomfortable using the platform. Also, 14.6% of the respondents experienced anxiety when they could not access ChatGPT. These findings indicate that decision makers and educators at the University of Jordan should consider incorporating ChatGPT into their curricula to address student concerns and mitigate potential misuse. The last hypothesis proposes that "ChatGPT use has a positive impact on students' academic performance in English courses". The respondents reported significant improvements in their English communication skills, boosted confidence in preparing assignments, and better performance in English language modules due to ChatGPT (Faysal Farhi, Satoutah, & Mohamed Ahmed, 2021). The tool has also

helped them complete and proofread assignments on time. In a related study, Mahapatra (2024) explored ChatGPT's role as a formative feedback instrument for undergraduate English language students in India. Using a mixed methods intervention approach, the study found a significant positive effect of ChatGPT on students' academic writing skills, with students expressing strong positive views. This suggests that ChatGPT can be an effective feedback tool for large writing tasks, provided it is accompanied by suitable training. However, Baskara (2023) argued that while ChatGPT can help learners learn and improve their English, it needs to replace human educators' expertise and deep learning in identifying more complex learning issues.

## 6. CONCLUSION

This research focused on examining the effectiveness of ChatGPT in language learning, particularly regarding English language learning among students in Ajman University, United Arab Emirates. The study findings provide empirical proof that all hypotheses are strongly supported, confirming the significant positive effect of ChatGPT on different facets of students' academic outcomes. These results highlight the critical role of ChatGPT in enhancing perceived improvement, shaping attitudes, and improving academic performance among university students. Furthermore, this research also emphasizes the precise relevance of ChatGPT for language learners, indicating its potential to address the different challenges faced by students. Overall, current research remains consistent with the existing studies regarding the positive constructive role of ChatGPT in education. However, the novelty and contribution of this study are based on its precise focus on English language learners in one higher education institution in the UAE. The findings indicate that ChatGPT is equally important, and results can be generalizable to educational institutions across the UAE to further ensure its positive use among students. Therefore, this research shows the transformative potential of AI-driven tools such as ChatGPT in revolutionizing language education, providing strong platforms for personalized learning experiences and enhanced educational results among higher education learners.

## 7. STUDY IMPLICATIONS

Theoretically supported by constructivist learning theory, this study demonstrates robust implications for the future of language education by investigating the use of ChatGPT in enhancing English language proficiency, as it extends beyond traditional pedagogical practices, supporting a more stringent and interactive educational environment. The findings suggest the possibility of using ChatGPT in reshaping educational paradigms by stressing the possibility of using AI-driven tools to personalize learning experiences and cater to learners' diverse needs and preferences.

This study shows the transformative potential of technology in encouraging student engagement and autonomy within the language learning process through its theoretical and empirical contributions. It also highlights the significance of integrating AI technologies into educational frameworks, not as a substitute for human instructors but as a supportive tool that expands teaching practices that improve the learning journey. Furthermore, this research is consistent with studies conducted in different regions, highlighting accessibility and inclusivity. By explaining how AI can sustain non-native English speakers, it supports unbiased learning possibilities, exceeding geographical, social and economic barriers. The study's focus on automating repetitive tasks shows the power of AI technology to ease administrative burdens, further freeing teachers to focus more on impactful and influential teaching initiatives.

These understandings will inform policymakers in strategic educational technology acquisitions and provide instructors with practical strategies to incorporate AI into pedagogical approaches. Therefore, this research acts as a pathway guiding the development of language education toward a more personalized, inclusive and technologically improved future.

## 8. STUDY LIMITATIONS AND RECOMMENDATIONS

Although this research fills a gap in the literature, it has some limitations. First, this research was conducted in the UAE, which brings into question the results' generalizability to other geographical regions. Future studies can replicate this study and conduct investigations in other regions to delimit this scope. The second limitation involves using a single-method approach for the analysis. Future studies can apply different methodological approaches, including mixed method approaches, to mitigate this limitation. The third limitation includes a focus on only English language learners, while existing literature indicates the positive effects of ChatGPT technology from different disciplines and education levels. Future researchers can focus on other education levels and disciplines to overcome these limitations.

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**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
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## REFERENCES

Ab Hamid, E. A. H., Maskur, H., & Mutalib, R. A. (2023). The use of ChatGPT applications in learning: Impact on understanding and student engagement in TVET institutions. *Malaysian Journal of Information and Communication Technology, 8*(2) 78-87. https://doi.org/10.53840/myjict8-2-98

Abbas, M., Jam, F. A., & Khan, T. I. (2024). Is it harmful or helpful? Examining the causes and consequences of generative AI usage among university students. *International Journal of Educational Technology in Higher Education, 21*(1), 10. https://doi.org/10.1186/s41239-024-00444-7

Acosta-Enriquez, B. G., Arbulú Ballesteros, M. A., Huamaní Jordan, O., López Roca, C., & Saavedra Tirado, K. (2024). Analysis of college students' attitudes toward the use of ChatGPT in their academic activities: Effect of intent to use, verification of information and responsible use. *BMC Psychology, 12*(1), 255. https://doi.org/10.1186/s40359-024-01764-z

Ajlouni, A., Almahaireh, A., & Whaba, F. (2023). Students' perception of using ChatGPT in counseling and mental health education: The benefits and challenges. *International Journal of Emerging Technologies in Learning, 18*(20), 199-218. https://doi.org/10.3991/ijet.v18i20.42075

Ajlouni, A. O., Wahba, F. A. A., & Almahaireh, A. S. (2023). Students' attitudes towards using chatgpt as a learning tool: The case of the University of Jordan. *International Journal of Interactive Mobile Technologies, 17*(18), 99–117. https://doi.org/10.3991/ijim.v17i18.41753

Ajman University. (2024). *Ajman university ranking & overview 2024*. Retrieved from https://www.4icu.org/reviews/4664.htm

Akastangga, M. D. F., Harmonis, S., & Hafidz, R. A. A. (2023). The impact of ChatGPT on the critical thinking ability of UIN Sunan Kalijaga students. *Matrix : Jurnal Manajemen Teknologi Dan Informatika, 13*(3), 157–165. https://doi.org/10.31940/matrix.v13i3.157-165

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*. Retrieved from https://www.researchgate.net/publication/376077173

Altarawneh, H. (2023). ChatGpt impact on student educational performance: A conceptual analysis. *EAI Endorsed Transactions on E-Learning, 9*, 1-5. https://doi.org/10.4108/eetel.4574

Annamalai, N., Eltahir, M. E., Zyoud, S. H., Soundrarajan, D., Zakarneh, B., & Al Salhi, N. R. (2023). Exploring English language learning via Chabot: A case study from a self determination theory perspective. *Computers and Education: Artificial Intelligence, 5*, 100148. https://doi.org/10.1016/j.caeai.2023.100148

Atlas, S. (2023). *ChatGPT for higher education and professional development: A guide to conversational AI University of Rhode Island.* Retrieved from https://digitalcommons.uri.edu/cba_facpubs/548?utm_source=digitalcommons.uri.edu%2Fcba_facpubs%2F548&utm_medium=PDF&utm_campaign=PDFCoverPages

Barrot, J. S. (2024). ChatGPT as a language learning tool: An emerging technology report. *Technology, Knowledge and Learning, 29*(2), 1151–1156. https://doi.org/10.1007/s10758-023-09711-4

Baskara, R. (2023). Exploring the implications of ChatGPT for language learning in higher education. *Indonesian Journal of English Language Teaching and Applied Linguistics, 7*(2), 343-358.

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). *On the dangers of stochastic parrots: Can language models be too big?* Paper presented at the Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, 610–623. https://doi.org/10.1145/3442188.3445922.

Bloomfield, J. (2019). Quantitative research design. *Journal of the Australasian Rehabilitation Nurses Association, 22*(2), 27–30. https://doi.org/10.33235/jarna.22.2.27-30

Campus, M., & Adyar, M. (2018). Measuring the effect size of coefficient of determination and predictive relevance of exogenous latent variables on endogenous latent variables through PLS-SEM. *International Journal of Pure and Applied Mathematics, 119*(18), 39-48.

Caratiquit, K. D., & Caratiquit, L. J. C. (2023). ChatGPT as an academic support tool on the academic performance among students: The mediating role of learning motivation. *Journal of Social, Humanity, and Education, 4*(1), 21-33. https://doi.org/10.35912/jshe.v4i1.1558

Chwialkowski, K., Strathmann, H., & Gretton, A. (2016). *A kernel test of goodness of fit.* Paper presented at the In International Conference on Machine Learning (pp. 2606-2615). PMLR.

Das, K. R., & Imon, A. (2016). A brief review of tests for normality. *American Journal of Theoretical and Applied Statistics, 5*(1), 5-12. https://doi.org/10.11648/j.ajtas.20160501.12

Demler, O. V., Paynter, N. P., & Cook, N. R. (2015). Tests of calibration and goodness-of-fit in the survival setting. *Statistics in Medicine, 34*(10), 1659-1680. https://doi.org/10.1002/sim.6428

Deng, J., & Lin, Y. (2022). The benefits and challenges of ChatGPT: An overview. *Frontiers in Computing and Intelligent Systems, 2*(2), 81-83. https://doi.org/10.54097/fcis.v2i2.4465

Dikko, M. (2016). Establishing construct validity and reliability: Pilot testing of a qualitative interview for research in Takaful (Islamic insurance). *The Qualitative Report, 21*(3), 521-528. https://doi.org/10.46743/2160-3715/2016.2243

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., & Ahuja, M. (2023). Opinion paper:"So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management, 71*, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Eltahir, M. E., Annamalai, N., Uthayakumaran, A., Zyoud, S. H., Ramírez García, A., Mažeikienė, V., & Al Salhi, N. R. (2023). Students' experiences of fairness in online assessment: A phenomenological study in a higher education institution context. *SAGE Open, 13*(4), 1-13. https://doi.org/10.1177/21582440231209816

Eltahir, M. E., Annamalai, N., Zyoud, S. H., Al Salhi, N. R., & Zakameh, B. (2023). Exploring the adoption of multiple intelligences in micro credentials by educators in Malaysian higher education. *The Qualitative Report, 28*(12), 3514-3535. https://doi.org/10.46743/2160-3715/2023.6093

Essel, H. B., Vlachopoulos, D., Essuman, A. B., & Amankwa, J. O. (2024). ChatGPT effects on cognitive skills of undergraduate students: Receiving instant responses from AI-based conversational large language models (LLMs). *Computers and Education: Artificial Intelligence, 6*, 100198. https://doi.org/10.1016/j.caeai.2023.100198

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. *Computers and Education: Artificial Intelligence*, *5*, 100180. https://doi.org/10.1016/j.caeai.2023.100180

Farhi, F., Satoutah, S., & Mohamed Ahmed, M. (2021). Uses of smartphones communication applications in teaching media courses in light of the Corona pandemic'A Field study on media professors at Arab universities. *Ilkogretim Online*, *20*(5).

Fauzi, F., Tuhuteru, L., Sampe, F., Ausat, A. M. A., & Hatta, H. R. (2023). Analysing the role of ChatGPT in improving student productivity in higher education. *Journal on Education*, *5*(4), 14886-14891. https://doi.org/10.31004/joe.v5i4.2563

Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the journal. *American Journal of Pharmaceutical Education*, *72*(2), 43. https://doi.org/10.5688/aj720243

Gill, S. S., & Kaur, R. (2023). ChatGPT: Vision and challenges. *Internet of Things and Cyber-Physical Systems*, *3*, 262–271. https://doi.org/10.1016/j.iotcps.2023.05.004

Guerin, F. (2008). *Constructivism in AI: Prospects, progress and challenges. computing and philosophy, aberdeen, scotland.* Retrieved from https://abdn.elsevierpure.com/en/publications/constructivism-in-ai-prospects-progress-and-challenges

Guo, K., Wang, J., & Chu, S. K. W. (2022). Using chatbots to scaffold EFL students' argumentative writing. *Assessing Writing*, *54*, 100666. https://doi.org/10.1016/j.asw.2022.100666

Guo, Y., & Lee, D. (2023). Leveraging chatgpt for enhancing critical thinking skills. *Journal of Chemical Education*, *100*(12), 4876-4883. https://doi.org/10.1021/acs.jchemed.3c00505

Hasanein, A. M., & Sobaih, A. E. E. (2023). Drivers and consequences of chatgpt use in higher education: Key stakeholder perspectives. *European Journal of Investigation in Health, Psychology and Education*, *13*(11), 2599–2614. https://doi.org/10.3390/ejihpe13110181

Hof, B. (2021). The turtle and the mouse: How constructivist learning theory shaped artificial intelligence and educational technology in the 1960s. *History of Education*, *50*(1), 93-111. https://doi.org/10.1080/0046760X.2020.1826053

Hoyle, R. H. (2000). 16—confirmatory factor analysis. In H. E. A. Tinsley & S. D. Brown (Eds.), Handbook of applied multivariate statistics and mathematical modeling. In (pp. 465–497): Academic Press. https://doi.org/10.1016/B978-012691360-6/50017-3.

Huang, Z., Mao, Y., & Zhang, J. (2024). The influence of artificial intelligence technology on college students' learning effectiveness from the perspective of constructivism—taking chatgpt as an example. *Journal of Education, Humanities and Social Sciences*, *30*, 40-46. https://doi.org/10.54097/y1x3jj43

Israel, G. D. (1992). *Determining sample size.* Retrieved from https://www.psycholosphere.com/Determining%20sample%20size%20by%20Glen%20Israel.pdf

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., . . . Hüllermeier, E. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, *103*, 102274. https://doi.org/10.1016/j.lindif.2023.102274

Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for language teaching and learning. *Relc Journal*, *54*(2), 537-550.

Kostka, I., & Toncelli, R. (2023). Exploring applications of ChatGPT to English language teaching: Opportunities, challenges, and recommendations. *Tesl-Ej*, *27*(3), n3. https://doi.org/10.55593/ej.27107int

Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: A mixed methods intervention study. *Smart Learning Environments*, *11*(1), 9. https://doi.org/10.1186/s40561-024-00295-9

Mérigot, B., Durbec, J.-P., & Gaertner, J.-C. (2010). On goodness-of-fit measure for dendrogram-based analyses. *Ecology*, *91*(6), 1850-1859. https://doi.org/10.1890/09-1387.1

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Mollick, E. R., & Mollick, L. (2022). New modes of learning enabled by ai chatbots: Three methods and assignments. *Available at SSRN 4300783*. https://doi.org/10.2139/ssrn.4300783

Pham, V. P. H., & Le, A. Q. (2024). ChatGPT in language learning: Perspectives from Vietnamese students in Vietnam and the USA. *International Journal of Language Instruction*, *3*(2), 59-72. https://doi.org/10.54855/ijli.24325

Rasoolimanesh, S. M. (2022). Discriminant validity assessment in PLS-SEM: A comprehensive composite-based approach. *Data Analysis Perspectives Journal*, *3*(2), 1-8.

Rian, R. A., Rukun, K., Refdinal, N., M., Vitriani, & Herlandy, P. B. (2019). *Design of e-learning structure model based on artificial intelligence for constructivism learning theory*. Paper presented at the Proceedings of the International Conference of CELSciTech 2019 - Science and Technology track (ICCELST-ST 2019). https://doi.org/10.2991/iccelst-st-19.2019.5.

Sánchez, O. V. G. (2023). Use and perception of ChatGPT in higher education. *Revista de Investigación en Tecnologías de la Información*, *11*(23), 98-107. https://doi.org/10.36825/RITI.11.23.009

Selya, A. S., Rose, J. S., & Dierker, L. C. (2012). *A practical guide to calculating cohen's f2, a measure of local effect size, from PROC MIXED*. Retrieved from https://www.frontiersin.org/articles/10.3389/fpsyg.2012.00111/full

Shanto, S. S., Ahmed, Z., & Jony, A. I. (2024). Enriching learning process with generative ai: A proposed framework to cultivate critical thinking in higher education using chat GPT. *Tuijin Jishu/Journal of Propulsion Technology*, *45*(1), 3019-3029.

Shehri, F. A., Maham, R., Malik, A., & Saif, O. B. (2023). Effects of ChatGPT on students academic performance: Mediating role of prompt engineering. *The Asian Bulletin of Big Data Management*, *3*(2), 137-147. https://doi.org/10.62019/abbdm.v3i2.58

Siemund, P., Al-Issa, A., & Leimgruber, J. R. (2021). Multilingualism and the role of English in the United Arab Emirates. *World Englishes*, *40*(2), 191-204. https://doi.org/10.1111/weng.12507

Stratton, S. J. (2021). Population research: Convenience sampling strategies. *Prehospital and Disaster Medicine*, *36*(4), 373–374. https://doi.org/10.1017/S1049023X21000649

Tenenhaus, M., Amato, S., & Esposito Vinzi, V. (2004). A global goodness-of-fit index for PLS structural equation modelling. *In Proceedings of the XLII SIS Scientific Meeting*, *1*(2), 739-742.

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, *10*(1), 15. https://doi.org/10.1186/s40561-023-00237-x

Xiao, Y., & Zhi, Y. (2023). An exploratory study of EFL learners' use of ChatGPT for language learning tasks: Experience and perceptions. *Languages*, *8*(3), 212. https://doi.org/10.3390/languages8030212

Zhou, X., & Schofield, L. (2024). Using social learning theories to explore the role of generative artificial intelligence (AI) in collaborative learning. *Journal of Learning Development in Higher Education*, *30*, 1-12. https://doi.org/10.47408/jldhe.vi30.1031