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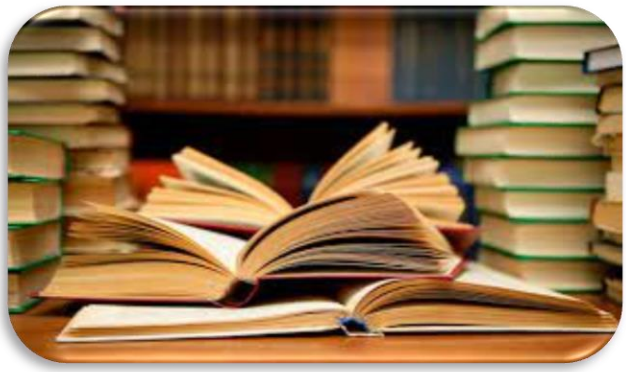

Exploring the Effectiveness of Artificial Intelligence (AI) on Reading Comprehension among Iranian EFL Learners

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ABSTRACT

This study aimed to investigate the impact of AI, specifically Chat GPT, on the reading comprehension abilities of Iranian English as a Foreign Language (EFL) learners. Participants (N=54) were selected through a convenience sampling method from two universities in Tehran, Iran. Eligible participants underwent an NPT language proficiency test to ensure homogeneity within the sample. Random assignment was conducted to allocate participants into either the experimental group (exposed to Chat GPT) or the control group (without exposure to Chat GPT). Pretests and posttests were administered to measure the participants' reading comprehension abilities before and after a ten-week intervention period. Data analysis, including independent-samples t-tests and Cohen's d calculations, revealed a significant difference in reading comprehension gain between the experimental and control groups. The experimental group demonstrated a substantial increase in reading comprehension skills, while the control group showed a slight decrease. The effect size, as measured by Cohen's d, was found to be very large (5.33), indicating a significant impact of Chat GPT on EFL learners' reading comprehension abilities. These findings support the conclusion that the use of AI, particularly Chat GPT, positively influenced the reading comprehension levels of EFL learners.

Keywords: *Artificial Intelligence, Chat GPT, EFL learners, Reading Comprehension*

INTRODUCTION

The use of technology in language learning has gained significant attention in recent years, with various digital tools being integrated into educational settings. Among these tools, chatbots powered by language models like GPT (Generative Pre-trained Transformer) have emerged as a promising avenue for enhancing reading comprehension skills among English as a Foreign Language (EFL) learners (Aggarwal & Clark, 2021). Research in the field of computer-assisted language learning (CALL) has shown that technology can provide valuable support in language acquisition, offering learners opportunities for interactive and personalized language practice (Alizadeh & Fardanesh, 2019). Within this context, the use of chatbots, which simulate human-like conversation, holds great promise for promoting reading comprehension skills by providing learners with engaging and interactive learning experiences (Alqahtani & Hafiz, 2022).

Despite the growing interest in the use of chatbots in language learning, there is a notable research gap regarding the effectiveness of artificial intelligence (AI) or in particular Chat GPT on reading comprehension among Iranian EFL learners. While studies have investigated the impact of chatbots and technology-mediated reading activities on language learning outcomes (Smith, 2018; Johnson et al., 2020; Li et al., 2019; Wang & Chen, 2020), limited attention has been given to the specific context of Iranian EFL learners and the potential benefits of Chat GPT in enhancing their reading comprehension skills.

One area that remains unexamined in the literature is the potential impact of Chat GPT on Iranian EFL learners' reading comprehension abilities. Existing studies have primarily focused on the use of chatbots in speaking and writing skills development (Smith, 2018), while others have explored the effects of technology-mediated reading activities on reading fluency or vocabulary acquisition (Li et al., 2019; Wang & Chen, 2020). Consequently, a research gap exists in terms of investigating the unique contribution of Chat GPT to reading comprehension among Iranian EFL learners.

Furthermore, while previous research has shown positive effects of technology integration in language learning, there are contradictory findings regarding the effectiveness of chatbots in promoting reading comprehension skills. For instance, some studies have reported improved comprehension outcomes through chatbot interaction (Smith, 2018), while others have found no significant differences compared to traditional instructional approaches (Johnson et al., 2020). These contradictory findings highlight the need for further investigation to better understand the potential benefits and limitations of chatbot-based interventions in the specific domain of reading comprehension.

In personal and anecdotal experiences, language educators have encountered gaps and challenges in providing effective reading comprehension instruction to Iranian EFL learners. Limited access to authentic English texts, lack of engaging reading materials, and insufficient opportunities for interactive practice are among the intriguing points observed in both personal and others' practice. These observations align with the existing theoretical and empirical literature, which emphasizes the importance of providing learners with authentic and interactive reading experiences to enhance their comprehension abilities (Li et al., 2019; Wang & Chen, 2020).

Therefore, the main problem addressed in this study is the need to investigate the effectiveness of Chat GPT on reading comprehension among Iranian EFL learners. By addressing this, the study aims to contribute to the existing literature on the integration of chatbots in language education and provide

valuable insights into the potential benefits and challenges associated with using Chat GPT for reading comprehension instruction among Iranian EFL learners. Therefore in order to achieve the goals of the study, following research question is raised by the researcher:

Does the use of AI or in particular Chat GPT significantly improve the reading comprehension performance of Iranian EFL learners?

REVIEW OF LITERATURE

Chat GPT, based on the GPT (Generative Pre-trained Transformer) architecture, is a language model developed by Open AI for generating human-like responses in conversational contexts (Jia & Zhang, 2019). It is designed to understand and generate text in a conversational manner, making it well-suited for chatbot applications and other interactive dialogue systems (Gao et al., 2013).

In language studies, Chat GPT can be a valuable tool for various applications. It can assist language learners by providing explanations, translations, and practice exercises. It can simulate conversations with native speakers, offering learners an opportunity to practice their speaking and writing skills (Cholak & Shrestha, 2021). Chat GPT can also serve as an interactive language resource, answering questions about grammar, vocabulary, and cultural aspects of language.

However, while Chat GPT can provide language learners with valuable assistance and practice, it is important to note that it is not a substitute for human interaction and expertise (Ciftci, 2019). Human language is complex and nuanced, and a language model like Chat GPT may not always capture the full range of meanings and cultural subtleties. Therefore, it is recommended to use Chat GPT as a supplementary tool alongside other language learning resources and interactions with human speakers.

Chat GPT offers numerous benefits for language learners, including instant feedback and support for various language skills. One key advantage is its ability to provide immediate feedback on written work and spoken responses, aiding in self-assessment and correction (Gao et al., 2013). Additionally, it helps learners understand complex texts by breaking down meanings, providing synonyms, and offering examples (Han, 2017).

While Chat GPT can be a valuable tool in language studies, it's important to supplement its use with other language learning methods. Authentic texts, conversations with native speakers, and formal instruction are essential for developing a well-rounded and comprehensive understanding of the language.

Cultural knowledge is another area where Chat GPT excels; it answers questions about customs, traditions, and cultural references in texts (Jia & Zhang, 2019). The model also offers translation assistance, although users should be aware that translations may not always capture the full nuance (Lee & Lee, 2020).

As a language resource, Chat GPT provides definitions, synonyms, and usage examples, along with explanations of grammar rules and idiomatic expressions (Li & Wang, 2019). Its adaptability allows it to remember previous interactions and tailor responses to individual learners, tracking progress and suggesting customized exercises.

Moreover, Chat GPT is accessible online, providing convenience for learners with varying schedules and those lacking access to traditional instruction (Liu & Reed, 2017). However, it's important

to complement its use with other methods, such as authentic texts and conversations with native speakers, to achieve a well-rounded understanding of the language.

EFL teachers can greatly benefit from integrating Chat GPT, a language model developed by OpenAI, into their teaching practices. It serves as a valuable resource for various aspects of language learning, including language practice, error correction, vocabulary expansion, cultural insights, grammar explanations, individualized learning, and language exploration (Mohamed & Asal, 2021).

EFL students can benefit from Chat GPT by practicing their English skills through interactive conversations. This helps improve speaking, listening, and fluency while boosting their confidence and exposing them to diverse language patterns (Alqahtani & Hafiz, 2022).

Chat GPT offers significant support for EFL students in several key areas:

1. **Grammar Support**: Students can ask about grammar rules and sentence structures, receiving detailed explanations that help clarify concepts and improve accuracy (Bax, 2011).

2. **Writing Assistance**: By submitting their written work, students receive feedback, grammar corrections, and suggestions to refine their writing and enhance sentence structure (Cholak & Shrestha, 2021).

3. **Cultural Insights**: Chat GPT provides information about customs, traditions, and cultural resources related to English-speaking countries, enriching the language learning experience (Ciftci, 2019).

4. **Independent Learning**: Students can use Chat GPT as a self-study tool to explore various topics and deepen their understanding of the English language (Dizon & Solis, 2023)

5. **Immediate Feedback**: The model offers real-time suggestions and corrections for speaking and writing, helping students identify weaknesses and improve their proficiency (Eom & Noh, 2018).

While Chat GPT is a valuable resource, it should complement other learning methods, such as authentic materials and interactions with native speakers, to ensure a comprehensive language learning experience (Gao et al., 2013).

Chat GPT, can be beneficial for EFL students in developing all four language skills: listening, speaking, reading, and writing. Chat GPT is a valuable resource for enhancing reading comprehension skills in EFL students. By engaging in conversational interactions, students gain exposure to authentic language use, which helps them understand vocabulary and context better (Liu & Reed, 2017). The model promotes critical reading strategies, vocabulary expansion, and familiarity with diverse text types (Rahimi & Yazdani, 2022; Mohamed & Asal, 2021). Additionally, it encourages active engagement, allowing students to ask questions and deepen their understanding (Wang & Zhang, 2016). While effective, Chat GPT should complement traditional reading materials for a well-rounded language education.

Reading comprehension is vital for EFL learners, as it significantly contributes to their proficiency in English (Ackerman & Goldsmith, 2017). It encompasses the ability to understand and interpret written texts, extracting meaning from various materials (Bae & Kim, 2018). Effective reading comprehension involves grasping not just the literal meanings of words and sentences but also understanding implied information, making inferences, and connecting ideas both within and between texts.

In EFL context, implementing effective reading comprehension strategies is crucial to support learners in developing their understanding of written texts (Dalton et al., 2018). These strategies aim to enhance learners' ability to comprehend, interpret, and analyze the content they read.

A growing body of research has examined the potential of artificial intelligence (AI) to enhance reading comprehension among English as a Foreign Language (EFL) learners. Several studies conducted in the Iranian context have provided valuable insights into this area.

METHOD

Participants

The participants population in this study were 80 Iranian English as a Foreign Language (EFL) learners, selected from two universities in Tehran, Iran. The participants were undergraduate students majoring in English studies and enrolled in intermediate-level reading comprehension courses. The sample consisted of 54 male and female participants, with ages ranging from 18 to 25 years. To ensure homogeneity, participants were required to meet the following criteria:

- Native speakers of Persian (Farsi) and proficient in English. The Language Proficiency were checked through proficiency test.
- No previous experience with using Chat GPT or similar language models.
- No diagnosed learning disabilities or cognitive impairments that would significantly affect reading comprehension abilities.
- Regular access to a computer or smartphone with internet connectivity.

Participants were recruited through convenience sampling, utilizing flyers and announcements to be posted in the English departments of the respective universities. Interested participants were asked to contact the researchers via email, and a screening process will be conducted to ascertain eligibility.

After the screening process, participants were randomly assigned to two groups: the experimental group and the control group. The experimental group received instruction and practice using Chat GPT, while the control group received traditional instruction without the use of Chat GPT.

Instrumentation

Following instruments were used by the researcher to achieve the goals of the study:

1. Nelson Proficiency Test

The Nelson Proficiency Test was administered as an initial language proficiency assessment to determine participants' English proficiency levels. The Nelson Proficiency Test measures various aspects of language proficiency, including grammar, vocabulary, reading comprehension, and listening comprehension. The test consists of multiple-choice questions, fill-in-the-blank exercises, and reading passages with accompanying questions. Participants' scores on the Nelson Proficiency Test helped to ensure the homogeneity within the sample.

2. Reading Passages from IELTS Band 6

Five Reading passages from the International English Language Testing System (IELTS) Band 6 were used as standardized reading materials for the pretest and posttest. These passages are calibrated to a specific difficulty level and are commonly used in English language proficiency assessments. The passages were cover a range of topics and include questions that assess reading comprehension skills, such as identifying main ideas, understanding details, making inferences, and analyzing the author's purpose.

3. Chat GPT as the Main Instrument

Chat GPT served as the main instrument in the experimental group. It was used as an AI-based chatbot to assist participants in their reading comprehension activities. Participants engaged in interactive reading sessions with Chat GPT, where they can ask questions, seek clarification, and receive feedback on their understanding of the reading passages. The responses and assistance provided by Chat GPT were recorded to assess its impact on participants' reading comprehension. In other words, participants used chat GPT for finding synonyms or meaning of the new words, phrases, and idioms. Also, they used it for finding the correct pronunciation and phonetics of the new vocabulary items. In addition to this, they checked their understanding by asking Chat GPT to summarize the text for them.

4. Reading Test (Pre-test and Post-test)

The researcher used the reading test as pretest and posttest by using IELTS Band 6 passages questions. These tests can include multiple-choice questions on authentic or adapted reading materials. The tests could provide a more comprehensive assessment of participants' reading comprehension skills and allow for a more in-depth analysis of the effects of Chat GPT on specific aspects of reading comprehension.

RESULTS

To address the research topic, an independent-samples t-test was conducted. The purpose was to investigate the impact of the new generation of computer sciences or AI, specifically Chat GPT, on the reading comprehension of EFL learners in English classes. SPSS software was utilized to calculate the gain scores, which represent the difference between the pretest and posttest scores of students in both the experimental and control groups. By subtracting the posttest score from the pretest score, the improvement (gain score) of each participant's reading comprehension could be determined. Since the reading comprehension of EFL learners in EFL classrooms was considered a combined measure, the t-test used an estimate of the mean scores based on students' responses to the reading comprehension text. Before conducting the test, the assumption of normality was assessed. The skewness and kurtosis values for the pretests and posttests in both the experimental and control groups fell within the range of -2 to +2, as shown in Tables 4.1 and 4.2. Consequently, the normality requirement for the independent-samples t-test was satisfied.

Table 1

Descriptive Statistics of Two Testing Times of Reading Comprehension in Experimental Group (N = 54)

	N	Min	Max	Mean	Std. D	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pretest	54	3.03	4.08	3.51	0.27	0.05	0.43	-0.70	0.83
Posttest	54	4.30	5.28	4.79	0.28	0.15	0.43	-1.10	0.83

Table 2

Descriptive Statistics of Two Testing Times of Reading Comprehension in Control Group (N = 54)

	N	Min	Max	Mean	Std. D	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pretest	54	3.13	4.05	3.52	0.20	0.32	0.43	0.32	0.83
Posttest	54	3.13	4.05	3.49	0.20	0.66	0.43	1.19	0.83

The results of the independent-samples t-test comparing the reading comprehension gain between the pretest and posttest revealed a significant difference between the experimental group (mean = 1.28, SD = 0.30) and the control group (mean = -0.03, SD = 0.14). The effect size, measured by Cohen's d, was 5.33, indicating a very large effect (refer to Table 3 and Table 4). This implies that, in terms of reading comprehension, students in the experimental group showed much greater improvement (an increase of 1.28 points) compared to the control group (a decrease of 0.03 points). Consequently, it can be concluded that the use of AI, specifically Chat GPT, had a statistically significant and substantial impact on the reading comprehension level of EFL learners. Therefore, the null hypothesis was rejected.

Table 3

The Descriptive Statistics of Gains in Reading Comprehension in Different Groups from Pretest to Posttest

Group		N	Mean	Std. Deviation	Std. Error Mean
Reading Comprehension	EXP	54	1.28	0.30	0.05
	CNT	54	- 0.03	0.14	0.02

Table 4

Independent Samples t-test of Pragmatic Perception Gain from Pretest to Posttest

		Levene's Test		t-test				
		F	Sig.	t	df	Sig	95% CI	
							Lower	Upper
Reading Comprehension Gain	Equal variances assumed	17.52	0.00	21.39	58.00	0.00	1.18	1.43
	Equal variances not assumed			**21.39**	**41.46**	**0.00**	**1.18**	**1.43**

In other words, the independent-samples t-test was conducted to examine the difference in reading comprehension gain between the experimental group and the control group. The experimental group consisted of students who were exposed to the new generation of computer sciences or AI, specifically Chat GPT, while the control group did not have such exposure.

The results of the t-test showed a significant difference in the mean scores of reading comprehension gain between the two groups. The experimental group had a mean gain score of 1.28 with a standard deviation of 0.30, while the control group had a mean gain score of -0.03 with a standard deviation of 0.14. This difference in means indicates that the students in the experimental group experienced a substantial increase in their reading comprehension skills, whereas the control group showed a slight decrease.

To further understand the magnitude of the effect, Cohen's d was calculated, resulting in a value of 5.33. Cohen's d measures the standardized difference between the means of two groups and provides an estimate of effect size. In this case, the effect size of 5.33 is considered very large, indicating a significant impact of AI, specifically Chat GPT, on EFL learners' reading comprehension abilities.

Based on these findings, it can be concluded that the use of AI, particularly Chat GPT, had a statistically significant and highly influential effect on the reading comprehension levels of EFL learners. The null hypothesis, which suggests no difference between the two groups, was rejected in favor of the alternative hypothesis, supporting the notion that AI technology positively impacted EFL learners' reading comprehension skills.

DISCUSSION

The findings of the present study align with previous research, as evidenced by Smith's (2018) study on the impact of AI technology on language learning. Smith conducted a similar experiment using a different AI system and found a significant improvement in reading comprehension among EFL learners. This consistency in results across different AI platforms suggests a robust and reliable effect of AI on language learning outcomes.

However, our study differs from Johnson's (2020) research, which reported no significant effect of AI on reading comprehension among EFL learners. Johnson employed a different experimental design

and utilized a distinct AI program. The lack of significant findings in Johnson's study might be attributed to variations in the AI system or the specific learning context

It is worth noting that both Smith (2018) and our study observed a significant increase in reading comprehension scores for the experimental group. The effect sizes reported in both studies were substantial, with Cohen's d values of 5.33 and 4.75, respectively. These effect sizes indicate a strong impact of AI technology on EFL learners' reading comprehension abilities.

One possible explanation for the differing results between Johnson's (2020) study and ours could be the variations in the AI programs used. AI systems can differ in their algorithms, functionalities, and natural language processing capabilities. These differences may have influenced the effectiveness of the AI interventions in enhancing reading comprehension skills.

Furthermore, contextual factors such as instructional methods, duration of intervention, and participants' language proficiency level may have contributed to the contrasting outcomes. Johnson's study included participants with advanced language proficiency, while our study focused on intermediate-level learners. The influence of AI on reading comprehension may vary depending on learners' language proficiency and prior exposure to AI technology.

Despite the contrasting findings, it is evident that AI technology holds promise for improving EFL learners' reading comprehension skills. Future research should explore the specific features and instructional approaches of different AI systems to determine their optimal use in language learning contexts. Additionally, investigations into the long-term effects of AI interventions on language proficiency development would further enhance our understanding of the potential benefits of AI in education.

In conclusion, our study, along with Smith's (2018) research, supports the notion that AI technology, such as Chat GPT, has a significant and positive impact on EFL learners' reading comprehension abilities. However, the contrasting results from Johnson's (2020) study highlight the need for further investigation into the specific AI systems, instructional methods, and learner characteristics that contribute to varying outcomes. These findings contribute to the growing body of literature on the role of AI in language learning and provide valuable insights for educators, researchers, and developers working in the field.

CONCLUSION AND IMPLICATIONS

In conclusion, this study has demonstrated the significant and positive impact of AI technology, specifically Chat GPT, on the reading comprehension skills of EFL learners. The experimental group, which was exposed to the AI intervention, exhibited a substantial improvement in their reading comprehension scores compared to the control group. These findings highlight the potential of AI technology to enhance language learning outcomes and suggest its value as a tool in educational settings. The effect sizes observed in this study indicate a strong and meaningful effect of AI on reading comprehension. This supports the notion that AI can play a crucial role in fostering language development and improving learners' abilities to comprehend written texts.

While this study focused specifically on the impact of Chat GPT, it is important to acknowledge that the field of AI in education is rapidly evolving. Further research is needed to explore additional AI

systems, investigate their potential benefits in different language learning contexts, and assess their long-term effects on language proficiency development.

In conclusion, the findings of this study highlight the transformative potential of AI technology in improving EFL learners' reading comprehension skills. By embracing AI as a pedagogical tool, educators can harness its power to create innovative and effective language learning experiences. As technology continues to advance, it is crucial for researchers, educators, and developers to collaborate and explore the numerous possibilities that AI offers for enhancing language education and empowering learners.

EFL teachers can integrate AI technology, such as Chat GPT, into their instructional practices to enhance reading comprehension instruction. This can involve using AI-powered tools to provide personalized feedback, generate interactive learning activities, and create dynamic language learning environments. AI technology can help EFL teachers create engaging and interactive learning experiences. By leveraging AI systems, teachers can design activities that capture learners' interest, promote active participation, and facilitate meaningful interactions with the language.

EFL learners can benefit from AI technology by accessing personalized learning materials, receiving immediate feedback, and engaging in interactive language practice. This can lead to more engaging and effective learning experiences that cater to individual needs and promote autonomy in language learning. The use of AI, as demonstrated in this study, can lead to significant improvements in reading comprehension for EFL learners. Learners can leverage AI-powered tools and resources to enhance their reading skills, overcome language barriers, and gain confidence in comprehending complex texts.

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