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Research Paper

Investigating the Impact of Face-to-Face vs. Computerized Instruction via Reading and Learning Strategies on Iranian Intermediate EFL Learners' Reading Comprehension

*Mohadese Golkoobi[1], Abbas Pourhosein Gilakjani[*1]*

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Abstract

This study investigated the impact of face-to-face vs. computerized instruction via reading and learning strategies on Iranian intermediate EFL learners' reading comprehension. The sample of this study included 80 female EFL learners from Safir Language Institute in Rasht, Iran. Following a preliminary English test, 60 intermediate language learners were randomly divided into two groups of 30 to conduct the research. Both groups were given a reading comprehension test as a pretest prior to the treatment. Then the treatment began, the experimental group received computerized instruction, whereas the control group used reading and learning strategies through face-to-face instruction. Finally, at the end of treatment, learners in both groups were given another reading comprehension test as a posttest to see if there were any differences in the level of reading comprehension skill. The data were then statistically analyzed using descriptive statistics, independent sample t-test, and Paired sample t-test. The findings revealed that there is a significant difference between the experimental group and the control group in terms of preferences for language learning strategies in the post-test. That is, the participants in the experimental group outperformed those in the control group in language learning strategies on the comprehension of intermediate level Iranian English language learners.

Key Words: Face-to-face instruction, Computerized instruction, Learning strategies, Reading comprehension

[1]- Department of English Language Translation, Lahijan Branch, Islamic Azad University, Lahijan, Iran. Corresponding Author: abbas.pourhossein@yahoo.com

Introduction

The advent of online education has made it possible for students with busy lives and limited flexibility to access quality education. Unlike traditional classroom teaching, computer-based instruction has made it possible to deliver classes worldwide through a single Internet connection. Although computer-based instruction has several advantages over traditional education, it still has its disadvantages, including limited social synergy. However, this seems to be the path many students take to get their degree. Traditionally, classroom instruction is known as teacher-centered and requires passive learning by the student, while online instruction is often student-centered and requires active learning (Salcedo, 2010).

Despite all the current reports supporting online education, researchers still question its effectiveness. Research is still ongoing on the effectiveness of computer-assisted teaching. Cost-benefit analysis, student experience, and student performance are now carefully considered when determining whether online education is a viable alternative to classroom teaching. This decision process will continue in the future as technology advances and students demand better learning experiences**.** Some studies favor traditional classroom instruction, stating online learners will drop out more easily and tat online learning lacks feedback for students and instructors (Atchley, Wingenbach, & Akers, 2013). Because of these deficiencies, student retention, satisfaction, and performance can be compromised. Like traditional teaching, distance learning has its detractors who believe that online education produces students who perform better than their traditional classroom counterparts (Westhuis, Ouellette, & Pfahler, 2006).

The pros and cons of both instructional methods must be fully identified and explored to truly determine which medium produces better student performance. Both methods have been proven to be fairly effective, but the question to ask is, is one really better than the other? Thus, the present study tries to check whether using face-to-face or computerized instruction through reading and learning strategies can have any effects on Iranian intermediate EFL learners' reading comprehension. Learning difficulties are considered a persistent condition and are assumed to be caused by neurological factors that interfere with the growth of verbal and nonverbal abilities. This condition varies in appearance and severity ad affects a person's self-esteem, education, social adjustment, and daily life activities. Reading is not just decoding written codes, but a complex process that requires understanding, linking, inferring, evaluation, problem-solving, and critiquing what has been read. Reading comprehension involves the complex process of acquiring meaning from the read text (Saifullah, 2021). Students' reading comprehension improves when teachers are interactive, ask questions about text structure, link texts to background knowledge, and engage students in asking questions (Ukrainetz, **2015).**

However, reading in English can be difficult for EFL learners as it is more complicated than reading in their naïve language (Fitzgerald & Graves, 2005). This is problematic for the success of reading comprehension, as it is more

difficult for teachers to offer guidance and support and they cannot easily access the reader's thoughts (Safadi & Rebabah, 2012). In order to provide effective reading instruction, teachers must ensure that reading activities remain the primary focus during the development of reading skills. Teachers should regard reading as the core skill to develop, but then build the skills and knowledge to teach reading effectively (Anderson, 2013). Reading comprehension skills are challenging for many students worldwide and have been attributed to various factors such as having low or poor inference making skills, vocabulary, low motivation, and grammatical boundaries (Anastasiou & Griva, 2009; Elbro & Buch-Iversen, 2013), and poor critical thinking skills (Mohseni, Seifoori, & Ahangari, 2020).

Most of the difficulties that students face while reading are lack of motivation, vocabulary knowledge, proficiency, and strategy use (Jayanti, **2016; Wang, Jia, & Jin, 2020). Moreover, these problems in reading can affect** students' reading performance and prevent them from gaining deep understanding (Sheorey & Mokhtari, 2001). Therefore, a good way to improve reading comprehension for a good reader is to use reading strategies for students. Other factors affecting reading comprehension problems are the difficulty of the material, the environment, and the students' reading technique. Moreover, teaching strategies in reading comprehension are important in the learning process and could affect students' reading comprehension. Brown (2004) has noted that teaching strategies can facilitate teaching reading to implement a variety of teaching methods and techniques.

However, teaching reading skills can pose significant challenges for educators at various educational levels. Bosuwon and Woodrow (2009) observed that EFL learners are less exposed to the English language and therefore not exposed to the output of written texts to enhance and develop their reading skills. Empowering students to better approach their language learning can overcome this problematic situation, and it is important that teachers know how to achieve this; such as setting learning goals and tasks that shift the focus from teacher to student and utilizing technology. The integration of technology in language instruction and learning has been done by many teachers in a principled way (Whittaker, 2014), however, the variety of specific forms of technology available are numerous, and particular choices for which technology is suitable should depend on the uniqueness of a learning environment.

This study attempts to compare the effectiveness of face-to-face vs. computerized instruction via reading and learning strategies in the improvement of Iranian intermediate EFL learners' reading comprehension. For this purpose, the following research question was proposed:

Is there a statistically significant difference in the reading comprehension of Iranian intermediate EFL learners in the face-to-face instruction compared to those in the computerized instruction via reading and learning strategies?

To fulfill the purpose of the study practically through the above mentioned research question, the following null hypothesis was considered:

H_0: There is not any statistically significant difference in the reading comprehension of Iranian intermediate EFL learners in the face-to-face

instruction compared to those in the computerized instruction via reading and learning strategies.

Review of the Related Literature

Reading Comprehension

Reading English as a foreign language used to be considered a passive process. It was conceived a decoding process to reconstruct the author's intended meaning by recognizing printed letters and words and constructing meaning for a text from the smallest textual units at the bottom, which are letters and words, to the larger units at the top such as phrases, sentences, and clauses (Carrell, 1998; Gamboa-González, 2017). Second language reading and comprehension problems were primarily considered decoding problems. Furthermore, Carrell (1998) explains that before 1970, the process of reading in a foreign language was seen as an attachment to oral language skills. The audio-lingual approach implemented in the 1970s downplayed the importance of reading skills and dictated the superiority of listening over others, and the importance structuralists give to the grapheme and phonemes is responsible for implementing the decoding view in second language reading.

Some other authors have different views on the process of reading in a foreign language (Dechant, 1991; Gamboa-González, 2017; Grabe, 1998; Hock, Brasseur-Hock, & Deshler, 2015; León & Escudero, 2015). In the 1980s, the accepted theories about reading as a decoding process significantly changed. The process of reading was not merely the extraction of information from texts, but a process in which reading activates a range of knowledge in the reader's mind that he uses, and may in turn modify and expand with new information that the text provides (Grabe, 1998). Dechant (1991) stated the other view of the reading process. She expressed that reading is a process for success in school; it is the key to developing interests outside of school, enjoying leisure time, and personal and social adjustment. Effective reading is the most important way to effective learning, reading is so essential to the entire educational process that academic success needs successful reading.

Reading comprehension is an intentional, active, interactive process that occurs before, during, and after a person reads a particular text. The act of reading is not complete without understanding because it is one of the pillars of reading. León and Escudero (2015) stated that reading comprehension requires the creation of a mental representation of a text by the reader through establishing a causal relationship based on the ideas and events of the text. On the other hand, Hock, Brasseur-Hock, and Deshler (2015) describe reading comprehension as a process in which text-based knowledge makes sense to the reader. In this process, the reader creates a mental image of the context of the text using the features of the text and the reader's understanding of the world.

Reading and Language Learning Strategies

According to Barron (1981), reading strategies are readers' mental procedures for performing a reading task. Reading strategies are a series of actions that the reader takes to understand their reading process. Brevik and

Gunnulfsen (2013) defined reading strategies as procedures used by students to improve reading comprehension. They added that reading comprehension can be attained if students use effective reading strategies well. Reading strategies include skimming, scanning, and inferring key concepts such as stimulating schemata, identifying text structure, using mental images, predicting, asking questions, monitoring comprehension, and evaluating strategies used (Maslawati et al., 2015; Rehman, Khan, Almas, Mohamad, & Ismail, 2020). These strategies are divided into three stages, which are pre-reading strategies, while-reading, and post-reading strategies. Some authors have highlighted the importance of teaching reading strategies to facilitate reading comprehension in a foreign language (Arismendi Gómez, Colorado López, & Grajales Marin, 2011; Grabe, 2007).

The process of reading in a foreign language is a matter of creating effective strategies for comprehension. Since reading strategies are chosen, controlled, and applied by readers, they must develop their metacognitive awareness or skills. The definition of metacognitive awareness is that the reader can allocate attentional resources to determine whether comprehension is happening, reading aims are being achieved, and linguistic resources can contribute to comprehension (Grabe, 2007). Therefore, metacognition is very important in reading because it involves the reader's knowledge of different strategies he can use and control and adjust his actions depending on his purpose of reading a text. Metacognitive and cognitive strategies in L2 reading are seldom developed by the reader alone, he needs explicit instruction from the teacher. Teachers should pay more attention to the comprehension process while students are reading, rather than to processing the text after students have finished their reading (Arismendi Gómez, Colorado López, & Grajales Marin, 2011; López & Giraldo, 2011).

Reading is strongly emphasized in conventional L2 teaching, so teachers should teach students reading strategies so that they can equip themselves to explain what they have read, relate their reading comprehension to the reading materials. Teachers should develop students' personal cognitive tools or strategies that are necessary for students to increase their attention in reading, and increase their memory. Teachers should teach students how to use these personal cognitive tools and reading strategies. When students use appropriate reading strategies, their reading comprehension and learning performance can improve (Maslawati et al., 2015; Rehman, Khan, Almas, Mohamad, & Ismail, 2020).

Reading strategies are complemented by language learning strategies. Some authors have provided definitions and classifications for learning strategies (O'Malley & Chamot, 1990; Oxford, 1990). The definition proposed by Oxford (1990) as steps used by students to enhance their learning is important for language learning because they are tools for active, self-directed participation that are essential for developing communicative competence. Using language learning strategies as defined by Oxford (1990) helps improve students' self-confidence and these reading strategies helps the learner to use a learning strategy to solve problems when trying to understand a text.

Computer Assisted Instruction (CAI)

Computer-assisted instruction refers to a computer-assisted self-learning method in which instruction employs instructional techniques that are monitored to meet the particular needs of students (Cotton, 2008). Computer Assisted Instruction (CAI) is an instructional technique in which students are taught by a computer and the computer contains a stored instructional program designed to inform, guide, control, and test students until they reach a certain level of proficiency (Audu & Agbo, 2010; Usman & Madudili, 2020). CAI is an interactive instructional technique whereby computers are used to deliver instructional materials and monitor learning. CAI now provides the possibility of deploying of an extensive, informative, and evaluative content through a variety of high-quality virtual materials (texts, videos, graphics, audios) pertinent to specific subjects. CAI is a self-learning technique that is usually off-line or online using a computer as a tool to facilitate and improve instruction. CAI is a type of instruction that uses a computer-controlled display and a response entry device that combines text, graphics, audio, and video to enhance the learning process through interaction, to achieve specific instructional goals, and improve educational results (Eyo, 2018).

Face-to-face Instruction

Face-to-face education is essentially offered in physical spaces (classrooms, laboratories, libraries, and computer rooms) where the teacher has direct contact with the students. Usually, he establishes objectives, plans activities, prepares resources, delivers the session and assesses students. Verbal communication is integral to this modality thus students are provided with a great many opportunities to develop their oral communication skills in the classroom (Arismendi Gómez, Colorado López, & Grajales Marin, 2011). According to Galindo (2002), the main characteristics of face-to-face education are the presence of the teacher in front of the students in a room ensuring greater interaction, the time and location are defined, the content of the course consists of notes prepared by the teacher to present and discuss in class and the theoretical basis of instruction can be behaviorism, cognitivism, constructivism or a combination of these.

Previous Studies

Computer-based systems present distinct advantages over traditional classroom instruction. First, they may provide more required instruction and opportunities for practice and a broader set of examples than a student would encounter in the classroom. Second, technology allows students to have control over the learning process in terms of pace, sequencing, instructional content, or feedback, which can enhance student engagement and learning expectations (McNamara, 2010; Serrano-Mendizábal, Villalón, Melero, & Izquierdo-Magaldi, 2023). The other advantage of computer-based systems that explains their effectiveness is the ability to accurately record learners' actions and provide timely and appropriate feedback (Morgan et al., 2020). Finally, there is

also a motivational element that supports the use of technology for learning (Vogel et al., 2006). All these opportunities that technology offers have fueled the development of computer-based systems for teaching and learning complex skills.

Studies investigating the impact of technology on developing EFL learners' reading comprehension skills started concurrently with the spread of technology. Researchers and educators are constantly discovering new technologies that may improve literacy and reading comprehension skills for EFL learners. According to Bensalem (2020), the integration of CALL in EFL reading instruction can have positive implications in terms of enhancing and improving the reading skills of learners. Keezhatta and Omar (2019) investigated the use of digital technologies in enhancing the motivation of struggling EFL learners in Saudi secondary schools. The students were randomly divided into two groups: experimental and control. The results revealed that the digital systems provided a motivating learning environment for L2 reading, which in turn has positive implications for improving the reading skills of students.

Previous empirical studies related to the application of computers have shown that interactive computer software, computer-assisted programs, online instruction, and online dictionaries have been used widely to teach reading comprehension (Houselog, 2019). Beek, Brummer, Donker, and Opdenakker (2018) examined the efficiency of providing both cognitive and metacognitive scaffolds in computer environments regarding students' reading comprehension. Findings showed that scaffolds in computer environments had a positive impact on reading comprehension. Moreover, Horne (2017) investigated the effect of a computerized reading comprehension program on the reading comprehension of primary age poor readers. The results indicated that computerized reading programs can have a positive impact on improving reading skills, and these programs are useful for learners with reading problems in disadvantaged areas, where resources are limited and family support in reading is lower. In another study, Hassan et al. (2017) investigated the impact of computer-assisted language learning and mobile-assisted language learning on EFL reading comprehension. The posttest results of reading comprehension achievement test showed that the experimental group performed better than the control group.

Some researchers believe that face-to-face instruction is a better way than computerized instruction, for example, Walstrom (2014) demonstrated students in the traditional course were more satisfied with the course than online students, but this was not statistically significant. Students in the online course found that the exams were more relevant to the course. Butcher, Epps, and Cleaveland (2015) discovered students in a traditional course more strongly perceived increased critical thinking skills and class discussion as a factor in understanding course material than did online students. Furthermore, Cater, Michel, and Varela (2012) demonstrated that students in traditional classrooms outperformed students in online classrooms on three course tests. The

researchers suggested this occurred because face-to-face interaction is the richest form of communication.

In a more recent study, Macaruso et al. (2019) used the Core5 program to study disadvantaged students longitudinally. Students began the program in kindergarten and tracked their reading scores until the end of the second grade. The results confirmed the effectiveness of the online development program. Students using the developmental program showed significant improvement in reading in the standard test compared to the control group members. Additionally, Beach et al. (2021) implemented an intervention in foundational reading skills. This reading intervention was delivered in a virtual format and involved 15–21 h of synchronous instruction with groups of two or fewer students. During this remote intervention, students improved their performance in reading skills. Finally, Akbari et al. (2021) investigated the impact of virtual teaching on learners' reading comprehension and found that online teaching is the most effective means of teaching reading comprehension, followed by hybrid presentation method and then traditional face-to-face instruction. Some other researches have been carried out in Iran (Eslami & Bahrami, 2022; Ghazizadeh & Fatemipour, 2017; Kheirzadeh & Birgani, 2018; Rad, 2018; Zahedi & Tabatabaei, 2015), the researchers examined the effect of blended instruction of reading comprehension on the learners' improvement in reading comprehension. All studies showed positive results.

Overall, the literature indicates that CBI of reading significantly gives better results in terms of EFL learners' reading skills when compared to the traditional educational reading methods. Review of the previous literature also indicates that some points are still unanswered. Some studies have only combined the online mode, and others have combined the conventional and online modes. What seems to be lacking here is the fact that none of the previous researchers tried to investigate the impact of face-to-face vs. computerized instruction via reading and learning strategies on Iranian intermediate EFL learners' reading comprehension. Therefore, to ensure the effect of using face-to-face vs. computerized instruction in the Iranian EFL context for teaching reading comprehension skills, it is worth a full investigation of the issue and this study attempted to fill this gap in the literature.

Methodology

Research Design

This study used a quasi-experimental non-equivalent intact group design, since random assignment could not be possible as one of the main components of experimental designs due to the pre-planned schedules at Safir Language Institute in Rasht, Guilan, Iran. This design tended to be inferior to randomized experiments with regard to internal validity; however, the researchers employed triangulation of data to account for this deficiency. However, the researchers took remedial alternatives to alleviate some of the problems accompanying the design. The pretest-treatment-posttest design was utilized to assess the possible impacts of the intervention of participants by analyzing the difference between the pretest and posttest scores of the participants. It is important to have both a

treatment group who received the intervention and a control group who received the "business-as-usual" condition to achieve the true results of the intervention. Having these two groups allowed the researchers to monitor other potential factors that are not relevant to the intervention.

Participants

Sixty female intermediate EFL learners participated in this study. All participants were 14 to 20 years of age and studied at Safir Language Institute in Rasht, Guilan, Iran. Based on their outcome in the Preliminary English Test (PET), the participants were chosen from a pool of 80 to ensure homogeneity. Therefore, a total of 80 students took PET and, among them, 60 EFL students who obtained the scores within the range of 45-69, were recognized as being at the intermediate level and selected as the study participants.

Instruments

The following two research instruments were used to explore the research question and collect the data.

Preliminary English Test

The present study was conducted with 60 EFL university students chosen out of 80 students based on their language proficiency test scores. A sample of the Preliminary English Test (PET) adapted from "Objective PET" by Hashemi and Thomas (2010), Cambridge University Press, was administered to evaluate the participants' general English proficiency level. PET is one of the standardized Cambridge ESOL tests in the series. It is an exam for individuals at an intermediate level that can use written and spoken English every day.

Reading Comprehension Test

Two reading comprehension tests, before and after the treatment, were administered to the participants to determine comprehension of content knowledge. The tests were derived from the web (*www.usingenglish.com*) and each one consists of 30 (true/false, multiple-choice, and gap fill) questions. There was one score for each participant, and the maximum achievable score will be 30 to estimate the reading comprehension of the participants. After doing each reading test, the scores were collected. The mean scores of the participants in each group were measured and served as the scores for reading comprehension. An Associate Professor in TEFL was requested to modify the test items to be more appropriate and content-based to determine content validity.

Data Collection Procedure

This research was performed within the framework of a reading course that meets once per week for 45-minute class periods over a 10-week semester in spring 2021. Before the treatment procedure, the pretest of reading comprehension was administered for both groups. Then, the reading course via reading and learning strategies was introduced with the goal of enhancing

students' general English reading comprehension. To ensure students' full participation, they were told that performing this reading activity is part of the course requirements. Participants were able to return to previously studied pages as much as they chose.

More specifically, participants in the experimental group received treatment in computerized instruction, while the control group used face-to-face instruction to learning reading comprehension practices. In each group, after a brief orientation on reading and learning strategies, participants were advised on how to use the text framework and asked to read the text independently in front of a computer in the computer lab to display the document (for the experimental group) or in the class (for the control group).

Thus, the reading course was given in eight 45-min sessions. No attempt to teach reading comprehension was applied during class hours, but students were free to take notes and promote asking questions at any time during the computer operation. Appropriate levels of assistance were given by the researchers in a timely manner, so as to help solve any possible technical or operational problem. To prevent students from using the other unrelated tools without focusing on the task, the researchers tracked students' learning process all the time and modified the intervention accordingly. Participants read the expository text until they feel confident that they could answer text-based questions to test their reading comprehension. After that, all of them were asked to complete the posttest of reading comprehension. The schematic representation of the procedure is shown in Figure 1.

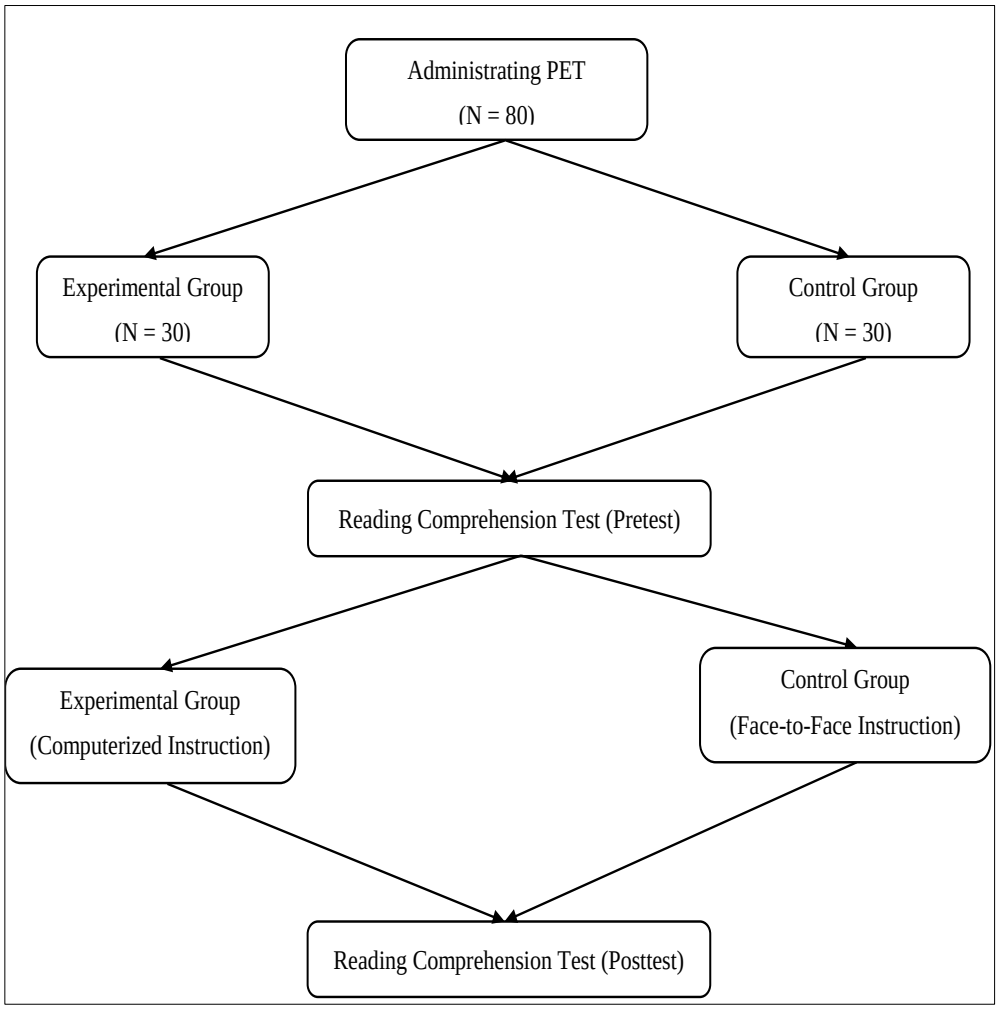

Figure 1 - The procedure of the study

Data Analysis

Two independent-samples t-tests were used to compare the means of the two groups based on the pre and posttest scores. Descriptive statistics (mean, frequency, and standard deviation) were utilized to summarize the collected data. The collected data in this study were evaluated by version 25 of the Statistical Package for Social Sciences (SPSS). The time lapse between pretest and posttest was eight weeks. Thus, the graphical approach to descriptive statistics (the bar-graph) was utilized to diagrammatically show the numerical datasets by a number of bars vertically. Second, the dispersion of the scores or variability (standard deviations, degrees of freedom, and variances) was calculated so as to see how much variation there will be from the mean. Finally, the inferential statistics, namely an independent-samples t-test, a paired samples t-test, and the Levene's test were executed (using the SPSS software) to compare the participants' mean scores as well as to determine not only the

possible differences between the two groups, but also to answer the research question and reject or retain the null hypothesis of the study.

Results

The nature of the research hypothesis required that the obtained data be analyzed using descriptive and inferential statistical methods. The descriptive statistics were used for sorting, displaying, and describing the data and included the calculation of simple statistical contributes such as the measures of central tendency including "mean." On the other side, the data were interpreted via implementing the inferential statistics which consisted of calculating independent-samples t-tests for showing the possible difference between the means of the tests of this study, also analyzing separately the covariance coefficient between the pretest and posttest scores of the two groups of the study.

The Descriptive Analysis of the Data

Before analyzing the results of the main study, the statistics of PET is presented. Total of 80 students took the test and 60 participants whose scores were between 45 to 69 were selected. Table 1 shows the descriptive statistics analysis for PET.

Table 1. ***Descriptive Statistics Analysis for PET***

N	Valid	60
	Missing	0
Mean		51.11
Std. Error of Mean		1.117
Median		49.50
Mode		49
Std. Deviation		9.989
Variance		99.772
Skewness		.139
Std. Error of Skewness		.269
Kurtosis		-.381
Std. Error of Kurtosis		.532
Range		51
Minimum		25
Maximum		76
Sum		4089

Table 1 showed the results of group statistics and numerical information for the PET scores which was administered for selecting homogeneous sample out of 80 participants. The obtained data from PET scores were collected from participants, with a mean of (51.11) and standard deviation of (9.989). Thus, 60 students were divided in two groups and participated in the pretest to evaluate

their initial knowledge of reading comprehension. The findings of the pretest are summarized in Table 2. Figure 2 depicts the differences in pretest means between the experimental and control groups.

Table 2. ***Descriptive Statistics of the Pretest Scores***

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Control Group	30	14	23	17.23	2.473	6.116
Experimental Group	30	13	22	17.37	2.282	5.206
Valid N (listwise)	30					

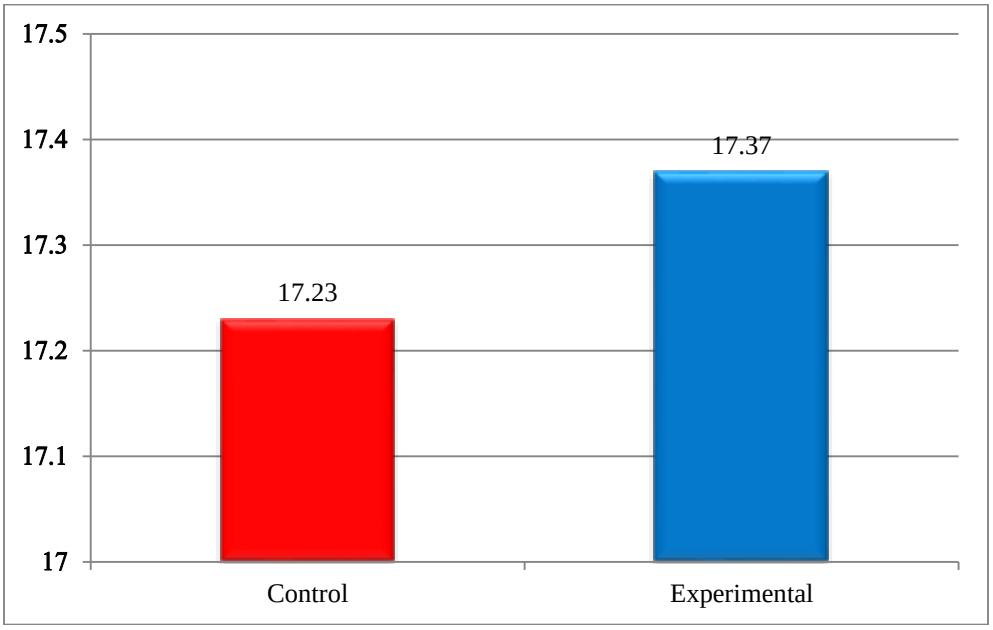

Figure 2 - The means plot for the pretest means of the study groups

As shown in Table 2, the experimental and control groups' scores in the pretest were very close to each other. Furthermore, it can be seen that the participants' performance on the tests was uninspiring. Finally, at the end of the study, the participants took the posttest. The posttest results were entered into the SPSS data view tab. The posttest data are shown in Table 3. Figure 3 shows the differences in the means of the posttest scores between the experimental and control groups.

Table 3. ***Descriptive Statistics of the Posttest Scores***

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Control Group	30	15	25	18.17	2.679	7.178
Experimental Group	30	20	28	24.17	1.895	3.592
Valid N (listwise)	30					

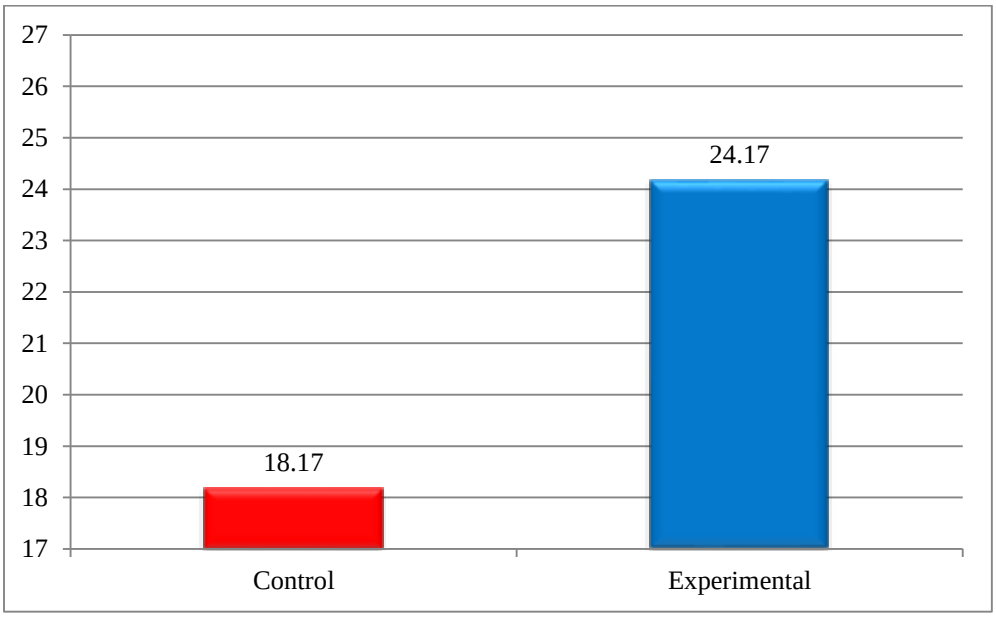

Figure 3 - The means plot for the posttest means of the study groups

As shown in Table 3, the experimental group's mean score in the posttest was higher than the control group. It means that learners who used metacognitive strategies in their treatment procedure had better scores than the control group, and as a result, they performed better on the posttest.

The Inferential Analysis of the Data

Before conducting the study, it was necessary to validate the survey's content. Therefore, the study questionnaire was given to 5 TEFL professors to review and evaluate them to ensure the validity of their content. As such, for each of them, the Alpha value of the Cronbach was calculated to ensure their internal reliability. The results showed that the Cronbach alpha value was 0.791 exceeding 0.7 for the questionnaire, which indicates that the questionnaire is reliable. At the beginning, the one-sample Kolmogorov-Smirnov test was

utilized to test if the samples came from a particular distribution. In other words, we can use this technique to determine if the samples come from a population that is normally distributed. The result of the one-sample Kolmogorov-Smirnov test is shown in Table 4.

Table 4. ***One-Sample Kolmogorov-Smirnov Test***

		Global Strategies	Problem Solving Strategies	Support Strategies
N		30	30	30
Normal Parameters[a,b]	Mean	3.6074	3.9182	3.7778
	Std. Deviation	.30636	.53081	.47321
Most Extreme Differences	Absolute	.122	.105	.226
	Positive	.122	.105	.226
	Negative	-.074	-.061	-.126
Test Statistic		.122	.105	.226
Asymp. Sig. (2-tailed)		.200[c,d]	.200[c,d]	.204[c]

In Table 4, the value Asymp. Sig (2-tailed) for all metacognitive strategies was 0.2, 0.2, and 0.204, respectively. So, it can be said that the probability value (p) of the data was higher than (0.05), and the data are normally distributed. After examining the normality assumption, to answer the research question, the results of reading comprehension test were evaluated by independent sample t-test, and paired sample t-test. First of all, an independent-samples t-test was used to determine whether there is a statistically significant difference between the pretest scores of the control and experimental groups. Thus, the results of the independent-samples t-test for the pretest scores of both groups are shown in Table 5 below.

Table 5. ***Results of the Independent-Samples T-Test Reported for the Pretest Scores***

		t-test for Equality of Means								
Levene's Test for Equality of Variances		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest Scores	Equal variances assumed	.072	.790	-.217	58	.829	-.133	.614	-1.363	1.096
	Equal variances not assumed			-.217	57.627	.829	-.133	.614	-1.363	1.097

As shown in Table 5, the two-tailed sig of the test is "0.829," which is much higher than the assumed p value of "0.05," implying that there is no significant difference between the groups. As a result, by considering that there was no significant difference between the two groups, each group received specific treatment to learn reading comprehension. Then, another independent-samples t-test was conducted between the posttest scores for the control and experimental groups to demonstrate the differences between them at the end of the process. The outcome of the independent-samples t-test for the posttest is shown in Table 6.

Table 6. ***Results of the Independent-Samples T-Test Reported for the Posttest Scores***

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest Scores	Equal variances assumed	2.542	.116	-10.014	58	.000	-6.000	.599	-7.199	-4.801
	Equal variances not assumed			-10.014	52.211	.000	-6.000	.599	-7.202	-4.798

As revealed in Table 6, the two-tailed sig of the test is "0.000," which is significantly less than the predetermined p value of 0.05. As a result, it is possible to conclude that there is a significant difference between the groups. In another sense, the value of T is "-10.014," which is less than the critical value (-.1.96). As a result, the study null hypothesis is rejected, and it is possible to conclude that the treatment was effective. Following that, paired-samples t-tests were run between the pretest and posttest scores of both groups in an attempt to measure the amount of progress they made over the course of the study. The result of the paired-samples t-tests is presented in Table 7.

Table 7. ***Results of the Paired-Samples T-Test Reported for the Experimental and Control Groups***

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control Group	-.933	1.230	.225	-1.393	-.474	-4.157	29	.000
Pair 2	Experimental Group	-6.800	1.789	.327	-7.468	-6.132	-20.821	29	.000

As depicted in Table 7, the two-tailed sig reported for statistical significance of the mean difference of the two groups of experimental and control is lower than the predetermined amount of p value, which is 0.05. As a result, it is possible to argue that there is a statistically significant difference in the participants' level of reading comprehension before and after the tests in both groups separately. The implication is that both groups made significant progress over the course of the study, though the experimental group gained more than the control group.

Discussion

The purpose of this study was to determine whether computerized or face-to-face instruction via reading and learning strategies can help Iranian intermediate EFL learners to improve their reading comprehension skill. It was indicated that the students in the computerized instruction group performed better than the F2F group. In other words, the scores of students in the computerized instruction group were higher than the F2F group. Online learning techniques seem to improve students' reading comprehension ability. One of the possible explanations for this can be the use of new educational methods in computerized instruction that attract the attention of students. The results of data analysis revealed that there is a significant difference between face-to-face instruction and computerized instruction via reading and learning strategies on the comprehension of intermediate level Iranian English language learners. According to the results obtained from the paired sample t-test of the experimental group, the mean score of the posttest of the experimental group is much higher than their mean score on the pretest. Therefore, the treatment had a good effect on learners' performance in the computerized instruction environment. That is, the experimental group that used computerized

instruction had better performance in the posttest than the control group that used face-to-face instruction. This result is in line with the findings of Maloney et al. (2015) who found that using online learning platforms are more effective than using face-to-face learning.

The analysis of the data emphasized that the implementation of technology-mediated reading comprehension strategies does have a statistically significant impact on improving Iranian intermediate EFL learners' reading comprehension. The results of the study can be explained by the fact that when technology is incorporated in the classrooms instructors can present information in multiple formats, consequently it allows learners to experience different learning styles (Karakaya, Ainscough, & Chopoorian, 2001; Mehri & Tavakoli, 2020) and it can also lead to deeper learning. The results of this study also confirmed the results of study conducted by Chang, Lan, Chien, Chang, and Sung (2010) on the efficacy of using mobile devices to help teachers in strategy instruction and increasing interaction among Chinese learners in reading comprehension.

In line with Wang and Reeves (2007) and Akbari, Heidari Tabrizi, and Chalak (2023), it was found that undergraduate intermediate EFL learners' reading comprehension can be significantly affected by a synchronous virtual learning environment. The researchers found that since Internet-based learning has increased, the number of students in online learning opportunities is increasing. Due to the increased accessibility of online learning, students from all backgrounds and geographic locations may access online settings. A flexible way for learners with intensive schedules is to expose themselves to online learning opportunities. Teachers must provide the right conditions for learners to succeed throughout the semester. In line with Akbari, Heidari, and Chalak (2020) and Akbari, Heidari Tabrizi, and Chalak (2023), instructors should provide the support students need and the environment should be comfortable throughout the experiment. Support can be through peers or through a coach. Not only the teacher but also other students can help in the learning process. Students in the experimental group, trained via computer and mentored throughout the semester, made more progress than the other class.

Akbari, Heidari Tabrizi, and Chalak (2021) conducted a research study on the effect of online vs. traditional teaching on enhancing Iranian undergraduate EFL students' reading comprehension ability. The three main groups were selected from students who were studying English translation. They involved a control class, an experimental group, and a mixed group. According to the findings of the research, the experimental group that was taught through technological devices during the semester, made more progress than the other two groups. The result of this study is compatible with Zakiyuddin, Mustofa, and Yunus's (2022) previous study in which they found that there was a difference in the reading comprehension scores of students using inquiry-based computer aid compared to those who did not use it. Many features of technology often improve students' learning outcomes because they have their own skills. The other study by Primasari (2019) represented that computer-assisted language learning can impact learners' reading comprehension in the computer

engineering study program. Other studies that assess students' preferences for online vs. face-to-face learning show that students prefer online instruction when delivered online, depending on the course topic and technology platform (Ary & Brune, 2011).

Similar positive results like being able to stay at home, a friendly environment at home, and being able to access online materials were observed in a study carried out with Polish medical learners (Biasutti, Philippe, & Schiavio, 2021). These benefits can help create courses tailored to the needs of certain categories of students. In this way, students are given the opportunity to complete learning tasks at their own pace that permits them to consider them critically. This finding is consistent with previous studies (Bakhtiyarovna, 2021; Bozorova & Salixova, 2021; Tavakoli & Loth, 2021) which confirmed that the correct use of computer-based reading can improve students' reading comprehension. In addition, the results of our research are in line with Ismail and Rahmat (2020), who indicated that the use of Moodle e-learning has a significant effect on the development of students' reading comprehension. The results of the current study also confirm those of Schutte (1999), which indicates that students who are trained in multimedia classes are more successful than students who are trained in traditional classes.

The findings of this study are in contrast with the study conducted by Can et al. (2007), which reveals that students who participate in educational activities without using the Internet are more successful than students who participate in Internet-based educational activities. The results of this study are also in contrast with the studies performed by DiRienzo and Lilly (2014) and Ruth and Conners (2012), who found no significant difference in the performance of students in online and traditional courses. Moreover, the findings of this research contrast with the studies carried out by Walstrom (2014), Butcher, Epps, and Cleaveland (2015), and Anstine and Skidmore (2005) who indicate that face-to-face instruction is better than computer instruction, and traditional course students were more satisfied with this course than online students.

Conclusions and Implications

Nowadays, reading is done not only in conventional ways, which is only in printed materials, but also in electronic devices such as computers. Computer-based reading is reading text from a computer screen, including tablets and e-book readers, from a source such as the internet or from the computer itself. With the rapid development of computers, people today do not have to stick to printed information. They can get information through the internet, online newspapers, online articles, and even online textbooks. In the teaching and learning process, the computer is used as an auxiliary medium. The use of CALL systems in teaching reading is related to readers' decoding abilities, outputs, experiences, and processes, and the contribution that their decoding skills make to their reading comprehension. The use of new technologies can improve learners' reading abilities to a greater extent than traditional classroom teaching.

It can be concluded that electronic settings have created a different teacher–student relationship, and changed the nature of the role of teachers and students in EFL reading classes. These findings demonstrate that the use of computer-based instruction can have a positive effect on L2 reading skills and lead to a higher degree of improvement in L2 learners' reading processes compared to face-to-face instruction. These results affect the usefulness and reliability of computer technologies in improving Iranian students' reading skills. One explanation has to do with the primacy of human's affective and motivational aspects over the automaticity and neglect of feelings on the part of computers, as they do what they are programed to do. Considering this issue, the learners of the experimental group outperformed the control group in posttest of reading comprehension. However, the reason for the difference between the control and experimental groups can be explained by the amount of energy spent on prompt provision in the first group. Thus, making classes more interactive through computer-based instruction could encourage students to be more interested and involved. Taking on a more active role gives them a sense of ownership, develops independence, fosters responsibility for their own learning, and rewards them with pride in their work.

The findings have several pedagogical implications for teachers, course development, and curriculum design. For example, online interaction can be used to enhance learning, especially for teachers who tend to be reserved in the classroom setting. Although an online class offers a comparably effective learning alternative, teachers should recognize that online learning has its unique advantages and disadvantages. In developing online courses, teachers should realize that some courses may be more challenging to students who persist in the online environment. Course developers of such courses need to carefully analyze what are the specific subjects that may hinder persistence and supplement instruction with face-to-face consulting, advising, or tutoring.

In curriculum design, it is better to consider how to exploit and integrate the comparative advantages of different modes of instruction to specific courses of reading comprehension ability by offering not only fully face-to-face or online but also hybrid classes to overcome the constraints of time, place, and resources. Before choosing which platform to teach reading comprehension strategies, teachers need to evaluate a student's proficiency level, needs and learning preferences through a needs analysis. This can be done as a Google Form and an online interview, while others may choose to carry out an interview analysis only.

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