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Investigating the Impact of WebQuest-Based Instruction on EFL Learners' Reading Comprehension and Its Relation to Their Critical Thinking

Negin Naderi

PhD Candidate, Department of English Language Teaching, Shiraz Branch, Islamic Azad University, Shiraz, Iran, Ngin.ndr76@gmail.com

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ABSTRACT

Objective: The present study aimed to investigate the effect of WebQuest-based instruction on EFL learners' reading comprehension and to examine the relationship between reading comprehension and critical thinking (CT).

Methods: This study adopted a quantitative quasi-experimental and correlational design. Following the administration of the Oxford Placement Test (OPT), 60 upper-intermediate EFL learners from the IELTS Academy Language Institute in Tehran were purposefully selected and assigned to experimental and control groups. The intervention was conducted over five weeks, consisting of ten instructional sessions. Reading comprehension was assessed using standardized IELTS reading tests from the Cambridge (2020) series administered at pre-test, immediate post-test, and delayed post-test stages. The experimental group received instruction through five online WebQuests designed to enhance reading comprehension, while the control group received conventional instruction. Learners' critical thinking was measured using Ricketts' (2003) Critical Thinking Scale. Data were analyzed using independent-samples t-tests and correlational analysis.

Results: The results showed that learners in the WebQuest-based instruction group significantly outperformed those in the control group on the immediate post-test of reading comprehension. However, no statistically significant differences were found between the immediate and delayed post-test scores, indicating stability in learners' reading performance over time. In addition, correlational analysis revealed a strong and statistically significant relationship between learners' post-test reading comprehension scores and their levels of critical thinking.

Conclusions: The findings suggest that WebQuest-based instruction is an effective approach for enhancing EFL learners' reading comprehension and is positively associated with the development of critical thinking skills. Overall, the study highlights the pedagogical value of integrating technology-enhanced, inquiry-based materials into EFL reading instruction.

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Introduction

Given the swift global evolution of technology, technical universities seek new and efficient methods for training highly qualified and competitive professionals. To be in line with modern professional requirements, English as a Foreign Language (EFL) learners need to develop adequate communicative competence to meet the demands of different real-life interactional situations. From the perspective of Iranian English teaching and learning, changing global prospects bring an urgent need to reform practices related to teaching and learning English. One possible direction to achieve this is introducing suitable digital tools into EFL instruction.

Among the various online resources available today to differentiate language teaching, WebQuest technology provides a particularly worthy option due to its specific pedagogical benefits (Berezova et al, 2018; Dousti et al., 2021). Thus, to acquire that knowledge, teachers should make full use of the information that new technologies could provide (Alsswey et al., 2024; Liang & Fung, 2020). In response to low motivation among EFL learners and their limited background knowledge, which are considered two crucial hindrances in writing good work, the introduction of creative and supportive technological tools in writing instruction has been suggested (Aydin & Yildiz, 2014; Mohammed Qadir & Yousofi, 2021). Engaging students exposed to innovative, technology-enhanced instructional methods in which learning is interactive and authentic can increase their interest in reading. These methods also can help enhance and activate learners' prior knowledge, as heightened reading comprehension results from contact with rich and real-life materials.

Traditional methods have always dealt with a shortage of time for correction, while in modern teaching methods, the newly technology-based and language-aided interventions were provided to assist the EFL learners. Although many teachers may appreciate the essential role of different Technology-Enhanced Language Learning (TELL) tools and platforms in Iranian EFL learning settings, several instructors considered utilizing different technology-based interventions because few language teaching institutions and even universities prepared the required infrastructures for administering web-based tools (Sahragard & Sadri, 2009; Zhang & Crawford, 2024).

It has been observed that some pupils read accurately but do not comprehend what they have read in the EFL environments. This issue may be attributable to the student's lack of knowledge of their learning style (Nami, 2022; Yağcıoğlu & Çalışkan, 2024). As the main problem that can be easily observed in learning reading comprehension skills among Iranian EFL learners, reading

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comprehension skill is mainly considered a complex and difficult task among learners because reading a text needs familiarity with the words and their situational meaning, different grammatical structures, being familiar with lexico-semantic features and knowing the contextual meaning.

Contemporary students are frequently described as digital natives or part of the Net Generation. They were born in the digital age and have been interacting with digital technology from an early age (Arteaga Sánchez et al., 2014; Thompson, 2013). Additionally, Motteram (2013) continues that utilizing such trendy interventions in EFL environments provide academics with appropriate availabilities in planning and implementing various pedagogical strategies. According to Pourhosein Gilakjani et al. (2015), the integration of different technological tools may indeed shift language instruction away from a traditional approach toward a more modern, technology-enhanced one. In a related discussion, Pourhosein Gilakjani and Sabouri (2017) note that technology enables learners to direct their own learning and to access a vast array of information which is beyond the teachers' direct control. To expand international acquisition, EFL courses are currently being designed and enlarged in many countries to improve the four main language skills among English learners.

On one hand, the EFL learners' emotions and their ability to read and comprehend the reading impacts English language learning development (Awada et al., 2020). Besides, it has been observed in different EFL classes that some learners read accurately with the exact intonation and pronunciation; however, they do not comprehend what they have read. This issue exists because of the students' lack of knowledge and their learning techniques (Nami, 2022). On the other hand, EFL teachers must also be sensitive and consider the most applicable and suitable techniques in the reading comprehension activities, making EFL learners familiar with the academic methods to comprehend texts.

TELL has some advantages in reducing the problems of learners' interaction and language use. TELL is the application of technology-based tools in language teaching, which sometimes utilizes computers and multimedia to increase teachers' innovation in teaching (Kranthi, 2017). Pedagogically, recruiting learners in language production is believed to help them perceive or notice gaps between their present language output and the target product they are acquiring. It is a meaningful practice which helps solidify cognitive associations in language development as well (Luk & Ruthman, 2022). However, TELL is effective only to the extent that the instructional

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materials and technology-related activities match up with the needs of learners and the specific language associated with the accomplishment of language tasks assigned to them (Reinders & White, 2010). Among many active online learning tools for the EFL context, WebQuests have become one of the well-known methods to be adopted for encouraging learners to get themselves involved in more authentic and deeper language use (Ebadi & Rahimi, 2018).

With the ever-increasing demand for advanced levels of English proficiency in the modern day, especially in reading, the pursuit of more effective instructional methods yielding immediate and long-term learning benefits has intensified (Mohammed Qadir & Yousofi, 2021). In this regard, the emergence of sociocultural perspectives in EFL pedagogy has largely transformed the perspective on reading comprehension and its development (Nami, 2022). In this respect, identifying appropriate strategies to improve reading comprehension and the overall text interpretation capability of EFL learners has turned into an influential factor affecting their very success in learning the language (Nami, 2022). Therefore, employing technology-based tools and strategies to foster reading comprehension skills is another challenge the present study attempts to deal with. One way to ease the problem is utilizing web-based interventions such as WebQuest strategies for EFL learners to improve their achievements in reading comprehension skills. Contrary to the importance of other technology-based interventions, WebQuest has received little attention from researchers in the EFL contexts in Iran.

WebQuests align with learner-focused frameworks suggesting that learning happens as students connect new information with what they already know (Liang & Fung, 2020). This is a constructivist perspective that places learners at the core of learning experience, with the power to shape the course and nature of their learning according to the ways in which they interpret new experiences in light of their prior knowledge.

The association between CT and receptive skills has been already highlighted in the English Language Teaching (ELT) research and Second Language Acquisition SLA literature (Liang & Fung, 2020). Similarly, numerous investigations have addressed the function of CT in listening comprehension development as another receptive skill (Mohammed Qadir & Yousofi, 2021).

Consequently, prior empirical research indicated the specific gap addressed in the current study; despite extensive work in this area, the influence of WQBI on reading comprehension receptive skill has been untouched in the Iranian EFL context. Meanwhile, the effect of employing WQBI

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on the development of CT and reading comprehension in a single study in the Iranian EFL context has not been well-researched. Accordingly, this investigation aimed to fill the present gap by analyzing the possible impact of employing WQBI and tools on improving EFL learners' reading comprehension skills in two different phases of immediate and delayed post-tests. Considering the cognitive aspects, the current study also aims to analyze the secondary impact of WQBI on EFL learners' CT and their viewpoints on reading comprehension receptive skills in Iran.

To review the literature, WebQuests are one example of active learning approaches online. It is a constructivist-inspired online activity that engages learners in inquiry (Dodge, 2001). According to March (2004), a WebQuest is a scaffolded learning experience for students in which access to preselected online resources is provided to engage them in an authentic task. By doing so, students delve into a central open-ended question, establish expertise individually, and synthesize, deepen and expand new learning by working cooperatively. Good quality WebQuests encourage students to make broader thematic connections, contribute meaningfully to authentic learning contexts, and gain awareness about their thinking processes.

According to March (2004), A WebQuest refers to a structured learning model that provides a line for the pedagogical resources on the World Wide Web. WebQuests engage EFL learners in open-ended activities that enable them to build their own expertise and participate in group activities to construct more advanced understandings. Furthermore, considering metacognitive issues, WebqQuestes paves the way for the learner to find more advanced thematic relationships between different elements while learning and connecting the course content to the real world (Berezova et al., 2018; Yağcıoğlu & Çalışkan, 2024). To this end, by clicking on the links provided by teachers, students get all their information from the web. Thus, the reason for employing WebQuest is to encourage students to utilize information rather than gather it and participate in meaningful classroom discussions. The main difference between WebQuest and other teaching strategies is its structure. A WebQuest is always specified in a document for students, usually accessible through the web, divided into sections such as an introduction, a description of the task, the process to carry it out and how it will be evaluated, and a kind of conclusion (Portilla Arciniegas & Camacho Vásquez, 2017; Zhang & Crawford, 2024).

Additionally, Dodge (2007) contends that WebQuest is in nature related to cognitive psychology, declaring that novice learners could be fitted from the practices and conducts of individuals

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enjoying higher levels of expertise. It signifies scaffolding techniques presented in the sociocultural learning environment and constructionism (Al Mamun et al., 2020). According to Bushey (2020), the term ‘scaffolding’ refers to the kind of assistance a teacher or peer offers to support learning. In other words, when the objective is scaffolded, the teacher assists the student to master a task that the student is initially unable to do independently. According to Dodge (2001), this instructional model is built around problem resolution and offers an organized sequence of steps to direct how learners work and collaborate. Thus, WQBI can be employed in providing materials for various language learning skills.

In the light of the strong link between constructivist learning theories and the development of language skills (Piaget, 1971; Vygotsky, 1986), one of the objectives of the current study is also to compare how WQBI and traditional face-to-face instruction affect EFL learners' receptive skills and CT. According to Sociocultural theory higher-level thinking and learning skills develop together, each strengthening the other. (Vygotsky, 1986). In this sense, CT, a higher-order cognitive skill, is considered an effective tool for enhancing receptive skills, themselves higher-order learning skills. Similarly, reading is conceptualized as a gateway skill that promotes CT. In other words, effective employment of CT can promote learners' receptive skills, while proficient employment of receptive skills can also enhance learners' CT (Aghaei & Rad, 2018; Aloqaili, 2012; Alsswey et al., 2024; Chen & Hu, 2018)

In this theoretical context, WebQuest-oriented instructional designs emphasize practices centered around the learner (Crawford & Brown, 2002) and have been supported as helping learners' overall academic development (Aydin, 2015; Chang et al., 2011), including listening and speaking skills. Thereby, in a WebQuest environment, learners could be exposed to peer-provided feedback (Ebadi & Rahimi, 2017) and teacher-provided feedback (Ai, 2017), which would create opportunities to improve various aspects of language performance. An interactive, inquiry-driven learning experience tends to raise learner motivation and engagement more than usual (Adanan et al., 2020; Amalia, 2018; Carpio Romero, 2019).

Al-Shamisi's (2016) study examined whether WebQuests could improve the reading ability of EFL learners in the U.A.E. The results are in line with the present research. In the same way that the present study proved that WQBI can exert a significantly positive influence on both the immediate and delayed reading comprehension of Iranian upper-intermediate learners, Al-Shamisi (2016)

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similarly detected the advantageous influence of WQBI on EFL learners' reading outcomes in the U.A.E. In addition, his result indicated that the EFL learners reported positive attitudes about WebQuests. Learners believed that WebQuests improved their teamwork, language use, reading, and critical thinking.

Hung (2015) explored the impact of a WebQuest-enhanced flipped classroom on EFL students' achievement, learning attitudes, and engagement. In a study by Hung, it was found that flipped classroom units organized through the use of WebQuests tended to yield greater improvements in learners' achievement, learning attitudes, and participation rates than both semi-structured flipped models and traditional non-flipped instruction. Similarly, the present study showed that employing WebQuests has a strong relationship with students' CT and their subsequent improvement in reading skills in the short and long terms.

Laborda (2009) found a significant positive effect of WebQuests on the oral communication improvement of EFL learners dealing with Tourism studies, and Portilla Arciniegas and Camacho Vásquez (2017) found that WebQuests could effectively improve the communicative competence of EFL students. Similarly, the t-test showed a significant ($p < 0.05$) impact of employing WebQuests on improving Iranian EFL learners' reading achievements in the immediate and delayed phases. In other words, in line with Laborda's (2009) positive and significant effect of WebQuests on learning, the present study showed that employing WQBI resulted in an improvement in participants' reading skills.

Given the features of WebQuests touched upon above, a further objective of this research is to examine the impact of WQBI on EFL learners' CT. According to Cottrell (2005), CT is a cognitive process which is deliberately intellectual. The development of CT through analytical and evaluative processing calls for learners to employ a range of cognitive operations, including focusing attention, organizing and classifying information, selecting relevant elements, and forming judgments. Nevertheless, many people whose CT could be developed may fail to do so for reasons other than that of intellectual capacity.

From a related perspective, Facione and Facione (2007) define CT as an intentional, self-regulated form of judgment whereby individuals justify their decisions with an explanation of the contextual factors underlying these decisions, an ability seen as central to CT competence. CT is considered an activity supported by both cognitive and sociocultural views (Chen & Hu, 2018). Through

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cognitive eyes, CT is considered one of the higher-order thinking skills that may support learners during the learning process (Eysenck & Keane, 2020). Likewise, through the socio-constructivist approach that ensued from sociocultural views, CT is considered to facilitate skill, paving the ground for logical and creative knowledge development. Through CT skills, EFL learners not only learn how to think instead of what to think but also improve their problem-solving skills and move toward self-regulation and autonomy (Lynch & Dembo, 2004). Aydin's (2015) meta-analysis demonstrated that WebQuests strongly support the growth of EFL learners' CT and other higher-order cognitive skills.

This study sought to analyze the impact of utilizing WQBI on Iranian upper-intermediate EFL learners' reading comprehension skills. Narrowing down the general aim, thus, as the primary objective of the research, the researcher attempted to employ WQBI among the participants in one different experimental group and collect the data in two different time intervals. In other words, the researcher intended to observe whether or not learners' reading comprehension skills improved after receiving WQBI. Also, the impact of WQBI was analyzed at two different time intervals; immediate posttest and delayed posttest. Therefore, the researcher attempted to compare the results of two different groups: One control group receiving traditional interventions for reading comprehension skills and another experimental group receiving WQBI for reading comprehension skills. Also, as a secondary goal, the research explored the link between implementing WQBI and learners' CT.

RQ$_1$. Is there any significant difference between Iranian upper-intermediate EFL learners' reading comprehension achievements receiving WQBI versus traditional methods?

RQ$_2$. Is there any significant difference between Iranian upper-intermediate EFL learners' reading comprehension achievements in the immediate versus delayed posttest?

RQ$_3$. Is there any significant relationship between Iranian upper-intermediate EFL learners' CT skills and their reading comprehension?

Material and Methods

The study adopted a quasi-experimental quantitative approach with pre- and post-test measures as well as a correlational design to achieve its objectives.

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Initially, a total of 300 EFL learners in the IELTS Academy Language Institute Center in Tehran were asked to participate in a proficiency test. Thus, purposeful sampling was employed to select the final participants. To this end, after running the OPT, 60 upper-intermediate students aged 18–25, both male and female were selected as the final participants of the present research. The gender factor was beyond the scope of the study. The participants were Persian native speakers developing EFL. To observe research ethics, the participants were made aware of the objectives of the study and ensured about anonymity and confidentiality of their information.

After administrating OPT, the final participants with upper-intermediate levels in general English were randomly and equally placed in either the control or experimental condition; each group contained 30 Iranian upper-intermediate EFL learners to develop reading comprehension skills. Learners in the experimental condition experienced WebQuest-integrated instruction, whereas those in the control condition received traditional in-person lessons. The present study lasted for ten sessions in five weeks at IELTS Academy Language Institute in Tehran city. In this study, the ethical standards (e.g., informed consent, respect for anonymity, and confidentiality) were into consideration. To preserve participant anonymity, the names of the students were omitted from the collected data.

Five instruments were employed to conduct the empirical phase of data collection in the current study: A standard Oxford Placement Test, Standard IELTS reading comprehension tests for pretest, posttest, and delayed posttest, as well as Ricketts (2003) Critical Thinking Scale as both pre- and post-tests.

Oxford Placement Test (OPT), containing 60 multiple-choice questions, was performed to extract and homogenize the final 60 upper-intermediate participants among 300 EFL students. The test was divided into different sections; all the sections of the test produced a total score of 60. To have a homogenous group of participants, those learners whose scores are between 16 and 29 can serve as the elementary-level sample for the study (levels A1 and A2). Learners whose scores fell between 40 and 47 were labeled as upper-intermediate learners (B2 level).

The study investigated how WQBI affects reading comprehension among Iranian upper-intermediate EFL students' receptive skills in three different phases; pretest, immediate posttest, and delayed posttest. All tests in three phases were standard IELTS reading comprehension tests adopted from the IELTS standard series released by Cambridge University (2020).

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The reading test is a general module (GM) test that has three sections with 40 questions in total and will last for 1 hour. The test includes different items such as plans, diagrams, tables or chart completion, summary items, notes, sentence completion items, short-answer questions, True/false/not given items, multiple choice items, classification items, and items related to matching paragraphs for one hour. Each of the 40 questions is assigned one point, and the candidate's total is translated into a reading score between 0 and 9 on the educational report. In the present study, the raw score was calculated out of 40.

A similar poll of standard IELTS reading comprehension tests but different in items and topics was utilized as the immediate posttest and delayed posttest. At the end of the last treatment session, the groups completed the immediate post-test. To examine how well reading comprehension was retained, a delayed test was given after a two-week gap to participants in the experimental group. IELTS reading tests are standard tests with approved reliability and validity.

To explore the connection between WQBI implementation and learners' critical thinking, the experimental group completed Ricketts's (2003) Critical Thinking Scale. The standardized Persian version of the instrument was used in the study, as this adapted version has already enjoyed wide application in research across educational sciences and TEFL. Consisting of 33 items, the scale measures three dimensions of CT: creativity (items 1–11), growth (items 12–20), and commitment (items 21–33). Its reliability has been consistently confirmed in previous studies, with coefficients ranging from .77 to .88 (Pakmehr et al., 2013, p. 33). Evidence supporting its construct validity was obtained by factor-analytic procedures (Pakmehr et al., 2013).

The study began its first phase in June 2022, when an OPT was administered among 300 participants to extract and homogenize the final 60 participants at the upper-intermediate level in the IELTS Academy Language Institute Centre, Tehran. To this end, after running the OPT, 120 upper-intermediate participants of both genders, aged 18 to 25, whose scores fell between the 40–47 range, were recruited as the final participants of the present research. As a final step, the upper-intermediate level participants in general English were randomly divided into two equal groups: 30 in the control group and 30 in the experimental group, both at the upper-intermediate level. The experimental group was taught through WebQuest-integrated lessons. However, the control group followed conventional face-to-face instruction. The treatment sessions were carried out between June and July 2022. To the QBI group, the researcher offered a website to upload the WebQuest-

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Based Program (WQBP). The proposed WQBP is a program consisting of five short-term WebQuests for reading comprehension skills. It included 10 WebQuests for the experimental reading comprehension group. Each piece of content was designed to be received in one session: ten WebQuests for ten sessions twice a week. The participants in experimental condition practiced reading through WebQuest tasks. Each WebQuest was organized around five components: an introductory section, the task outline, step-by-step procedures, an evaluation segment, and a final conclusion. The stages are presented in detail in Table 1.

Table 1. WebQuests for Teaching Reading Comprehension Skills

Phases	Descriptions
Introduction	Provides necessary background information and also opens learners to consider an idea or a challenge.
Task	Specifies the nature of the final outcome learners are expected to produce, which can be anything from an elaborate PowerPoint presentation to a simple poster summarizing their findings.
Process	Gives students the step-by-step information that is needed in an orderly sequence to complete the process, with indications as to what resources will be needed at each point. Students are presented with preselected hyperlinks to online resources selected by the instructor and a list of offline supplementary references needed to complete the activity. WebQuest resources can range from governmental or educational sites to searchable online databases, subject-matter expert contacts, and other physical materials available in the classroom.
Evaluation	Specifies the criteria and processes that shall be undertaken to assess the individual learner's final output.
Conclusion	Reiterates main aims of the activity and encourages learners to go further in investigating related areas.

However, in the control group, the participants were taught the lessons without any WebQuest exercises. It is also noteworthy that the students in this group had access to the internet for collecting information, looking up new words in online dictionaries, and reading new materials. Likewise, the control group dealt with exercises through pair- and group-based activities to practice newly learned concepts in reading comprehension skills. In this group, the participants were given paper-based exercises in pairs and groups.

After the end of the treatment and in the last session, the immediate post-test of reading comprehension was given to both groups as well as the Ricketts Critical Thinking questionnaire. Also, after a 2-week interval, the participants in the experimental condition were given another reading comprehension test, entitled the delayed posttest. According to Bachman (2004), a two-week interval is enough to reduce the score pollution effect resulting from learners' awareness of the test items and remembering the answers.

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Scores from the pre-, immediate post-, and delayed post-tests were analyzed quantitatively to assess the impact of WQBI on learners' reading comprehension and critical thinking.

Results

Regarding the first research question, descriptive statistics of the reading comprehension immediate post-test between the experimental and control group were given in Table 1.

Table 1. Results of Descriptive Statistics for the Reading Comprehension Immediate Post-test in Both Groups

Test	Group	N	Mean	SD	SEM
Reading Posttest	Control Group	30	20.73	4.97	0.52
	Experimental Group	30	27.43	7.22	0.44

According to the Table 1, the immediate post-test mean was 20.73 (SD = 4.97) for the control condition and 27.43 (SD = 7.22) for the experimental condition. To evaluate whether the gap between the two groups was meaningful, an independent-samples t-test was conducted. The output of this test is shown in Table 2.

Table 2. Results of Independent Sample t-Test for the Reading Comprehension Post-Test of Both Groups

	Levene's Test for Variances		T-test for Means			
Factor	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean Diff.
Equal variances assumed	10.145	.002	-4.182	58	.000	-6.7000
Equal variances not assumed			-4.182	51.440	.000	-6.7000

As shown in the Table 2, the two groups differed significantly, as indicated by p = .00 after the administration of traditional instruction and WQBI to Iranian upper-intermediate EFL learners. An independent-samples t-test was performed to confirm if the immediate post-test reading comprehension results for the two groups varied in a statistically meaningful way at $p < .05$. It means that the learners who underwent WQBI outperformed the control group, whose reading comprehension showed no meaningful gains under traditional instruction.

Concerning the second research question, descriptive statistics for the delayed reading comprehension scores of the experimental group are reported in Table 3.

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Table 3. Results of Descriptive Statistics for the Reading Comprehension Immediate Post-Test and Delayed Post-Test in Experimental Group

	Group	N	Mean	SD	SEM
Pair 1	EX1 reading posttest	30	20.83	5.08	.92
	EX1 reading posttest	30	31.13	6.79	1.24

As shown in the Table 3, the delayed post-test means scores for reading comprehension were 20.08 (SD = 5.08) for the control group and 31.13 (SD = 6.79) for the experimental group. To assess the statistical relevance of this gap, the researcher applied an independent-samples t-test. The outcomes are shown in Table 4.

Table 4. Results of Paired Sample t-Test for the Reading Comprehension Immediate Post-Test and Delayed Post-Test in Experimental Group

		Mean	SD	SEM	t	df	Sig.
Pair 1	EX1 reading posttest	20.83	9.12	1.666	-2.220	29	.034
	EX1 reading posttest	31.13	9.12	1.666	-2.220	29	.034

According to the Table 4, a meaningful statistical difference was found between the experimental group's immediate and delayed reading post-test results (p = .34). The paired-samples t-test confirmed a meaningful difference (p < .05) between the two testing phases, showing that the learners' reading comprehension continued to improve over time. This suggests that the use of WQBI not only enhanced learners' reading skills immediately after instruction but also supported sustained improvement in the long term. Table 5 displays the independent-samples t-test findings.

Table 5. Results of Independent Sample t-Test for Reading Delayed Post-Test of Both Groups

	Levene's Test for Variances		T-test for Means			
Reading	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean Diff.
Equal variances assumed	4.006	.050	-6.646	58	.000	-10.3000
Equal variances not assumed			-6.646	53.727	.000	-10.3000

Comparing the impact of different interventions in the delayed post-test, the Table 5 revealed a significant difference (p=.00) in Iranian upper-intermediate learners' reading comprehension outcomes between traditional and WQBI groups. Therefore, the independent t-test indicated a significant difference (p<0.05) between Iranian EFL learners' reading comprehension achievements in the control versus experimental groups in the delayed post-test phase. In other words, employing WQBI in the experimental group resulted in an improvement in participants' reading comprehension skills in the long term, compared to the students in the control group who

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showed no improvement in the short and long term in reading comprehension after receiving traditional methods. With regard to the third research question, correlation test was run. Table 6 presents the correlation between learners' CT scores and their reading comprehension performance.

Table 6. Relationship between Iranian Upper-Intermediate EFL Learners' CT Skills and their Reading Comprehension

		reading post	Critical thinking
Reading post	Pearson Correlation	1	.890
	Sig. (2-tailed)		.000
	N	30	30

The table 6 showed a strong correlation (p=.00, r=.89) between the reading comprehension scores of Iranian upper-intermediate EFL learners and their critical thinking abilities. The results of correlation analysis revealed a significant relation (p<0.05, p=.00) between the learners' reading post-test performance and their critical thinking abilities. Thus, a strong relationship (r=.89) between EFL learners' reading scores and their CT was observed in the present study.

Discussion

The present section of the research attempted to compare with similar case studies that sought at analyzing the effect of WQBI on improving intermediate-level Iranian EFL students' reading comprehension proficiency. Here, the researcher attempted to highlight the similarities and differences, showing to what extent the findings are supported by the findings of other similar empirical types of research in the literature review.

Aligned with what this study examined, investigating WebQuests in terms of their potential relation to CT, Aydin's (2015) meta-analysis found that WebQuest activities greatly enhance EFL learners' development in CT as well as other higher-level cognitive processes.

About the impact of WebQuests on reading skills, a significant positive change in learners' reading performance due to WebQuest use is consistent with the results obtained by Al-Shamisi (2016). In turn, Carpio Romero (2019) utilized WebQuests to enhance L2 reading competence of EFL students in Spain and confirmed significant progress in students' L2 reading development.

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It can be argued that WebQuests enhance learners' self-confidence and this makes them less anxious in reading comprehension. Thus, their reading comprehension is enhanced. Moreover, WebQuests make them more motivated, engaged and involved in learning. This contributes to higher reading comprehension among them. Additionally, WebQuests help learners have agency and control over their learning. This may also lead to higher reading comprehension in them. Besides, as a result of using WebQuests, learners' interest in learning is enhanced, and this is associated higher reading comprehension.

The relationship between reading comprehension and CT can be attributed to the mediating role of learners' reading anxiety. That is, learners' reading anxiety decreases under the effect of their reading achievement. This leads to higher CT among them. Moreover, due to using WebQuests, learners learn with more enjoyment. This contributes to increased levels of CT among them.

Conclusion

To conclude, this quantitative study examined how WQBI affected upper-intermediate Iranian EFL learners' reading comprehension and investigated its connection with their critical thinking performance. Results of the pretest, immediate posttest, and delayed posttest were analyzed to observe the significant impact of interactive reading comprehension interventions on participants' final reading comprehension improvement. A series of quantitative tests were conducted to explore the connection between WQBI and the CT skills of upper-intermediate Iranian EFL students.

Analysis of the reading data revealed that upper-intermediate Iranian EFL students exposed to WQBI experienced a statistically significant boost in reading comprehension from pre- to post-testing. Learners in the traditional classroom, however, did not achieve comparable progress. Hence, the use of WQBI contributed to measurable gains in reading comprehension.

Comparing the impact of different interventions in the delayed post-test, the analysis revealed the presence of a significant difference among Iranian upper-intermediate EFL learners' reading comprehension achievement between traditional and WQBI groups. In other words, participants exposed to WQBI demonstrated lasting enhancement in reading comprehension, unlike those in the control condition, whose performance remained unchanged in both the immediate and delayed assessments. Indeed, comparing the impact of different interventions in the delayed post-test, a significant difference among Iranian upper-intermediate EFL learners' reading comprehension achievement between traditional and WQBI groups was revealed.

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Therefore, employing WQBI in the experimental condition resulted in a development in participants' reading comprehension abilities in both the short and long term. However, there was a significant difference among Iranian upper-intermediate EFL learners' reading comprehension achievement in the immediate post-test versus delayed post-test phases. Also, the analysis revealed a strong correlation between participants' reading comprehension results and their critical thinking skills. The study's conclusions may be applied as guidance for different groups.

First of all, a group that may gain from the findings is EFL learners. The findings of this research may assist them to get familiar with various reading comprehension-aided interventions and instructions such as WebQuests. Moreover, students may realize the difference between newly updated WebQuests techniques in different settings, getting familiar with the strengths and weaknesses of each tool in various contexts. Consequently, different material and syllabi designers may benefit from the results of the current study to design reading comprehension instructions and interventions assisting the teachers and students in improving their subsequent language skills in Iran.

At the same time, the study's limitations create opportunities for subsequent research. The sample size was limited, 60 Iranian upper-intermediate EFL learners in total, divided evenly into groups of 30.Therefore, the researcher suggests conducting other studies to analyze the impact of WebQuest activities among students with different proficiency levels, such as elementary, intermediate, and advanced EFL learners. In addition, this investigation focused on examining how WebQuest activities influence learners' reading comprehension skills. Thus, other main language skills, such as speaking and writing, can be the subject of their future studies. The study also overlooked factors such as gender and age; therefore, the age and gender of students can also be analyzed concerning employing WebQuest activities.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All author(s) contributed to the study conception and design, material preparation, data collection and analysis. All author(s) contributed to the article and approved the submitted version.

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Conflict of interest

The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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