Foreign Language Vocabulary Learning: Interactive Whiteboard-Mediated vs. Paper-Based Corrective Feedback

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Abstract
This study sought to probe the efficacy of interactive whiteboard-mediated corrective feedback versus conventional corrective feedback for Iranian EFL learners' target language vocabulary development. To this end, a sample of 80 EFL learners at the intermediate proficiency level was selected based on scores obtained from a language proficiency test. The participants were then randomly divided into three groups: two experimental and one control. The first experimental group (n = 30) was taught the target vocabulary items while receiving interactive whiteboard-mediated corrective feedback, and the second experimental group (n = 25) was taught the target vocabulary items while receiving conventional corrective feedback; the control group was taught the target words receiving no feedback of either kind. The ANOVA test results indicated that conventional corrective feedback slightly improved target vocabulary learning by the participants. Interactive whiteboard-mediated corrective feedback, however, proved to be significantly effective in this respect. The findings can be said to provide innovative insights into the area of CALL and new techniques in L2 pedagogy.

Keywords: interactive whiteboard, corrective feedback, interactive whiteboard-mediated corrective feedback, conventional corrective feedback, vocabulary learning

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Introduction

Today, computer technology is a significant part of good quality education (Becker, 2000, as cited in Ahmadi, 2018). According to Crystal (2001), technology is a kind of revolution to change the teaching and learning process. Any educational program can be said to benefit a lot from technological advancements, of which the interactive whiteboard (IWB) is a modern example. Interactive whiteboards, or smart boards, have begun to act as an important factor in this regard. They help in providing learning input, improving teaching and learning processes, using multimedia, increasing the amount of conversation/student talk in the classroom, clarifying concepts and ideas and contributing to an interactive and motivating learning environment, and engaging the learners in cooperative learning activities (Alshaikhi, 2017; Levy, 2002; Souhila & Khadidja, 2013). According to Adigüzel et al. (2011), if teachers use this technology properly, they will provide a contributive context for their learners to develop their interaction with the course. As Lewin et al. (2008) claimed, in order to have a lively class, whiteboards with touch-screen qualities can grab learners' attention and make learning fun; also, classroom management would be easier for instructors. In a report by Smart Technologies (Q), it has been stated that the IWB can help bring about an interactive learning environment.

As the core variable of this study, corrective feedback (CF) has a significant role to play in SL/FL teaching and learning. It helps language learners to become aware of certain features of the target language (Han, 2001). As reported in the related studies below, different types of CF have been studied by researchers to explore its role in second language learning. These studies, however, have mostly focused on writing skill among the other language skills and on the grammar component out of all the other components of language. Only a few studies (e.g., Henderson, 2019; Nakata, 2015; Sippel, 2019) have dealt with CF in promoting vocabulary knowledge. It seemed to the authors of this paper that the role of computer-mediated CF, specifically its IWB-based modality, in helping second/foreign language learners to build up an appropriate vocabulary in the target language still remained to be further investigated. Thus, the current study was meant to help fill this gap in the literature, though partially.

Review of Related Literature
Theoretical Background

Corrective Feedback Definition. By definition, CF is regarded as any piece of feedback offered to learners about their errors in L2 productions (Loewen, 2012; Sheen, 2007). As Ellis et al. (2006) put it:

> Corrective feedback is a response to a learner's utterance that contains an error. The response consists of an indication that an error has been committed, provision of the correct target language form, or metalinguistic information about the nature of the error, or any combination of these. (p. 340)

CF has been classified into different categories each of which lies somewhere within the continuum moving from indirect to direct CF. Further details about different types of CF are given below.

Explicit vs. Implicit Corrective Feedback. This explicit feedback falls towards the end of the CF explicit/implicit continuum (Ellis et al., 2006). In this type, the teacher as the last resort overtly alerts the learners to the errors they produce. Implicit CF, however, gives no overt indication of the error produced by the learner.

Clarification Request. In this type of CF, questions are raised in order to indicate that the uttered language form is not well-formed nor is it properly understood, and that there is a need for repetition or reformulation of the respective form. The problems in this type has to do with "comprehension, accuracy or both" (Lyster & Ranta, 1997, p. 47).

Metalinguistic Feedback. Similar to explicit CF, this feedback occurs at the end of the CF continuum. Lyster and Ranta (1997) refer to it as sets of comments, information and questions regarding the extent to which the learners' utterances are well-formed. In this kind, the correct form is not provided. They also subcategorized this feedback type into *metalinguistic comments*, *information* and *questions*. Metalinguistic comments merely indicate that an error has occurred. This feedback category highlights the existence of an error or identifies its location and contains some metalanguage that indirectly refers to the nature of the error as well. The last subdivision is concerned with metalinguistic questions. These questions "point to the nature of the error but attempt to elicit the information from the student" (Lyster & Ranta, 1997, p. 47).

Elicitation. As stated by Panova and Lyster (2002), this feedback is meant to motivate learners to correct themselves. In a face-to-face interaction, elicitation can be practiced through three strategies with varying degrees of implicitness or explicitness: (1) reformulation request for an ill-formed utterance, (2) using open questions and (3) using strategic pauses to leave a room for the learner to finish up an utterance. Since the latter strategy is the least communicatively intrusive, it can be concluded that it is the most implicit one. Accordingly, elicitation does not belong to either extremes of the implicit/explicit CF continuum, and it is commonly presented independently, without being associated with other types of CF.

Repetition. Since repetition is less communicatively intrusive, it stands at the implicit end of the CF continuum. Panova and Lyster (2002) defined repetition as "repeating the ill-formed part of the student's utterance, usually with a change in intonation" (p. 584).

Translation. As stated by Lyster and Ranta (1997), translation is a subcategory of recast. Recast differs from translation in that that the former comprises a feedback to the learner's defective L2 utterance, whereas the latter is a feedback to his/her perfect L1 utterance.

Recast. In Lyster and Ranta's (1997) definition, recast is "the teacher's reformulation of all or part of a student's utterance, minus the error" (p. 47). Long (1996) also considers it as "utterances that rephrase a child's utterance by changing one or more components (subject, verb, object) while still referring to its central meaning" (p. 434). Other scholars consider recast effective in the learners' interlanguage progress (Lyster, 1998a; Lyster, 1998b; Panova & Lyster, 2002). According to Long (2006) and Sheen (2006), recast involves reformulating the entire or a portion of the leaner's utterance carrying an error

through replacing some non-target looking words or phrases with their equal forms in the target language while the interlocutors' intent is to emphasize the communicative meaning without highlighting the linguistic form. In their elaborate taxonomy of CF types, Sheen and Ellis (2011) introduced *conversational* versus *didactic* recasts. The former is an implicit recast which refers to a student's utterance reformulated by the teacher to help avoid a breakdown in communication, while the latter is an explicit recast consisting of a student's utterance with no communication hindrance involved. On the significant role of recast, Lyster et al., (2013) state that "because, in some foreign language settings, recasts have even been found to lead to learner repair as frequently as explicit correction, they have been considered tantamount to explicit correction in those contexts" (p. 3).

Target Language Vocabulary Learning. Scholars have highlighted the importance of learning L2 vocabulary (Barcroft, 2004; Laufer & Nation, 1995; Nation, 2001; Schmitt, 2000). According to McCarthy (1990), many English teachers feel that vocabulary is the most crucial language component. Allen (1983) believes the reason for emphasizing learning vocabulary is the fact that, despite the remarkable time dedicated to teaching vocabulary in English classes, the result is dissatisfying since there are too many other words that have not yet been acquired.

The Role of Technology in Education. Today, the role of Information and Communication Technology (ICT) is evident in our lives. ICT helps both teachers and learners in education (Selwyn, 2003). As a new ICT advancement, the IWB can be said to be influential in teaching/learning and supporting various learning styles (Bacon, 2011). Turel (2011) has cited researchers/scholars (BECTA, 2003; Beeland, 2002; Schmid, 2008; Slay et al., 2008; Wall et al., 2005) who believe that the IWB is a modern board, a beneficial technological advancement at teachers' disposal to promote learning achievement. According to Ertan et al. (2011), teachers who use the IWB provide an opportunity for most of the learners to use electronic books and academic materials that exist on the teachers' computer. Hall and Higgins (2005) suggest different potential uses of the IWB in the classroom like modeling software use, presenting learners' activity, digital lessons, using web-based resources, displaying video clips, etc.

The following can be mentioned as the benefits of IWB-mediated instruction (see Brown, 2009; Swan et al., 2008):
- Persuading teachers to generate digital resources
- Motivating learners by permitting them to demonstrate their knowledge
- Enabling teachers to build a collection of learning materials
- Facilitating interaction with websites in in the way directed by the teacher
- Providing an electronic flipchart
- Promoting collaborative learning
- Demonstrating the usage of educational software.
- Providing an opportunity for teachers to monitor their learners
- Running tests and providing instant feedback for learners
- Catering learners with special needs

Computer-Mediated CF. Given the role of CF in L2 teaching/learning along with the technological advancements, researchers have tried to link this area of research to that of CALL, focusing on the possible effects of computer-assisted CF in L2 learning. Research findings have indicated that CF that is provided by various CALL systems influence learning (Bull, 2000; Hulstijn, 2000; Sachs & Suh, 2007). According to Ware and Warschauer (2006), software-based CF is potentially useful and effective; therefore, it can be replaced by human CF. To Yeh and Lo (2009), computer-mediated CF can significantly aid in raising metalinguistic awareness of learners, annotating the text with different colors and attracting learners' attention on restricted information. However, it seems that this research is still experiencing infancy and its emaciated related literature requires further enrichment. Thus, in order to help complete the outlook of research findings in this area, this study has been an attempt to explore the role of the IWB-mediated CF in English vocabulary learning by EFL learners in the Iranian EFL context.

Computer-Mediated Vocabulary Learning. As also cited by Cojocnean (2015), some researchers (Abraham, 2008; Basoglu & Akdemir, 2010; Groot, 2000; Ma & Kelly, 2006; Oberg, 2011; Yun, 2011) believe that development in CALL has led to the emergence of a technology-based system for effective vocabulary learning. According to Coady et al. (1993), the computer with its graphic and external stimulation provides a rich setting for learning vocabulary. Lu (2010) believes that technological advancements have resulted in the better employment of instructional and educational technology. In this regard, the IWB as a new technological achievement can be said to help L2 learners to better improve their L2 vocabulary learning.

Empirical Study Findings

The Role of Interactive Whiteboard (IWB). Given the increasing popularity for the use of IWBs across the globe, referring to some research endeavors (Amolo & Dees, 2007; Beeland, 2002; Hall & Higgins, 2005; Levy, 2002; Moss et al., 2007; Somyürek et al., 2009; Torff & Tirotta, 2010; Wall et al., 2005), Turel (2011) reiterates that both qualitative and quantitative studies have addressed the role of IWB in educational contexts.

Wall et al. (2005) aimed to investigate students' rate of achievement as well as students' and teachers' views and attitudes with respect to installing an IWB in a primary school in the UK. The result of the study indicated a positive change in classroom interaction and teachers' practices. In another study, Wood and Ashfield (2008) investigated 10 lessons in Literacy and Numeracy in primary schools of the UK where IWBs were used regularly. Their results demonstrated that learners were required to engage more in process-oriented discussions. However, teachers tended to display information via the IWB by easy-level questioning and evaluative feedback. Kennewell et al. (2007) believed that teachers seek to persuade their students to ask questions or provide detailed answers at a fast pace in their lessons. Therefore, using an IWB can facilitate learners' active participation in the classroom and, hence, flourish their thinking and learning skills.

As for the place of IWB in language education, several studies have been conducted. Albaaly and Higgins (2012) examined the effectiveness of IWBs in

ESL leaners' English essay writing development in Egypt. The results did not reveal a greater efficacy for IWB in affecting the learners' writing ability.

Katwibun (2013) examined the question how IWBs might impact learners' vocabulary learning; the setting was a public high school in Thailand. The data was gathered by observing students' participation, a questionnaire, and a vocabulary test. The results revealed that using the IWB led to a significant achievement in learning vocabulary.

Mechling et al. (2007) examined the efficacy of the IWB in improving mildly disabled learners' ability to read the sight words. They found that learners' reading level increased via using the IWB. The researchers believed that the IWB could make the target information more visible and increase learners' attention. Gatlin (2007) investigated the role of the IWB in student learning progress. The result showed that using the IWB during the instructional process led to a significant achievement. In another study, Shen and Chuang (2009) attempted to find out how attitudes and behaviors could impact the IWB use. The participants were fifth and sixth grade students in Taiwan. They reported that using an IWB in the classroom is significantly correlated with attitudes concerning interactivity, ease of use, and ideas of usefulness.

Some studies have addressed the role of IWBs in EFL learning in Iran. Amiri and Sharifi (2014) explored the impact of IWBs on Iranian EFL learners' writing proficiency. They found that using an IWB effectively raised the amount of accuracy in the use of adverbs by the learners. Ghaniabadi et al. (2016) studied the impact of IWBs on reading comprehension ability of EFL learners at Iranian high-schools. The results revealed that IWBs could help improve performance on reading comprehension tasks. In the same vein, Shams and Dabaghi (2014) launched a study on the role of online annotation via IWBs in developing Iranian EFL learners' reading comprehension. Their results revealed that online annotation via the IWB significantly enhanced the learners' reading comprehension ability. Having investigated the attitudes and views of Iranian EFL teachers concerning the deployment of IWBs in EFL classrooms, Dashtestani (2019) concluded that "the teachers believed that the IWBs can be employed to teach different language skills and sub-skills" (p. 207).

The Role of Computer-Mediated CF. Given the importance of providing corrective feedback (CF) in L2 teaching/learning contexts, researchers have found interest in the electronic mode of providing CF. In view of the fact that this method offers remote feedback, it can encourage those reluctant learners who feel under pressure to be given feedback in a direct encounter setting. Therefore, computer-mediated feedback provides flexibility and convenience for the learners (Ho & Savignon, 2007).

Some studies have addressed the efficacy of computerized and internet-based CF in learning a second/foreign language. Kim et al. (2020), studying the role of task repetition and synchronous written CF in learning Korean grammar, concluded that this kind of feedback has a facilitative impact on grammatical accuracy of the learners of Korean as a second/foreign language. Sarré et al. (2019) discovered that indirect CF associated with computerized micro tasks over a specified time interval could be the most efficient type of CF in fostering L2 writing accuracy. Rassaei (2019) studied the efficacy of the dual

modality of computerized CF (text-based versus audio-based) in learning how to use the English articles by EFL learners in Iran. The study also corroborated the learners' preferred perceptual style as the moderating variable. The results were indicative of positive effects for both CF types on developing appropriate use of English articles by the learners. Also, it was found that CF mode when matched with preferred perceptual style resulted in the increased efficacy of computer-mediated CF. Ghufron (2019) studied the comparative roles of Grammarly CF (software-mediated CF) and teacher CF in EFL writing assessment. His results revealed that the frequency of lexical, grammatical, and spelling and punctuation errors declined due to the effect of Grammarly CF. In a study by Shaqaqi and Soleimani (2018), it was found that computer-mediated written CF significantly enhanced intermediate EFL learners' use of verb tense compared to the conventional written CF. S and El-Sakka (2017) found that computer-mediated indirect-direct CF significantly contributed to the writing accuracy of the Egyptian EFL learners in the target population of the study. Ghazi and Zamanian (2016) studied the impact of computer-mediated versus conventional CF on EFL learners' writing accuracy in Iran. Their results displayed that computer-mediated CF was more effective in the intake of grammatical feedback than the conventional CF modality.

AbuSeileek and Abualsha'r (2014) probed into the question whether peer-offered computer-mediated CF would result in enhanced writing ability of the participants. The participants who were 64 EFL learners at the intermediate level of proficiency were randomly divided to three groups, each receiving a different type of CF. The first group received the feedback via track changes, a kind of electronic feedback using Microsoft Word 2010. The second group was provided with recast and the third group experienced metalinguistic feedback types. The study took eight weeks. Each individual received CF on drafts written by a member of the other group, and then discussed it with the group members. Accordingly, the learners who were treated to computer-mediated CF outperformed those who were exposed to recast and metalinguistic feedback.

Faghih and Hosseini (2012) attempted to explore whether asynchronous and e-mail assisted CF would promote the correct use of articles and prepositions. They reported significant improvement in the participants' performance on the use of articles. Elsewhere, Razagifard and Rahimpour (2010) explored the effect of chat-based CF on learners' grammar achievement. They used both meta-linguistic CF and recast methods. Consequently, they found that meta-linguistic CF more effectively contributed to learners' noticing of the gap and to enhancing their ability to use correct grammatical structures. Elola and Oskoz (2010) studied the effect of computer-mediated CF on peer-writing and individualized writing performance. They used wikis and chat environment. They found no significant difference regarding complexity, accuracy, and fluency between individual (wikis) and collaborative (chat) practices.

Henderson (2019) probed the role of feedback timing in vocabulary development by the learners who were learning Spanish as a foreign language. The feedback was presented via synchronous computer-mediated interaction. The participants experienced error repetition (either immediate or delayed)

plus recast, or received no feedback on their vocabulary errors. Both CF groups outperformed the comparison group on the picture description task. Feedback immediacy, however, did not prove to have a moderating effect in this research context.

As understood from the studies reviewed above, a great majority of researchers have addressed the impact of computer-mediated CF in the writing skill of the learners; fewer studies, however, were found to focus on other language skills and components. In general, there exists a gap regarding studies on the efficacy of CF in L2 vocabulary development. More specifically, this gap seems to be much wider with reference to the role of a new technological advancement like IWBs in L2 vocabulary learning. Given this, the researchers meant to examine the effect of IWB-mediated CF on English vocabulary learning by EFL learners in the Iranian EFL context. To this end, the researchers posed the research questions as follows: (1) Does conventional CF make a difference in L2 vocabulary learning by Iranian intermediate EFL learners? (2) Does IWB-mediated CF make a difference in L2 vocabulary learning by the participants? (3) Does IWB-mediated CF contribute to L2 vocabulary learning more than conventional CF?

Methodology
Participants
A group of 200 female subjects were selected randomly among a population of EFL learners at a language learning institute in Sanandaj, Iran. They were given the Oxford Quick Placement Test (OQPT), and 80 intermediate learners were chosen, based on the scoring scheme described below.

All the learners were homogenous. Their ages varied between 13 and 16 years old. They had similar learning background and all of them had studied English at school for several years. The study was conducted in three classes, one of which was equipped with an IWB. The participants were randomly assigned to three groups. Group A consisting of 30 members received indirect electronic elicitation feedback via the IWB. Group B, 25 in number, received indirect elicitation feedback through conventional methods, and Group C, also 25 in number, received no feedback of either kind.

Materials
The two main materials that were used in this study included an interactive whiteboard and a proper software. The interactive whiteboard was used as a technological device for teaching L2 vocabulary, and the Oxford Word Skills (intermediate) software was chosen as the appropriate software for this research context. It was installed on a laptop attached to the board; then, the board acted like a touch screen monitor.

Instruments
The Oxford Quick Placement Test (OQPT) and Target Vocabulary Test. The instruments included two kinds of tests, namely, the Oxford Quick Placement Test (OQPT) and the researcher-developed target vocabulary test. To screen the participants for the same language proficiency level, the researchers employed the OQPT. The test was designed in 2004. The test

designers reported a reliability index of .90 for this test. The test contains 60 multiple-choice items in two parts. In the first part, there are 40 items (1 through 40), and the second part includes 20 items (41 through 60). Based to the scoring scheme of the test, the test takers who scored between 0 and 29 were to be consider as elementary EFL learners; those scoring between 30 and 47 were regarded as the intermediate learners, and the learners whose test scores fell within the range of 48-60 were labeled as advanced learners. The time allocated to answering all the test items was 30 minutes, which was in accordance with the test rubrics.

The researchers also designed a vocabulary test as the main instrument for pretest and posttest purposes. It comprised 20 multiple-choice items based on the 20 target words selected from Oxford Word Skills (intermediate) units. Learners had 20 minutes' time to answer the test items. The Cronbach alpha value for the instrument was calculated at .80, which is indicative of a high reliability rate. The test validity was also accounted for in this study. To this end, the researchers asked three field experts to confirm the content validity of the test. They commented on some items, and the researchers modified them based on the experts' comments. Finally, the expert judges confirmed the content validity of the test and deemed it appropriate for measuring the participants' vocabulary knowledge.

Procedure

As the first step, the proficiency test was administered to 200 female EFL learners in Abidar English Language Center in Sanandaj, Iran. Then, based on the scores obtained and according to the screening criteria mentioned above, 80 intermediate EFL learners participated in the study; they were then divided to three groups: the control group (n = 25), the conventional CF group (n = 25) and the IWB-mediated CF group (n = 30). Thus, the study included one control group and two experimental groups.

The first experimental group received the IWB-mediated CF while learning the target words and the second experimental group was given the conventional CF for the same purpose. However, the control group was made to learn the target words with no CF of either kind. All the participants in the three groups were given the pretest on the target vocabulary items to ascertain that they were homogeneous prior to the treatments. After receiving the treatment for eight sessions (each session lasting for 90 minutes), all groups took the same test as the posttest.

For the experimental group receiving indirect conventional elicitation CF, the target words were presented within 10-15 minutes. The learners with the help of the teacher defined each word and looked for several other synonyms for the new words. While the participants were doing the exercises, the teacher monitored each individual, offering indirect conventional elicitation CF, indicating the wrong answer by putting a cross next to them without revealing the correct form. Therefore, based on the first strategy of elicitation, i.e., eliciting reformulations of the learners' ill-formed utterances, the teacher provided an opportunity, allowing learners to rely more on their own knowledge and redo the exercises in order to gain the correct form, with this opportunity being offered to the individual learner several times to correct

his/her response. Meanwhile, the experimental group who received the IWB-mediated indirect, electronic elicitation CF was taught the same target words via the IWB. This group learned the target words via the Oxford Word Skills CD-ROM, which is the software specifically designed for Oxford Word Skills books. The software presents the new words one by one with proper images and pronunciations. After presenting the new words, each individual comes to the board to do an exercise. In some exercises, the new words are presented in the form of pictures. The software reads the new words and the learners are required to provide the correct answer by touching the right picture or word on the board. If any incorrect responses are detected by the software, some guidelines and opportunities, like reminding the learners to use the correct part of speech in the blank and highlighting the cues in the text in order to guide them to find the correct answers, are provided for the learners to redo the exercises. There is another type of exercise in the form of a dialogue or sometimes a text. A list of the new words and some sentences are provided. The learners should read the sentences and select the correct word from the list to drag it (by means of touching the board) into the blank. The moment the learners finish the exercises, the software will give them an indirect, electronic elicitation CF of their performance by putting a check next to correct responses or a cross next to wrong ones in order to guide the students to reformulate the ill-formed response. To this end, it is necessary to press a box, which is designed on the software, labeled as GET THE ANSWER. By doing this, the software will immediately give feedback on their performance. Following this, the learners can either see the correct answers or do the exercises again. The software and the IWB provided the learners with about 10 opportunities for each exercise to redo and correct their mistakes. Finally, the third group, i.e. the control group, was taught the target words according to the conventional method of vocabulary teaching while receiving no corrective feedback of either kind (neither conventional nor the IWB-mediated). After the completion of the instruction, all groups were given the vocabulary posttest, the results of which were statistically compared with those of the pretest to investigate the respective research questions.

Data Analysis

For data analysis, both descriptive and inferential statistical analyses (one-way ANOVA) were applied by the researchers. Employed to find any differences among the three independent groups, the one-way ANOVA was meant to establish that they were homogeneous before the treatments. In addition, it was conducted in order to compare the three groups after the treatments for any significant differences. All the analyses were performed via the SPSS software (version 22).

Data Analysis Results
Pre-Test Results

In order to determine the normality of the data, a one-sample Kolmogorov-Smirnov test was used. The results indicated that the data obtained from the target vocabulary pre-test was normally distributed. Also, Levene's test results indicated the homogeneity of variances. Thus, normality

and homogeneity assumptions as prerequisites to ANOVA test were established (Tables 1 and 2).

Table 1
Results for the Normality of the Distribution for the Pre-test

N		80
Normal Parameters	Mean	9.76
	Std. Deviation	4.31
Most Extreme Differences	Absolute	.09
	Positive	.09
	Negative	-.09
Test Statistic		.09
Sig. (2-tailed)		.06

Table 2
Levene's Test for the Homogeneity of the Variances

Levene Statistic	df1	df2	Sig.
1.092	2	77	.34

To ensure that the participants did not differ significantly before applying the treatments to the experimental groups, the researchers conducted a one-way ANOVA analysis on the target vocabulary pretest. The results are presented in Tables 3 and 4 below.

Table 3
Statistics for One-way ANOVA on the Vocabulary Pretest

Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	25	9.12	5.06	1.01	7.02	11.21	.00	19.00
3	25	9.32	3.44	.68	7.89	10.74	2.00	16.00
5	30	10.66	4.03	.73	9.15	12.17	3.00	18.00
Total	80	9.76	4.23	.47	8.82	10.70	.000	19.00

Note: 1. Pre-test control group 3. Pre-test Conventional group 5. Pre-test IWB-mediated group

Table 4
ANOVA Results for Performance on Target Vocabulary Pretest

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	39.74	2	19.87	1.11	.33
Within Groups	1374.74	77	17.85		
Total	1414.48	79			

As shown in the table above, the results revealed no significant difference across the three groups concerning their performances on the target vocabulary pretest [F (2, 77) = 1.11, p = .33]. Thus, the researchers could ensure that the groups were not significantly heterogeneous in their knowledge of the target words before treatment application.

Results for the Research Questions of the Study

To answer the research questions, the researchers conducted a one-way ANOVA analysis. Descriptive statistics, ANOVA results, and post-hoc test results are presented in Tables 5, 6, and 7 below. Since the same table (Table 7) was used to investigate each research question, the table was not repeatedly provided in reference to the second and third research questions in order to save space. It is worth mentioning that, as done for pretest scores, the normality and homogeneity tests were also run for the posttest scores to establish that the assumptions for the ANOVA test persisted for the data.

Table 5
Statistics for One-way ANOVA on the Vocabulary Posttest

Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	25	9.32	3.44	.68	7.8965	10.74	2.00	16.00
Conventional	25	9.96	4.00	.80	8.3068	11.61	3.00	18.00
IWB	30	15.70	2.96	54	14.5943	16.80	9.00	20.00
Total	80	11.91	4.52	.50	10.9053	12.91	2.00	20.00

To probe the first research question, the researchers tested the following null hypothesis: **conventional corrective feedback has no effect on L2 vocabulary learning by Iranian intermediate EFL learners.** As shown in Table 6 below, a significant difference was found among the three mean scores (p = .000). Post-hoc comparison revealed a significant difference between the control group and conventional groups [MD = .64, p = .001] (Table 7). Therefore, the researchers were able to reject this hypothesis.

Table 6
ANOVA Results for Performance on Target Vocabulary Posttest

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	693.68	2	346.84		
Within Groups	924.70	77	12.00	28.88	.000
Total	1618.38	79			

Table 7
Tukey's HSD Test Results for the Group Differences on Posttest Mean Scores

(I) g	(J) g	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	Conventional	-.64*	.98	.001	2.98	1.70
	IWB	-6.38*	.93	.000	-8.62	-4.13
Conventional	Control	.64*	.98	.021	1.70	2.98
	IWB	-5.74*	.93	.000	-7.98	-3.49
IWB	Control	6.38*	.93	.000	4.13	8.62
	Conventional	5.74*	.93	.000	3.49	7.98

*The mean scores were different at .05 level of significance

For the answer to the second research question, the researchers tested the null hypothesis below: **IWB-mediated corrective feedback has no effect on L2 vocabulary learning by Iranian intermediate EFL learners.** Likewise, based on Table 7 above, the post-hoc test results displayed a significant difference between the performance of the control group and the IWB group [MD = 6.38, p = .000]. Thus, this hypothesis could also be rejected.

Finally, in their attempt to investigate the third question, the researchers tested the hypothesis below: **IWB-mediated corrective feedback is not more effective than conventional corrective feedback in L2 vocabulary learning by Iranian intermediate EFL learners.** By the same token, post hoc test results (Table 7) revealed that the conventional and the IWB CF groups were significantly different [MD = 5.74, p = .000]. The effect size for IWB CF turned out to be quite large (Eta squared = 0.42). Thus, the last hypothesis was likewise rejected.

Discussion

This study was designed to explore the effect of IWB-mediated CF versus conventional CF on L2 vocabulary learning by Iranian intermediate EFL learners. The results confirmed the significant effect of IWB-mediated CF on L2 vocabulary learning of the participants. As mentioned earlier, several studies have been conducted, focusing on computer-mediated CF (e.g., AbuSeileek & Abualsha'r, 2014; Seiffedin & El-Sakka, 2017; Elola & Oskoz, 2010; Faghih & Hosseini, 2012; Ghazi & Zamanian, 2016; Ghufron, 2019; Henderson, 2019; Kim et al., 2020; Loewen & Erlam, 2006; Rassaei, 2019; Sachs & Suh, 2007; Sarré et al., 2019; Shaqaqi & Soleimani, 2018). Some studies have dealt with CALL and L2 vocabulary learning (Barani, 2013; Katwibun, 2013), and very little research was done on CF and L2 vocabulary learning (e.g., Henderson, 2019; Nakata, 2015; Sippel, 2019). As far as the researchers of this study have searched, no

study has been done regarding the effect of IWB-mediated CF. Therefore, this research tends to be mostly exploratory by nature than confirmatory from this perspective.

The results for the first research question revealed that conventional methods of providing CF slightly improved the learners' performance with regard to L2 vocabulary learning. This finding can be said to give credit to those findings by other researchers indicating that teachers' CF facilitates language learning and has a major influence on learners' writing performance (e.g., Caws, 2006; Ho & Savignon, 2007; Pan, 2010; Rabiee, 2010). On the other hand, the finding is not consistent with that of Tafazoli et al. (2014), which indicated that conventional written CF did not reveal any significantly positive effect on the grammatical accuracy of Iranian ESP students' writing. This discrepancy might be due to the fact that grammatical accuracy requires more consciousness-raising and adequate practice by the learners in addition to providing CF. Thus, CF alone might not suffice for this purpose.

In view of the findings for the second research question, it became apparent that IWB-mediated CF had a significant effect on learning second language (L2) vocabulary. This finding can be said to support those obtained by other studies on the efficacy of computer-mediated CF in learning different language skills and components (e.g., Bull, 2000; Caws, 2006; Hodge & Anderson, 2007; Faghih & Hosseini, 2012; Ghufron, 2019; Hulstijn, 2000; Kim et al., 2020; Rassaei, 2019; Razagifard & Rahimpour, 2010; Razagifard & Razzaghifard, 2011; Sachs & Suh, 2007; Sarré et al., 2019; Sauro, 2009; Seiffedin & El-Sakka, 2017; Yeh & Lo, 2009). More specifically, this finding supports the findings by some other studies (e.g., Amiri & Sharifi, 2014; Ghaniabadi et al., 2016; Shams & Dabaghi; 2014) which revealed that IWBs could significantly develop EFL learners' grammatical knowledge, writing ability, and reading comprehension skills.

The third research question revealed that the IWB-mediated feedback surpasses conventional CF when it comes to second vocabulary learning. This finding corroborates the study conducted by Shaqaqi and Soleimani (2018), who found that computer-mediated written CF had a significantly greater effect on the intermediate EFL learners' use of verb tenses than the conventional written CF. Likewise, it conforms to the finding by Ghazi and Zamanian (2016), indicating that computer-mediated CF was more effective in the intake of grammatical feedback than conventional CF modality. Similarly, the finding is in line with another study by AbuSeileek and Abualsha'r (2014) in which they investigated the use of peer-generated computer-mediated CF to enhance EFL learners' writing ability. Their finding indicated that the overall score of the learners who received computer-mediated CF was better than those who received recast and metalinguistic feedback.

As mentioned above, as the nature of this research was mostly exploratory rather than confirmatory, almost no directly related findings in the related literature could be traced, which means that comparing and contrasting the findings of the study with other genuinely relevant findings in the literature is not readily feasible from this perspective. This, in turn, can mean that this line of research is experiencing its initial infancy stage; many other quantitative and qualitative studies are to be conducted in order to throw more light on the

issues and help offer a comprehensive picture of the possible conclusive findings in the literature.

Conclusion

This study revealed that IWB-mediated CF was a highly effective and efficient recent advancement in language learning. The IWB provides feedback to individuals indirectly; therefore, implementing it in classrooms can lead to improved learning and active engagement of the learners. The IWB-mediated CF has mostly been used to improve learners' acquisition of grammar and writing skill. This study confirmed that using an IWB to provide CF can significantly promote L2 vocabulary learning as well. Consequently, it can be suggested that IWB-mediated teaching/learning can be incorporated into L2 teaching/learning contexts. Computer-assisted CF, however, can be offered in different types and modalities across other language proficiency levels. Thus, further studies are required in order to probe into the problem in a much wider scope. Also, employing elaborately-designed software, including interactive whiteboards, exclusively for providing CF, can yield more conclusive results and complete the picture of findings in the related literature in a more comprehensive way.

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