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Original Article

The Effect of Mobile-mediated Dynamic Assessment on EFL Learners' L2 Vocabulary Knowledge

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Abstract

This study examined the effect of mobile-mediated dynamic assessment (DA) to enhance English as a foreign language (EFL) learners' vocabulary learning. To this end, 78 pre-intermediate level EFL learners learning English at a language institute were selected based on their availability to the researcher. The participants were randomly assigned to three equal groups (one control and two experimental). Next, the vocabulary pre-test was conducted for all participants to observe their development throughout the instruction. WhatsApp was used in one of the experimental groups (mobile-mediated DA), and 26 students entered a talk group where DA was applied. The second experimental group received DA in class (in-class DA). The control group assessed the participants' zone of actual development (ZAD) at various points in the course. Concerning the experimental groups, a scale of prompts was used to mediate the learning process when students made an error, and the researcher acted as a mediator. The results showed that mobile-mediated DA was successful in enhancing EFL students' vocabulary learning. Moreover, a reduction in the prompt's mean score at the end of the course suggested that fewer prompts were required to divert the participants' attention to the error. The findings of this study can lead to a better understanding of the pedagogical importance of mobile-mediated DA.

Keywords: Dynamic assessment, EFL learners, L2 vocabulary, MALL, Zone of actual development

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1. Introduction

Teachers' approaches to pedagogy have been influenced in various ways over the last two decades by the necessity to adjust learning settings to learners' traits (Andujar, 2020). In this regard, the relationship between students and teachers, which is crucial in the classroom setting, often requires consistent and sustained feedback from the teacher, but owing to the conventional limitations of time and place, this interaction lacks constant input (Ally, 2008). To reinforce this interaction, smartphones have been4 utilized to enable students to access information from various sources, leaving static and motionless devices to become technological nomads (Kukulska-Hulme, 2009).

Mobile-assisted language learning (MALL) is a comparatively new field of computer-assisted language learning (CALL) research that has gained prominence with the advent of modern smartphone devices that improve learning in dynamic, genuine, and contextual settings (Kukulska-Hulme, 2009). Proponents of MALL claim that the accessibility of portable gadgets, including smartphones, compact digital dictionaries, iPod Touches, and tablets provide the second language (L2) learners with comprehensive, productive, and accessible learning experiences that PCs may not be capable of providing (Lantolf & Poehner, 2007).

As a virtual environment, mobile instant messaging (MIM) apps have been used where the instructor aims to keep the track of his/her students' progress and provide continuous feedback in case of language error during communication (Lantolf & Poehner, 2007). These applications' unique features, including instant message delivery via a pop-up mechanism, a user list, or a mechanism to signify whenever people are accessible, make them productive grounds for implementing a dynamic assessment (DA) approach (Lantolf & Poehner, 2011; Poehner et al., 2017).

Focusing on Vygotsky's (1978) mediator hypothesis and zone of proximal development (ZPD), DA emphasizes cognitive and social processes rather than the end product of learning. As Vygotsky (1978) argued, ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (p. 86). Based on Vygotsky's sociocultural theory and ZPD, a post-psychometric evaluation approach known as DA has arisen to recognize personality variations (Lidz & Gindis, 2003). As a result, in a standard DA protocol,

assessors/mediators are authorized to participate in the evaluation process through consultation (e.g., clues, prompts, and motions, etc.) within the learners' ZPD if they cannot reply to the appropriate tasks individually.

Most research on DA in L2 acquisition has highlighted its educational importance as a formative assessment tool (Lantolf & Poehner, 2011; Yang & Qian, 2019). This study, in which MIM and DA are included, focuses on this last form of DA. In DA, scholars have proposed two distinct approaches to mediation (Lantolf & Poehner, 2004). The interventionist approach is the first one, in which the mediator or tutor gives a sequence of prompts or warnings to students, with some degree of explicitness steadily increasing. This method concentrates on a single element of the language and reduces discourse to a sequence of drills that students must complete. The second approach is the interactionist, in which the mediator is a critical element in assisting learners' success by detecting their challenges and formulating solutions to any issues that arise during the interaction (Feuerstein et al., 2003). The extent of freedom for the mediator to respond to learners is one of the main distinctions between these two approaches, with the interventionist being more rigorous in terms of materials and stimuli anticipating the types of difficulties students may face (Poehner & Lantolf, 2010).

MALL offers a setting for promoting a community of fair opportunity, in which teachers and students can work together to achieve better results. Furthermore, owing to the potential it offers for DA, using mobile devices in learners' evaluation can be beneficial. As a result, this research aims to detect whether using mobile-mediated DA as a tool can improve L2 vocabulary knowledge in EFL learners. It is also within the scope of the present study to explore what prompts teachers most frequently use while giving feedback through the in-class and mobile-mediated DA.

2. Literature Review

2.1. Dynamic Assessment

Vygotsky (1978) viewed man and his environment as two forces that form each other in a spiral phase of development rather than as individual factors (Yang & Qian, 2019). Vygotsky (1978) claimed that, like all species, a human's capacity to establish lower-level or normal psychological mechanisms is biologically defined.

The result of an interventionist DA program is typically reported in terms of a series of points, one of which is an individual score that reflects learners' success without the assistance of mediators, i.e., learners' autonomous performance. In negotiated DA tests where no action is required during the exam, an actual score is the inverse of a learner's score (Poehner & Lantolf, 2005). A learner's score after seeking mediations from the assessor is referred to as a mediated score. A mediated ranking, in other words, reflects the learners' aided output. The difference between actual and negotiated scores reflects the learners' degree of openness to mediation, or the extent to which they have gained from the DA test's assistance/mediation. The disparity between their actual and mediated scores may demonstrate this (Poehner, 2008).

A large gap margin in favor of the mediated score indicates that the learner is more receptive to mediation (Poehner, 2007). Another essential aspect of interventionist DA is taking the learner's growth due to participating in the evaluation into account. The transfer score indicates whether students have expanded their learning to more challenging situations by disclosing the results of their exposure to more complex tasks than those in the initial DA exam.

Standard DA procedures cannot handle a significant number of participants at the same time. Lantolf and Poehner (2004) used a single grammatical element to improve learners' French-speaking capacity in the same study. As a result, they expected that in the future, two major problems would dominate the field of dynamic assessment: computer-based DA and group-based DA. These two versions can resolve the above issues (Lantolf & Poehner, 2007).

Poehner (2008) outlined three key benefits of computer-based DA over traditional DA: "it can be applied to large groups of learners at the same time; learners can be reevaluated as often as required, and; reports of learners' results are automatically generated" (p. 177). Computer-based DA methods, on the other hand, have been criticized. Most notably, as with other interventionist methods, the disadvantage of computer-based DA is linked to the type and efficiency of mediation it provides. Since the mediation is pre-planned, it cannot be adjusted to the individual needs of learners, no matter how meticulously structured it is (Poehner, 2007).

2.2. Mobile-Assisted Language Learning (MALL)

MALL focuses on language learning through using mobile devices (Kukulska-Hulme, 2009). Due to MALL's facilitative role in improving the standard of learning and teaching, its adoption has gained much attention in foreign language pedagogy (Andujar, 2020). MALL has several benefits that will help students learn more quickly and improve the standard of their learning. Ubiquity, Internet connection, interactivity, portability, and cost-effectiveness are only a few of the significant benefits of MALL (Yang & Qian, 2019). Furthermore, MALL offers a setting for promoting a community of fair participation, in which teachers and students can collaborate to achieve more remarkable results (Poehner et al., 2017). These benefits have prompted educational institutions and organizations to view MALL as a viable method of improving students' language skills.

There has been a dramatic increase in mobile instant messaging (MIM) over the last decade, including WhatsApp and Telegram. According to recent research, these apps can help people to learn and improve their second language. MIM research has looked at the opportunities for learning in various fields that this form of social networking provides (Andujar, 2020; Singh et al., 2018). Different studies have examined the possible advantages of MIM as an L2 learning method. Rezaee et al. (2020) explored the effect of mobile-based DA on improving EFL learners' oral fluency. Rezaee et al. (2020) found that the experimental group that received mobile-mediated DA improved their speaking fluency significantly better than the control group. Recently, Ebadi and Bashir (2021) examined the effect of mobile-mediated DA on EFL learners' writing skills. Experimental groups received a text- and voice-based mediations following an interactionist DA using both WhatsApp and Google Docs. The results showed that only the text group's post-test scores significantly improved, and there was a significant difference among the three groups in their post-test scores, which indicated outperformance of the voice group.

One of the key areas that MIM research has been consistently found advantageous is L2 vocabulary learning (Yang & Qian, 2019). Samaie et al. (2018) used MIM to test students' self-evaluation of oral language skills, but the findings were negative because students were hesitant to use this form of assessment. On the other hand, other scholars such as Zhang et al. (2011) pointed out some drawbacks to using MIM, such as the possibility of disturbance or the difficulties of remembering vocabulary learned in the application.

According to the literature, there is a need for giving continuous feedback to learners, whether in a computerized or in-class version of DA, as mediation becomes a central aspect throughout the growth of this form of approach. This mediation is mainly done by the instructor or pupils, who are in charge of intervening in social interactions. Because of their intrinsic characteristics such as ubiquity and availability, MIM apps have become effective instruments for developing DA to help teachers reach a higher degree of mediation. As a result, this research aimed to fill in a gap in the current literature about the use of mobile-mediated DA to promote vocabulary learning as well as to learn more about the ability of MIM to perform this type of evaluation. Whether using an interactionist or interventionist approach, research on DA has stressed the use of DA as an assessment tool. Similarly, some of the difficulties inherent in each approach seem to be essential to address, such as understanding the effects of interactionist approaches to provide more effective responses. In line with Feuerstein et al.'s (2003) arguments about mediation's more significant effect in exposing underlying difficulties and initiating the process of mediating growth, the purpose of this research was to merge interactionist and interventionist approaches.

Moreover, reviews have suggested that results are still inconclusive regarding the effectiveness of technology when learning an L2. Not only are the results inconclusive and conflicting, but there is also too little empirical evidence dealing with aspects of technology that are not basic features of mobile phones such as DA, which may be due to the novelty of the field. In addition, to compensate for the lack of research in MALL and DA, more potentials of MIM and language learning through free interaction need to be investigated. Thus, this study aimed to look into the potential of pedagogical DA in an L2 classroom in improving the EFL learners' vocabulary knowledge. Regarding the gap in the literature, the following questions were discussed and answered to achieve the objectives of the current study:

1. Does using in-class dynamic assessment play any role in EFL learners' L2 vocabulary knowledge?
2. Does using mobile-mediated dynamic assessment play any role in EFL learners' L2 vocabulary knowledge?
3. Is there any significant difference between in-class and mobile-mediated dynamic assessment in gaining L2 vocabulary knowledge?
4. What prompts do teachers use most frequently for in-class and mobile-mediated dynamic assessment?

3. Methodology

3.1. Design and Context of the Study

The design of the present study was a quasi-experimental pretest-posttest with a control group. The data was collected at the language center of Shiraz University, Iran, for three months from September 2020 to December 2020.

3.2. Participants

This research involved three groups (N = 78), each of which included 26 participants studying at the Language Center of Shiraz University, Iran. Participants were Persian speaking learners of English taking a pre-intermediate English course for four hours per week. Their availability to the researcher was taken into account when they were chosen. The participants' age ranged from 18 to 29. The demographic information of the participants has been presented in Table 1.

Table 1.

Demographic Background of the Participants

No. of Students	78
Gender	57 Females & 21 Males
Native Language	Persian
Setting	Language Center of Shiraz University
Time of Data Collection	September 2020 to December 2020

3.3. Instruments

3.3.1. The Proficiency Test

To assess the participants' general English proficiency level prior to the experiment, the participants completed the Oxford Quick Placement Test (OQPT), a formal English proficiency test. Oxford University Press and Cambridge ESOL developed the OQPT, a flexible measure of English language proficiency. It has been pre-tested and validated by about 6,000 students in about 20 countries. This test consists of 60 multiple-choice elements, and learners with scores ranging from 0 to 10 are considered beginners; the learners with scores of 11 to 17 are deemed breakthrough; learners with scores of 18 to 29 are considered elementary; Pre-intermediate students have 30 to 39 points; intermediate students have 40 to 47 points; advanced students have 48 to 54 points, and; proficient

students have 55 to 60 points. The exam lasted 20 minutes and was administered in a classroom environment.

3.3.2. Vocabulary Pre-test and Post-test

A vocabulary test was designed based on the participants' level of proficiency and the book they were studying (i.e., Top Notch). The test format was multiple-choice, including 50 vocabulary items. The test was piloted on a representative group of students (N = 20) at the same level in another language institute. The KR-21 was used to test the reliability of the test. The coefficient value for the KR-21 test was 0.86. Moreover, an item analysis was done on the test to make sure that item facility and item discrimination were appropriate. The content validity of the test was confirmed by three well-experienced EFL teachers. After piloting the test, it was conducted on both experimental and control groups. After the test, all the exam papers were collected and graded by the researcher. As scoring the test was objective, it was graded by only one scorer. The pre-test was utilized as the post-test, that is, the items were counterbalanced, and the order of the choices was changed to prevent the students from recalling the answers.

3.3.3. Prompts Inventory

An inventory of teacher prompts was created to provide learners with feedback in an incremental order ranging from the most implicit to the most explicit. Figure 1 illustrates the inventory of teacher prompts.

Inventory of Teacher Prompts

1. Teacher uses an emoticon (or visual/ auditory signal) which expresses that somebody is thinking.
2. Teacher uses a question-like intonation to repeat the whole utterance (elicitation).
3. Only erroneous part of the utterance is repeated (elicitation.)
4. Teacher identifies a flaw in the sentence.
5. Teacher refers to the incorrect words by capitalizing them.
6. Instructor proposes a more similar target form (recasts).
7. A metalinguistic clarification that is explicit is used.

Figure 1. *Teacher Prompts Inventories (adapted from Poehner & Lantolf, 2010)*

Whenever an error was made, the teacher rigorously followed this scale. When a non-target-like word or structure was mentioned, whether directly or indirectly, Prompt 1 was provided (Iwashita, 2003). Negative feedback was classified into three categories in the inventory, based on the degree of explicitness: restating a non-target-like form, recasts, and providing a more target-like form (Long, 1996). Elicitations are responses to previous instances indicating a more target-like form without providing any metalinguistic information.

On the condition that students produced target-like forms, higher-level errors such as style and register were ignored. Concerns about the difficulties posed by DA in computer-mediated communication, such as the inability to provide visual (e.g., gestures) or auditory (e.g., intonation) signals in an online context, were alleviated by the use of emoticons used in MIM apps.

3.3.4. Mark Sheet

As for the qualitative part of the study, the researcher used a journal including a mark sheet. The mark sheet was created to record the mediator's suggestions to each student when they made a mistake. This mark sheet included an interaction account, including the names of the users, the prompt issued, and the date it occurred. This helped the teacher account for the student's vocabulary learning process during the instruction through the feedback they receive using DA techniques.

3.4. Data Collection Procedure

First, 84 EFL learners were chosen, considering their availability. Then, the OQPT was conducted to assess the homogeneity of participants' language proficiency, and finally, 78 EFL learners at the pre-intermediate level were selected. After that, the participants were randomly put into three groups (one control and two experimental). Next, the vocabulary pre-test was conducted for all participants to observe their development throughout the instruction.

The course was taught for three months from September 2020 to December 2020. In one of the experimental groups (mobile-mediated DA), WhatsApp was introduced, and 26 students entered a talk group where DA was applied. The participants' identities were coded, and a WhatsApp group was formed. The second group was the second experimental

group who received the DA in class (in-class DA). The third group was the control group in which the participants' ZAD at various points in the course was assessed. The ZAD depicts a learner's current level at a particular stage of the learning process. The data collection procedure is depicted in Figure 2.

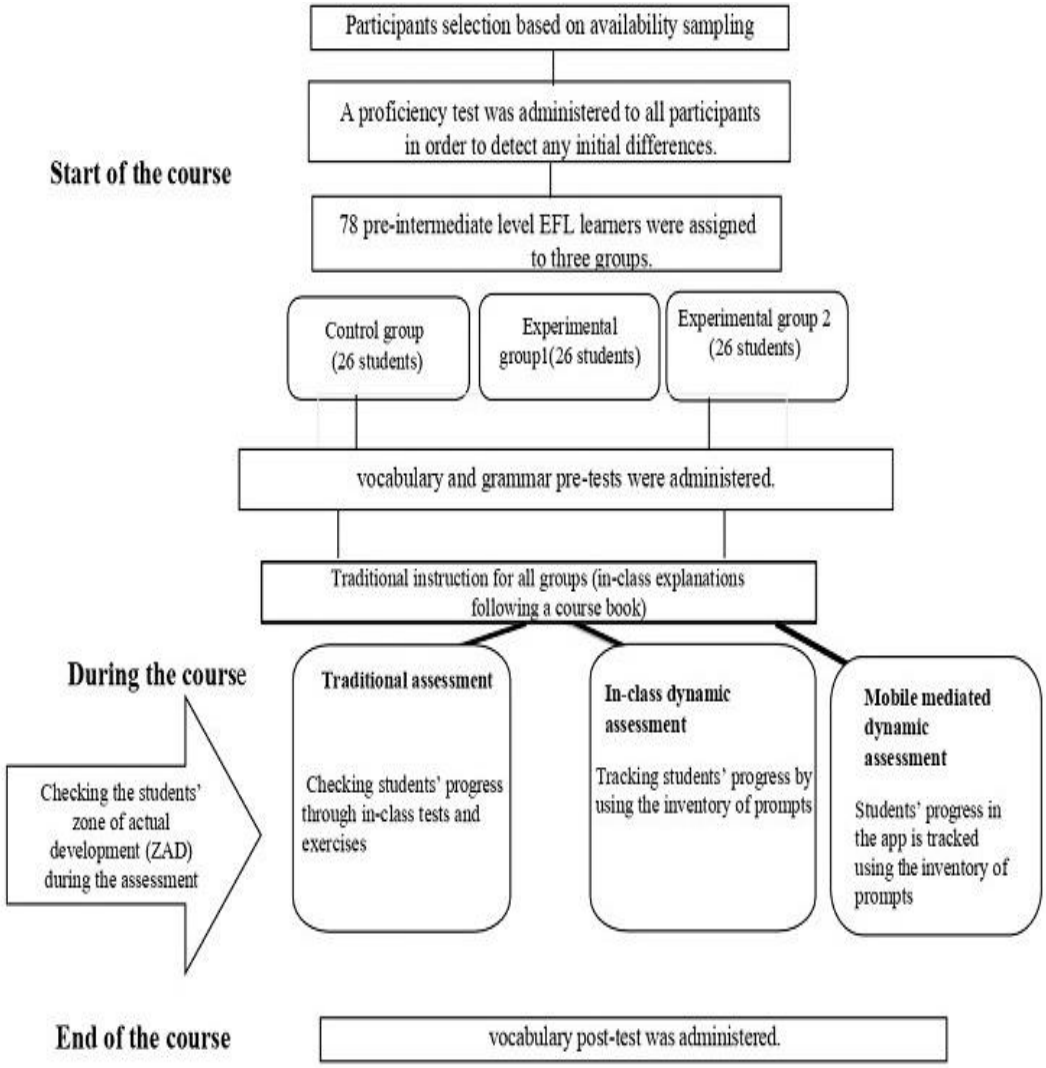

Figure 2. *The Procedure of the Study*

In the experimental groups, the researcher aimed to examine to what extent the participants' L2 vocabulary skills improved as a result of DA, and if MIM could be used to conduct DA. Concerning the experimental groups, a scale of prompts was used to mediate the learning process when students made an error (see Figure 2). When non-target-like forms emerged, the researcher, who was also the teacher of the groups under study, gave feedback to students from an inventory of prompts. These prompts were provided in order

of implicitness to explicitness. To assess the pedagogical DA at various intervals, the number of prompts used was computed at three points during the class, i.e., after two weeks (15/09/2020), two months (1/11/2020), and three and a half months (15/11/2020) from the beginning of the course. The researcher kept track of the name, prompts given, and date the repair was completed regularly using a mark sheet.

In the mobile-mediated DA group, the researcher was then able to go through the data collected using the web version of the platform to account for the degree of mediation used and the student's ZPD. In the mobile-mediated DA group, a variety of practical considerations were required to be taken into account, including asking participants' cell phone numbers, forming a WhatsApp community, and ensuring that all participants have a 3G or 4G Internet access. However, only writable material was included in the analysis. In the in-class DA group, on the other hand, the whole class sessions at the three measurement times were video recorded, and then teacher-student interactions were analyzed. The researcher took part in the discussion as the group's instructor, acting as a mediator in the participants' learning process and giving feedback as needed.

3.5. Data Analysis

First, Kolmogorov-Smirnov tests were utilized to confirm the normal distribution of the selected participants. Then, a one-way analysis of covariance (ANCOVA) followed by Bonferroni tests was employed to analyze statistically significant differences between pre and post-test scores in three groups. Moreover, to ensure that the variations between the three tests are statistically meaningful, descriptive statistics and one-way repeated measures ANOVA followed by pairwise comparisons of the complete number of prompts received during interactions were calculated for each experimental group. The qualitative analysis of data included the careful study of the researcher's journal (i.e., mark sheets of teacher's prompts) from the two experimental groups receiving DA, and a report on the frequency and percentage of the prompts given by the teacher.

4. Results

First, the Kolmogorov-Smirnov (K-S) tests were used to check the normality of the vocabulary pretest and posttest (see Table 2).

Table 2.

Results of Kolmogorov-Smirnov Tests on the Vocabulary Pre-test and Post-test

Group		Kolmogorov-Smirnov		
		Statistic	df	Sig.
Control	vocabulary pre-test	.133	26	.200
	vocabulary post-test	.121	26	.200
In-class DA	vocabulary pre-test	.154	26	.116
	vocabulary post-test	.138	26	.200
Mobile–mediated DA	vocabulary pre-test	.151	26	.114
	vocabulary post-test	.149	26	.140

As presented in Table 2, all the significance values were more than .05, implying no violation of the assumption of normality. Table 2 represents the mean score, standard deviation, minimum, and maximum grades of the participants on the vocabulary tests in three groups.

Table 3.

Descriptive Statistics of the Vocabulary Pre-test and Post-test Scores

Groups		N	Min.	Max.	Mean	SD
Control	pre-test	26	19	29	23.58	2.845
	post-test	26	30	38	34.00	2.245
In-class DA	pre-test	26	18	28	22.69	2.363
	post-test	26	32	43	37.54	2.470
Mobile-mediated DA	pre-test	26	18	28	23.04	2.435
	post-test	26	35	42	39.35	1.938

As Table 3 represents, the means of the three groups were very close to each other in the pre-test (23.58; 22.69; 23.04). However, on the post-test, the mobile-mediated DA group had the highest mean score (M = 39.35), and the in-class DA group had a higher mean (M = 37.54) than the control group (M = 34). This implies that DA in experimental groups had a positive effect on participants' performance.

To answer research questions one, two, and three which examined the significant differences between three groups in gaining L2 vocabulary knowledge, a One-way

ANCOVA was carried out. This measure was used to see whether the post-test results of the three groups differed significantly from the pre-test scores (see Table 4).

Table 4.

Results of ANCOVA on Vocabulary Post-test Scores

(I) Inp+ut Group	(J) Input Group	Mean Difference (I-J)	Std. Error	Sig.
Traditional assessment	In-class DA	-4.206*	.316	.000
	Mobile-mediated DA	-5.753*	.314	.000
In-class DA	Traditional assessment	4.206*	.316	.000
	Mobile-mediated DA	-1.546*	.313	.000
Mobile-mediated DA	Traditional assessment	5.753*	.314	.000
	In-class DA	1.546*	.313	.000

Table 4 shows that there was a significant difference between the performance of the three groups on the vocabulary post-test was found, F (2, 74) = 179.311, p < .05, partial η^2 = .829. The performance of the students on the pre and post-tests was significantly different. The value of partial η^2 is .829, which is a large effect size (Cohen, 1988), suggesting that almost 83 percent of the variance of the vocabulary test was explained by the treatment. To locate where the differences lie, Bonferroni post hoc tests were carried out (see Table 5).

Table 5.

Results of Bonferroni Post hoc Tests

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	663.016	3	221.005	174.226	.000	.876
Intercept	345.103	1	345.103	272.056	.000	.786
Vocab Pre-test	278.477	1	278.477	219.533	.000	.748
Group	454.910	2	227.455	179.311	.000	.829
Error	93.869	74	1.268			
Total	107317	78				
Corrected Total	756.885	77				

Table 5 shows that the average grades of both in-class DA (MD = 4.206, $p < .05$) and mobile-mediated DA (MD = 5.753, $p < .05$) groups were significantly different from that of the control group. This suggests that both experimental groups outperformed the control group in this study. Furthermore, the findings revealed a substantial difference between the in-class DA and the mobile-mediated DA groups (MD = 1.546, $p < .05$), suggesting the outperformance of the mobile-mediated DA group was over the in-class DA group in the vocabulary post-test.

Although the post-test scores enabled us to see a greater improvement in the participants' ZAD in both experimental groups, it was impossible to make a clear distinction between the three groups, since those in the experimental groups had more experience and rehearsal time. As a result, there was a need to assess participants' progress via DA by tracking the data produced by the interaction. Through comparing three different measurements taken throughout the course, the teacher's prompts inventory was used to interpret the participants' future progress. These three measurements considered the average of the prompts provided to students at various points of encounter.

For the mobile-mediated DA group, this information was entered into the SPSS program, and the data were analyzed using the web version. For the in-class DA group, this information was video recorded and, then, analyzed. Table 6 shows the number of messages in the app and the number of prompts given by the teacher in both experimental groups.

Table 6.

Results of Students and Teacher Production in Measurements 1 to 3

Group			Measurement 1	Measurement 2	Measurement 3
In-class DA	Teacher	Number of prompts	140	130	107
	Student	Number of sentences	331	352	310
Mobile-mediated DA	Teacher	Number of prompts	158	144	111
	Student	Number of sentences	683	741	760

As Table 6 shows, the teacher's number of prompts for the in-class DA group was 140 repairs in Measurement 1 (taken 15 days after the onset of the course), while the number of prompts for the mobile-mediated DA group was 158. For the in-class DA group, the teacher's number of prompts was reduced to 130 in Measurement 2 (taken two months after the beginning of the course) and dropped to 107 in Measurement 3 (taken three and a half months after the beginning of the course). For the mobile-mediated DA group, the number of prompts in Measurements 2 and 3 was reduced to 144 and 111, respectively. Moreover, the number of sentences in the mobile-mediated group was more than twice as much as the in-class DA group. In Measurement 3, there is a drop in the number of sentences produced by the in-class DA group, whereas the number of sentences in the mobile-mediated group increased to 760. Figure 3 illustrates the frequency of the prompts used in the in-class DA group. To this end, a stepwise method from less to more explicit was used.

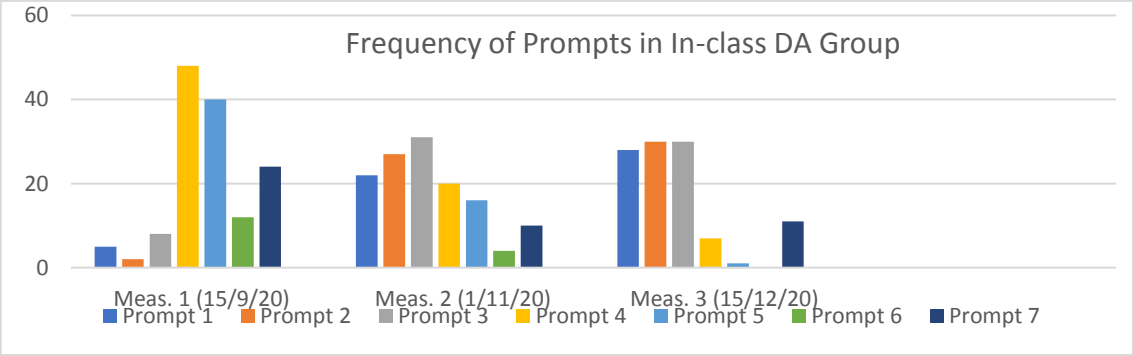

Figure 3. *Prompts Frequency Provided for In-class DA-Group Following the Intervention Scale (1–7)*

As Figure 3 demonstrates, the frequency and type of prompts given during the interaction in the in-class DA category are depicted. Measurement 1 revealed a high level of explicitness, with Prompts 4, 5, and 7. Measurement 2 was conducted 45 days after Measurement 1 to see if participants' potential development had progressed over time. After two months after the beginning of the class, Measurement 2 featured a turning point in participants' future development, as the sharp increase of frequencies for Prompts 1, 2, and 3 revealed that more implicit prompts were used in class. On the other hand, Measurement 2 showed a significant decrease in using explicit prompts.

The frequency and form of prompts given during the interaction in the mobile-mediated DA group are depicted in Figure 4.

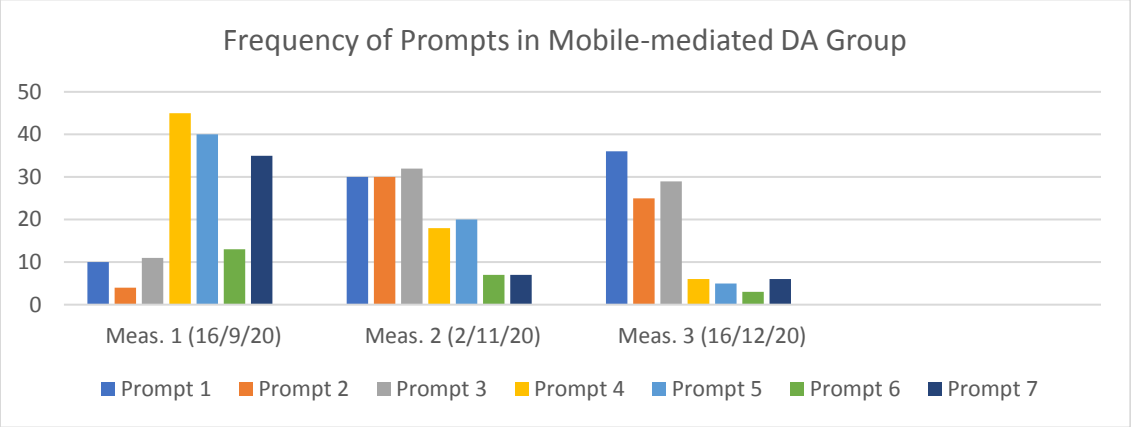

Figure 4. *Prompts Frequency Provided for Mobile-mediated DA-Group Following the Intervention Scale (1–7)*

As Figure 4 illustrates, similar to the in-class DA group, there was a high level of explicitness in Measurement 1, with Prompts 4, 5, and 7 used much more frequently than Prompts 1, 2, and 3. Measurement 2 taken 45 days after Measurement 1 showed a significant change in participants' learning, as the degree of explicitness had decreased. However, the degree of implicitness had sharply increased. Forty-five days later, the results of Measurement 2 were verified in Measurement 3, in which Prompts 1, 2, and 3 were the most frequent during the interaction. A One-way repeated-measures ANOVA was used to detect statistically significant differences between the various measures taken in the in-class DA group (Table 7).

Table7.

Results of One-way Repeated-measures ANOVA

Source		Sum of Squares	df	Mean Square	F	Sig.	partial η^2
Time	Greenhouse-Geisser	20.949	1.446	14.492	17.236	.000	.408
Error (time)	Greenhouse-Geisser	30.385	36.139	.841			

As Table 7 represents, the repeated-measures ANOVA with a Greenhouse-Geisser correction showed that the average of the frequency of prompt differed significantly between time intervals [$F(1.446, 36.385) = 17.236$, $p < 0.05$]. Table 8 illustrates the results of post hoc tests using the Bonferroni correction.

Table 8.

Results of Bonferroni Post hoc Tests

(I) Input Group	(J) Input Group	Mean Difference (I-J)	Std. Error	Sig.
Measurement 1	Measurement 2	.346	.135	.051
	Measurement 3	1.231*	.256	.000
Measurement 2	Measurement 1	-.346	.135	.051
	Measurement 3	.885*	.237	.003
Measurement 3	Measurement 1	-1.231*	.256	.000
	Measurement 2	-.885*	.237	.003

As Table 8 depicts, the mean scores of both Measurement 1 (MD = 1.231, p <.05) and Measurement 2 (MD = .885, p < .05) are significantly higher than that of Measurement 3. This means that mean of the frequency of prompts decreased significantly through the end of the course. Furthermore, the findings revealed no significant difference between Measurement 1 and Measurement 2 (MD = .346, p >.05). One-way repeated-measures *ANOVA* was used to validate statistically significant differences between the various measures taken in the mobile-mediated DA group (Table 9).

Table 9.

Results of One-way Repeated-measures ANOVA

Source		Sum of Squares	df	Mean Square	F	Sig.	Source
Time	Greenhouse-Geisser	44.795	1.686	26.565	34.417	.000	.579
Error (time)	Greenhouse-Geisser	32.538	42.156	.772			

As shown in Table 9, repeated-measures ANOVA with a Greenhouse-Geisser correction showed that the average of the frequency of prompt varied significantly between

time intervals [F (1.686, 42.156) = 34.417, $p < 0.05$]. Table 10 demonstrates the results of post hoc tests utilizing the Bonferroni correction.

Table 10.

Results of Bonferroni Post hoc Tests

(I) Input Group	(J) Input Group	Mean Difference (I-J)	Std. Error	Sig.
Measurement 1	Measurement 2	.538*	.186	.023
	Measurement 3	1.808*	.266	.000
Measurement 2	Measurement 1	-.538*	.186	.023
	Measurement 3	1.269*	.212	.000
Measurement 3	Measurement 1	-1.808*	.266	.000
	Measurement 2	-1.269*	.212	.000

As Table 10 represents, the mean score of both Measurement 1 (MD = 1.808, $p < .05$) and Measurement 2 (MD = 1.269, $p < .05$) were significantly higher than that of Measurement 3. This means that the mean of frequency of prompts significantly decreased through the end of the course. Moreover, the results showed a significant difference between Measurement 1 and Measurement 2 (MD = .538, $p < .05$).

5. Discussion

In the DA literature, one of the most important goals is to allow L2 learners to gain a more precise assessment of their ZAD and ZPD (Poehner et al., 2015). Aside from a correct identification of students' ZPD, the pedagogical perspective of this type of assessment is of high importance. The findings of this study can lead to a better understanding of the pedagogical importance of DA. In line with prior DA research (Andujar, 2020), students gradually reduced the number of prompts available and needed fewer explicit prompts, implying an improvement in their language competence as a result of the mediation techniques. At the end of the course, frequencies for Prompts 1, 2, and 3 were the most frequent during the interaction, showing that participants in both in-class DA and mobile-mediated DA groups could learn only by receiving more implicit feedback. Given the scale of prompts used in this study, a reduction in the prompts means score in both experimental groups can suggest that the feedback offered was more indirect and implicit, and fewer prompts were required to divert the participants' attention to the error.

This suggests that the ability for mediator-learner and learner-learner engagement to facilitate L2 learning, which has been previously illustrated in MIM research (Andujar, 2020), could be practical to the approaches to DA. Owing to the dialogic aspect of DA, the teacher had several chances to identify the students' linguistic difficulties and assist them in overcoming them and promoting their learning. Another explanation for EFL learners' improved vocabulary learning in the experimental groups may be the positive effects of having ZPD-oriented interaction during both in-class and mobile-mediated DA, which provided a conducive learning environment for developing vocabulary. According to Vygotsky (1978), learners may reveal such emergent functions not yet internalized in the context of collaborative interaction.

The findings cannot be compared explicitly with related studies in the field since this approach to DA is unique to this research. Nevertheless, previous studies on DA that used a graduated prompt method, including Andujar's (2020) and Poehner et al.'s (2015), stressed the potential of DA to reveal students' strengths and weaknesses in L2 learning. Unlike previous research on mobile-mediated DA which used an inventory of prompts to elicit automated responses to linguistic cues (Poehner et al., 2015), or a computer program that allowed students to choose from a variety of mediation prompts (Yang & Qian, 2019), in this study, the asynchronous nature of MIM enabled the instructor to track and analyze the interactions whilst still providing relevant feedback to the participants, ensuring that the feedback was of high quality. Simultaneously, the ability to respond directly to each student in the community facilitated the provision of this form of DA compared to in-class DA in which the teacher could not provide relevant feedback asynchronously. This can be one reason for the outperformance of the mobile-mediate DA group over the in-class DA group in the vocabulary post-test.

According to the findings of the research, mobile-mediated DA is successful in enhancing EFL students' vocabulary learning. The results supported previous research, indicating that EFL learners who used mobile-mediated DA reinforced their language skills (Andujar, 2020). One potential reason for this outcome is that mobile-mediated DA can help students communicate with the teacher when taking the test (Poehner, 2008). Moreover, learners may interact with the assessor in ways that are not possible in the formal tests by using mobile-mediated DA.

ZPD-based interaction within the evaluation process, according to Vygotsky (1978), provides a better perception of learners' abilities than ZAD alone. As a result, it is not surprising that the EFL learners' vocabulary learning improved dramatically after using mobile-mediated DA and in-class DA. The mobile-mediated DA group outperformed the in-class DA group. The reason for such an outcome may be the beneficial effect of supplying learners with various ways of mediation during the mobile-mediated DA phase (Poehner, 2008). The teacher's mediation during DA was highly tailored to a learner's requirement and delivered in a step-by-step manner. Since each learner's ZPD was different, the mediation given to them was distinctive as well.

Furthermore, the study's results were consistent with previous research on the efficacy of MALL in EFL learning (Andujar, 2020; Ebadi & Bashir, 2021; Rezaee et al., 2020; Thornton & Houser, 2005). Mobile technology offers a variety of learning opportunities and platforms that enable students to be more inspired, positioned (location-specific), and socially engaging (Yang & Qian, 2019). Furthermore, mobile devices offer student-centered teaching and learning environments in which students' learning is dependent on their active participation, and educators are seen as facilitators. The findings of this research differed from those of other researchers that found mobile learning to be ineffective for EFL learners (Alemi et al., 2012).

6. Conclusion

In this study, MIM apps were utilized to bring the DA approach to improve participants' L2 vocabulary learning into effect. The use of MIM aimed to optimize the benefits of this method of assessment by minimizing the disadvantages discovered in previous DA studies. Consistent with previous research (Andujar, 2020; Poehner et al., 2015), DA enabled students in the experimental groups to explore their ZPD.

The results also showed that in both DA groups, students needed less direct feedback to understand language errors they made by the end of the interaction, suggesting that they could interpret a specific language error quicker and create a more target-like structure. However, aside from the vocabulary test, this study did not assess actual learners' uptake. Therefore, we can solely make conclusions about the feedback type used in the present study intervention scale and how it developed during the experiment. In this study, learners were treated similarly irrespective of the degree of control they had over a

specific language feature whether the teacher provided feedback implicitly or explicitly. As a result, it would be difficult to tell how much control a learner had over his or her performance. It can be concluded that as students in DA groups had more inclination toward implicit feedback, they had developed more mastery over their language performance. However, students became more aware of their errors in the interactions and this affected the number of implicit prompts in this study. From our viewpoint and owing to the insight acquired during this research, the writers strongly believe that MIM can provide an excellent opportunity to extend students' in-class time and strengthen language interpretations and concepts.

The results have implications for both Iranian and non-Iranian EFL practitioners. First and foremost, MALL is regarded as a comparatively novel area that is rapidly evolving. Researchers and educators also have much work to do in the area of L2 teaching and learning to notice how mobile technology can be used to help different types of learning and improve useful approaches and resources.

The results of this study may support the use of mobile devices in EFL classrooms, providing scientific evidence in this field. Second, language teachers can effectively implement mobile-assisted DA as a new efficient teaching method. Language teachers can use the mobile-assisted DA to conduct L2 exercises outside class to enhance EFL students' vocabulary skills. It also aids teachers in identifying their students' vulnerabilities and providing remediation, as necessary. EFL students can also benefit from mobile-assisted DA because this type of assessment allows students' vocabulary to be more accurately measured, which may contribute to improving L2 results. Since mobile-assisted DA offers a stress-free learning atmosphere, it can provide a better picture of learners' abilities.

In this study, the participants' vocabulary retention was not measured. Future research, therefore, can include delayed post-tests to examine the effect of DA on the retention of new words. Moreover, this study was conducted in an EFL context. Hence, future studies can examine the effect of mobile-mediated DA on EFL learners' vocabulary knowledge in ESL contexts. Finally, the teacher, as the primary source of input in class, had to provide constant feedback which may not be practical in many educational settings; therefore, future research into DA can consider peer feedback resulting in the reduction of burden on the teacher.

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