Examining the Effects of Interactive Mobile-Based Multimedia on Iraqi EFL Learners' Writing Ability and Writing Motivation

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Abstract

Interactive Mobile-Based Multimedia (IMBM) encompasses the digital content on mobile devices that is likely to facilitate language learners' interlanguage development owing to its personalized learning features. Duolingo constitutes an IMBM application that has been widely used in language classes due mainly to its interactive learning environment and favorable gamified characteristics. Using a quasi-experimental design, the present study examined the impacts of Duolingo-informed writing instruction on Iraqi EFL learners' writing ability and Writing Motivation (WM). To this end, the researchers selected 50 intermediate-level EFL learners as the participants with the help of convenience sampling. They took advantage of writing, WM pretests, posttests, and Duolingo-informed treatment sessions to collect the data. Moreover, they analyzed the obtained data using the t-test and the MANOVA test. The results indicated that Duolingo-informed IMBM writing instruction significantly ameliorated the learners' writing performance and WM in their academic setting. The study discusses the implications of the results in the context of foreign language in Iraq.
Keywords: Duolingo, IMBM, WM, writing ability.

1. Introduction

The close examination of the recent research (e.g., AlAzzam-Khraiwish et al., 2021; Fadda & Alaudan, 2020; Marleni & Asilestari, 2018; Zohrabi & Khalili, 2025) indicates that IMBM has attracted considerable attention in the field of language instruction. IMBM comprises the digital content that is accessible on mobile platforms and expedites and facilitates the process of language learning by providing the learners with an interactive learning experience and enabling them to take part in adaptive language tasks (Li, 2023; Liu & Leveridge, 2017; Malekzadeh & Najmi, 2015). The interest in IMBM mainly stems from its congruence with various learning styles and preferences (Li & Bonk, 2023) and its availability both inside and outside the academic settings (Liu et al., 2016; Zohrabi & Khalili, 2024).

Among the various types of IMBM, interactive applications have been widely examined in

empirical studies (Kessler et al., 2023). These applications encompass the software that expedites learners' interlanguage development using interactive lessons (Yu, 2022). They are compatible with learners' various learning styles (Lee, 2020), empower them to take their time in task performance in a safe environment (Kaid Mohammed Ali & Rashad Ali Bin-Hady, 2019), and are likely to relieve them from their language learning anxiety in their classes (Ghounane & Rabahi, 2021). Duolingo constitutes a widely utilized IMBM application in various academic settings (Nushi & Eqbali, 2017; Khalili et al., 2025). It constitutes a free application that is installed on mobile devices, involves an engaging and interactive interface, takes advantage of gamified elements, and expedites the learners' interlanguage development (Khalili & Zohrabi, 2024; Perez, 2020). It is regarded as a more favorable IMBM application compared to the other applications since it provides the teachers with diverse pedagogical resources and facilitates the learners' individualized learning (Budiyanto & Ridho, 2024; Khalili et al., 2022).

The scrutiny of Duolingo's empirical studies indicates that they have disregarded certain research lines. First, most of these studies (e.g., Ajisoko, 2020) have examined its utility for vocabulary acquisition. Second, some studies have focused on the role of this application in learners' skill development, such as speaking (Kazu & Kuvvetli, 2022) and reading and listening (e.g., Xiangying et al., 2021). Lastly, a few studies (e.g., Kessler, 2021; Li & O'Rourke, 2022) have strived to determine the utility of this application for improving the learners' affective factors, such as their metacognitive awareness and engagement. Nonetheless, these studies have disregarded the learners' writing skill that determines their capability to use written mechanics such as vocabulary to organize thoughts, construct coherent arguments, and adapt writing style to different contexts and audiences (Khalili & Zohrabi, 2024). Moreover, they have not investigated certain affective factors, including WM which determines the learners' internal interest and desire to engage with writing tasks of the target language and to complete them despite numerous task performance challenges (Waller & Papi, 2017). Finally, there is a lack of research on Duolingo-informed IMBM writing instruction in the EFL context of Iraq. The present study endeavored to address these research issues in the Iraqi context by answering the following question:

1. Does Duolingo-informed IMBM instruction significantly affect Iraqi EFL learners' writing ability and WM?

2. Method

2.1. Participants

The researchers utilized convenience sampling to select the participants in light of the aims. Accordingly, they selected 50 intermediate-level EFL learners including 23 male and 27 female learners in two intact classes of a university in Baghdad (Iraq) as the participants (based on their results on a proficiency test) and obtained their consent. These learners were in the age range of 19 to 25 and spoke Arabic (37), Turkish (8), or Kurdish (5) as their mother tongue.

2.2. Instruments

The researchers used the following instruments to gather the data for the study:

2.2.1. Oxford Placement Test

In order to guarantee the participants' language ability homogeneity, the researchers used Alan's (2004) Oxford Placement Test (OPT). This test involves three main parts, including

grammar (20 items), vocabulary (20 items), and a cloze test (20 items). The researchers conducted a pilot study with 20 intermediate-level learners (10 male & 10 female) to examine OPT's reliability using Cronbach's Alpha (α) measure. Based on the results, this test was satisfactorily reliable (α=.85) and could be used in the Iraqi context.

2.2.2. Writing Pretest and Posttest

The researchers developed a writing pretest and a writing posttest using the writing topics in the textbook entitled *Intermediate Select Readings* (Lee & Gundersen, 2011). In each of these tests, the learners were prompted to write a 550-word essay on the relevant topic in forty minutes.

2.2.3. WM Pretest and Posttest

Considering the objectives, the researchers used Waller and Papi's (2017) WM questionnaire as the WM pretest and posttest of the study. This instrument encompasses seven items rated on a six-point Likert scale and addresses three main sub-components of WM: *intensity, effort*, and *desire*. The analysis results indicated that the reliability index of this questionnaire (.87) was acceptable and could be used in the present study.

2.2.4. Writing Assessment Framework

In light of the aims, the researchers used Brown and Bailey's (1984) writing assessment framework in order to assess the participants' performances on the writing pretest and posttest of the study. This framework enables the researchers to examine writing performance based on three underlying criteria, including style (20 points), mechanics (20 points), and structure (20 points). To examine inter-rater reliability, the researchers used the inter-rater correlation coefficient. Based on the results, this coefficient was (.81) and highlighted the reliability of the writing assessment in the present study.

2.2.5. IMBM Application

The researchers used Duolingo application as the IMBM application based on the purposes. Duolingo, Inc. developed this application in 2011. This application offers courses in 43 languages and aims to facilitate and expedite learners' acquisition of diverse aspects and skills of the target languages. Accordingly, it adopts specific approaches, including gamification and spaced repetition, to expose the learners to second language input, engage them in meaningful language use, and ameliorate their interlanguage development (Ajisoko, 2020).

2.3. Procedure and Data Analysis

In this study, first, the researchers select 50 intermediate-level EFL learners at a university in Baghdad (Iraq) as the participants based on their results on Allan's (2004) OPT and assigned one of these classes to the experimental group or Duolingo Group (DG) (25 participants) and the other to the Control Group (CG) (25 learners). Second, they administered the writing pretest and WM pretest to both groups to ensure their homogeneity before the beginning of treatment. Third, during the treatment, the researchers provided DG with IMBM treatment using the Duolingo application in sixteen sessions in eight weeks (i.e., two sessions per week). More specifically, they asked the participants in this group to install the Duolingo application on their mobile phones. They apprised them of the interface's features and the design of its units and courses. In addition, they made the learners cognizant of the role of their meaningful interaction in completing the tasks and prompted them to rely on their background information in task

performance. Accordingly, the learners were assigned *sentence translation*, *response to prompt,* and *journaling* writing tasks that enabled them to express their ideas effectively. In addition, they were assigned story engagement tasks that empowered them to take part in follow-up discussions. Lastly, the learners were assigned summary writing tasks in which they listened to Duolingo podcasts and summarized their content by writing paragraphs about the pertinent podcasts. In each treatment session, the researchers used peer review sessions to enable the learners to assess their peers' writing performance and provide each other with formative feedback. Nonetheless, CG was instructed using the product-oriented writing instruction approach. The researchers provided the learners with writing topics and asked them to write 550-word essays in 40 minutes. Fourth, the researchers administered the writing posttest and WM posttest to DG and CG to examine the effectiveness of IMBM treatment. Finally, the researchers analyzed the obtained data using SPSS 25.

The researcher used the quasi-experimental design to conduct the present study. Creswell (2009) stated that this design enables the researchers to examine the effects of a number of independent variables on certain dependent variables without using random participant assignment. Accordingly, in this study, the researchers scrutinized the impact of IMBM writing instruction (i.e., independent variable) on Iraqi EFL learners' writing ability and WM (i.e., dependent variables) in intact classes of the selected university.

In this study, the researchers used Mean and Standard Deviation descriptive statistics, independent-samples t-test, paired-samples t-test, and MANOVA inferential statistics (Pallant, 2020) to perform the data analysis.

3. Results

The researchers examined the features of the obtained data to determine the required statistical tests. The results of preliminary analysis indicated that the data were congruent with parametric test assumptions since they were independently collected interval data that were normally distributed based on the results of Kolmogorov-Smirnov and Shapiro-Wilk normality tests ($p > .05$). As a result, t-test and MANOVA tests were used to perform the analysis (Pallant, 2020). Accordingly, first, the researchers compared the performances of DG and CG on writing and WM pretests to ensure their homogeneity. Table 1 shows the descriptive statistics on the writing pretest:

Table 1

Descriptive Statistics on Writing Pretest Performances

Groups	N	M	SD	SEM
DG	25	21.44	2.274	.455
CG	25	21.80	1.826	.365

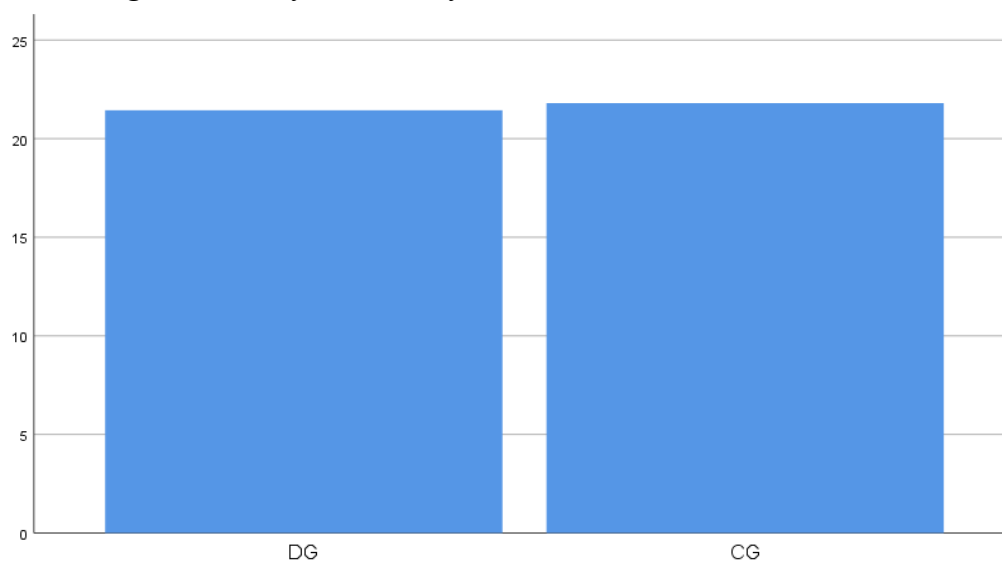Table 2 shows the results of the relevant independent samples t-test of the writing pretest:

Table 2

The t-test of Writing Pretest Performances

| | Levene's Test | | t-test | | | | | 95% CI | |
	F	Sig.	t	df	Sig. (2-tailed)	MD	SED	Lower	Upper
Equal variances assumed	2.677	.108	-.617	48	.540	-.360	.583	-1.533	.813
Equal variances not assumed			-.617	45.855	.540	-.360	.583	-1.534	.814

As shown in Table 2, DG and CG were homogeneous regarding their writing pretest performances (p>.05). Figure 1 shows these results:

Figure 1

Writing Pretest Performances of DG and CG

In addition, Table 3 provides the descriptive statistics on the WM pretest:

Table 3

Descriptive Statistics on WM Pretest Performances

Groups	N	M	SD	SEM
DG	25	20.12	1.878	.376
CG	25	20.56	1.609	.322

Table 4 indicates the results of the relevant independent samples t-test of WM pretest:

Table 4

The t-test of WM Pretest Performances

	Levene's Test		t-test

	F	Sig.	t	df	Sig. (2-tailed)	MD	SED	95% CI Lower	Upper
Equal variances assumed	.718	.401	-.890	48	.378	-.440	.495	-1.435	.555
Equal variances not assumed			-.890	46.900	.378	-.440	.495	-1.435	.555

According to Table 4, DG and CG were homogeneous in regard to their WM pretest performances (p>.05). Figure 2 illustrates these results:

Figure 2
WM Pretest Performances of DG and CG
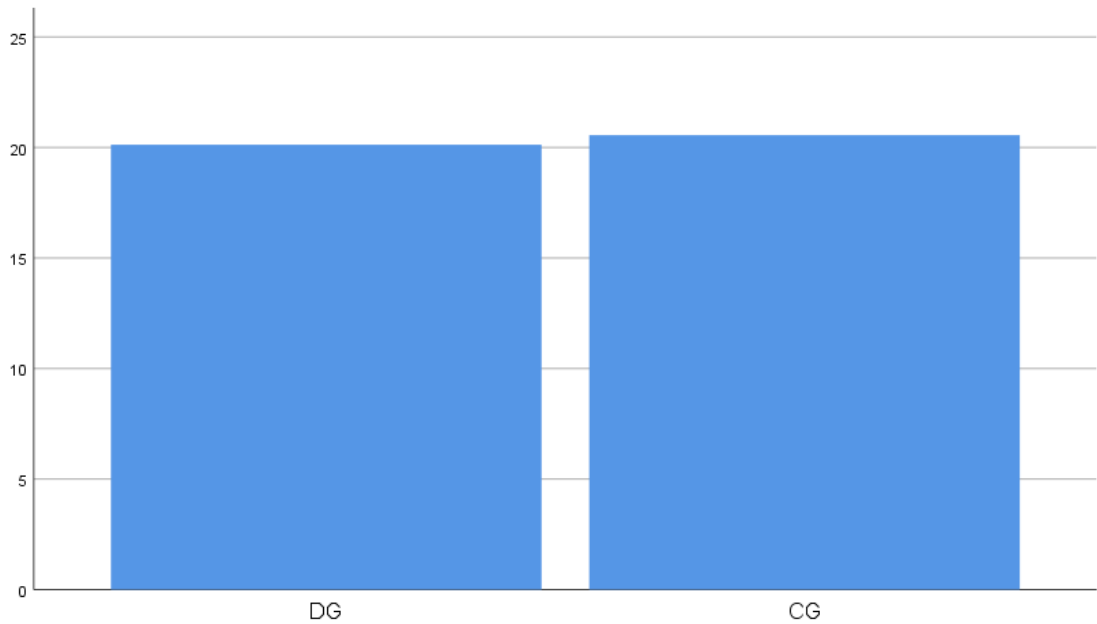
Considering these results, the researchers proceeded to answer the research question:

1. Does Duolingo-informed IMBM instruction have a significant effect on Iraqi EFL learners' writing ability and WM?

In light of the aim of this question, the researchers compared the performance of DG on writing and WM pretests and posttests. Table 5 shows the pertinent descriptive statistics:

Table 5

Descriptive Statistics on the Performances of DG on Writing and WM Pretests and Posttests

		M	N	SD	SEM
Pair 1	DG Writing Pretest	21.44	25	2.274	.455
	DG Writing Posttest	38.96	25	2.669	.534
Pair 2	DG WM Pretest	20.12	25	1.878	.376
	DG WM Posttest	32.36	25	3.108	.622

　　　　Table 6 provides the results of the pertinent paired-samples t-tests of the performances of DG on the writing and WM pretests and posttests:

Table 6

The t-tests of the Performances of DG on Writing and WM Pretests and Posttests

	Paired Differences							Sig. (2-tailed)
				95% CI				
	M	SD	SEM	Lower	Upper	t	df	
Writing Pretest-Posttest	-17.520	3.293	.659	-18.879	-16.161	-26.603	24	.000
WM Pretest-posttest	-12.240	3.767	.753	-13.795	-10.685	-16.247	24	.000

　　　　As shown in Table 6, DG had significantly better performances on writing and WM posttests compared to the pretests (p<.05). Figure 3 and Figure 4 show these results:

Figure 3

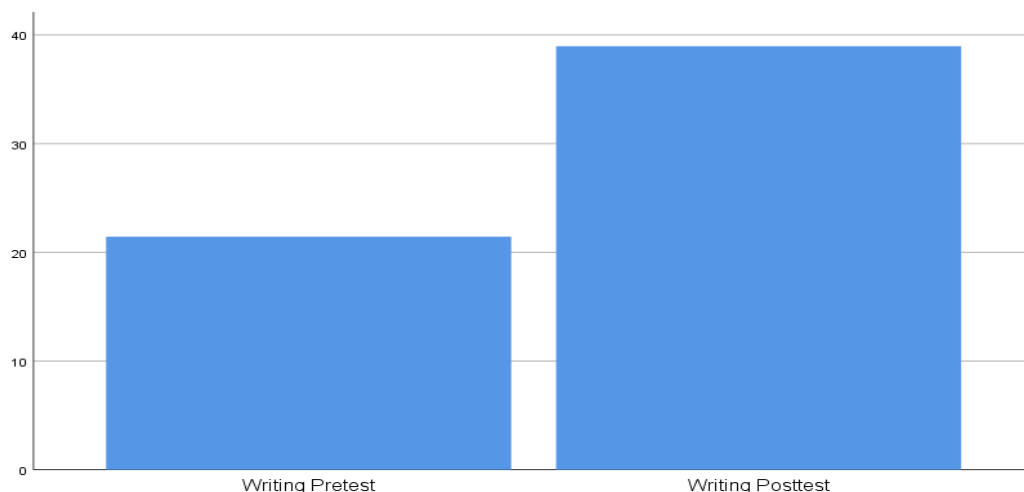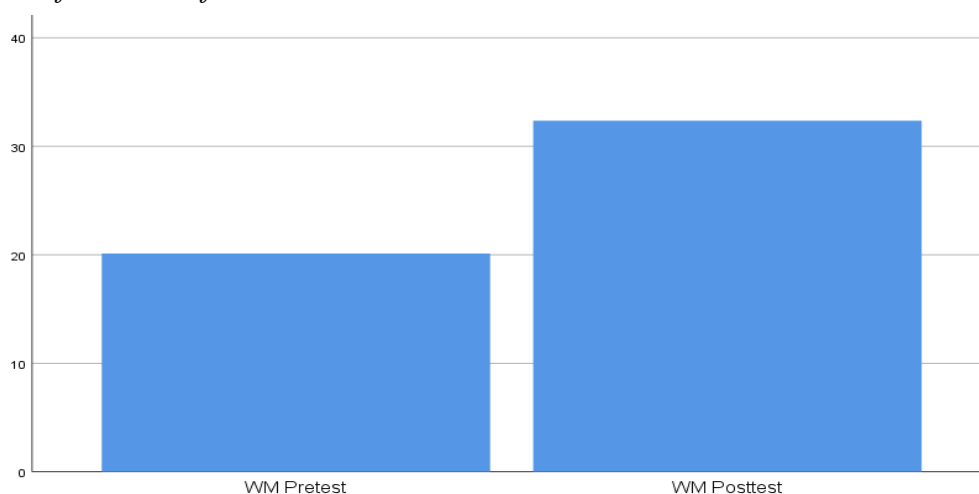*Performance of DG on Writing Pretest and Posttest*

Figure 4

Performance of DG on WM Pretest and Posttest

Nonetheless, the researchers used the MANOVA test to ensure that the improvements to the writing and WM of DG stemmed from the IMBM treatment of the present study. Table 7 shows the results of multivariate tests:

Table 7

Multivariate Test Results

Effect		Value	F	Hypothesis df	Error df	Sig.
Groups	Pillai's Trace	.946	413.130	2.000	47.000	.000
	Wilks' Lambda	.054	413.130	2.000	47.000	.000
	Hotelling's Trace	17.580	413.130	2.000	47.000	.000
	Roy's Largest Root	17.580	413.130	2.000	47.000	.000

According to Table 7, the Wilks' Lambda multivariate test result was significant

(p<.05). Consequently, the researchers examined the results of between-subjects tests. Table 8 provides the relevant results:

Table 8

Results of Between-Subjects Tests

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Writing Posttest	2797.520	1	2797.520	661.613	.000
WM Posttest	824.180	1	824.180	139.141	.000

As shown in Table 8, DG outperformed CG on writing and WM posttests (p<.05). Duolingo-based IMBM instruction of the study significantly ameliorated the participants' writing and WM. Figures 5 and 6 show these results:
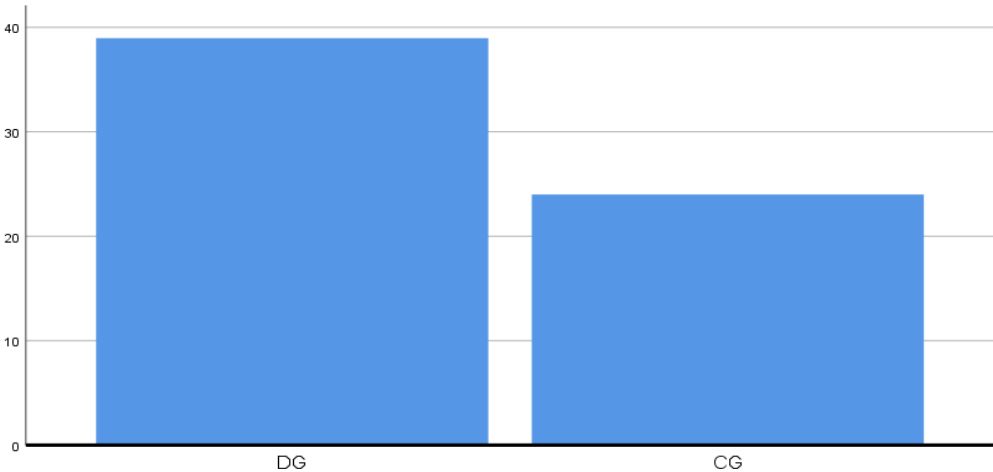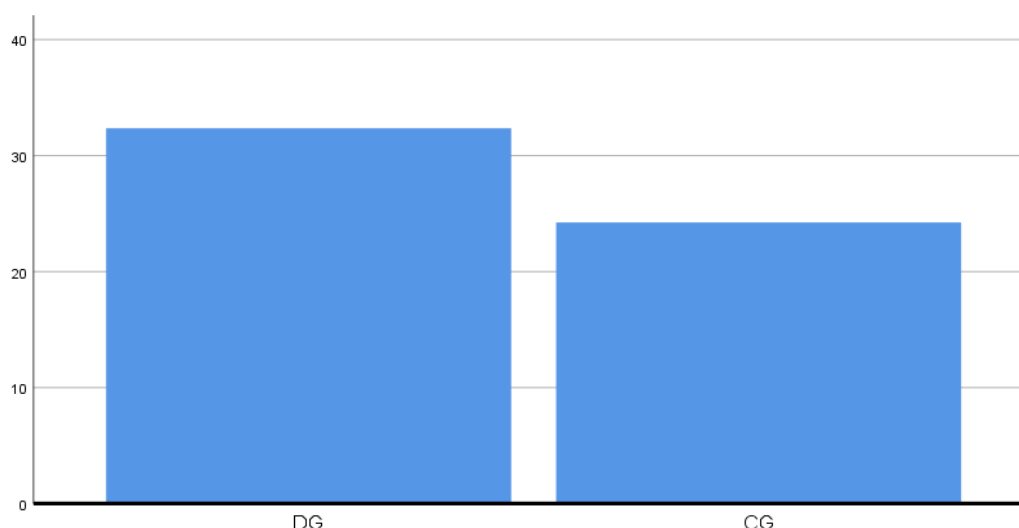
Figure 5

Writing Posttest Performances of DG and CG

Figure 6

WM Posttest Performances of DG and CG

4. Discussion

The study's research question examined the impacts of Duolingo-informed IMBM instruction on Iraqi EFL learners' writing ability and WM. Based on the results, this type of instruction significantly ameliorated the learners' writing performance and their WM in the process of task performance. Regarding the learners' writing ability, the results corroborate the results of Xiangying et al. (2021), Kazu and Kuvvetli (2022), and Purwanto et al. (2022).

Xiangying et al. (2021) stated that in their study, Duolingo-informed instruction had a beneficial impact on their learners' reading and listening skills since it utilized structured practice and feedback. According to them, the spaced repetition and immediate feedback in this approach enabled the learners to pay attention to the formal aspects of the language and to deal with the areas for improvement effectively. In addition, Kazu and Kuvvetli (2022) pointed out that the effectiveness of Duolingo-informed IMBM instruction for ameliorating their learners' speaking skills stemmed from the fact that it exposed them to the contextualized uses of various words and grammatical structures. As they noted, the focus on context enabled the learners to internalize the nuances of sentence construction. Lastly, Purwanto et al. (2022) stated that in their study, Duolingo was a viable instrument for teaching second language skills owing to the fact that it integrated gamification into the learning process. According to them, the gamified elements of this application, such as its points and rewards, created an engaging learning environment for the learners and improved their language skill development. Considering these discussions, it can be stated that, in the present study, Duolingo-informed IMBM instruction significantly improved the participants' writing ability due mainly to the fact that it provided them with structured writing practice and immediate written corrective feedback, exposed them to contextualized uses of language forms in second language texts, and engaged them in writing tasks using gamified aspects.

Additionally, in regard to the language learners' WM, generally, the results are in line with the results of Kessler (2021) and Li and O'Rourke (2022). Kessler (2021) reported that in his study, Duolingo-based instruction had an advantageous impact on the learners' metacognitive awareness since it took advantage of various types of language tasks and required the learners to use their language skills in different contexts. They explained that these tasks made the

learners cognizant of the different uses of language forms and functions and improved their metacognitive awareness. In addition, Li and O'Rourke (2022) noted that in their study, Duolingo-based instruction significantly improved the learners' engagement with their tasks due to its interactive nature and its peer review process. As they pointed out, the constant interaction between the learners and the application encouraged them to practice their skills regularly. Moreover, the peer review opportunities in Duolingo-based instruction enabled the learners to provide their peers with feedback and to engage them in task performance. Consequently, it can be argued that in the present study, Duolingo-informed instruction significantly ameliorated the participants' WM owing to the fact that it used various writing tasks, engaged them in constant writing-based interaction using its interface, and enabled them to take advantage of their peers' feedback on their writing performance.

5. Conclusion

This study strived to determine the extent to which Duolingo-informed IMBM instruction influenced Iraqi EFL learners' writing performance and WM. The results indicated that the use of this application improved the learners' writing performance and increased their WM in various writing tasks. The results indicate that it is necessary to overhaul EFL teacher education courses in the Iraqi context. In this regard, there is a need to include a technology-oriented module in the relevant courses that informs the teachers about IMBM applications, including Duolingo, and enables them to integrate them into their language classes to improve their learners' language skills, including writing and affective factors such as WM. Moreover, teacher educator empowerment courses are essential in the Iraqi context. These courses can provide educators with information about state-of-the-art applications, such as Duolingo, and can help them incorporate their discussions into their education courses.

In addition, the results highlighted the need to revise teacher manuals and instructional materials. In this regard, Iraqi EFL syllabus designers should include a technology section in the pertinent manuals to enable teachers to put IMBM applications, including Duolingo, into practice to ameliorate their learners' writing performance and WM. Additionally, they have to include specific Duolingo-based writing tasks in the EFL textbooks that enable the learners to take advantage of its advantageous features, including its gamified elements, structured practice, and diverse tasks to develop satisfactory second language writing skills.

Lastly, the results showed that EFL teachers can utilize Duolingo as a viable instrument in writing instruction. Accordingly, Iraqi EFL teachers need to utilize Duolingo's various writing tasks, including sentence translation, response to prompt, and journaling tasks, to facilitate their learners' writing skill development and to ameliorate their WM in task performance.

This study suffered from two limitations that may negatively influence the generalizability of its results. These limitations stemmed from the researchers' lack of ability to use random participant assignment and their lack of capability to control the impacts of the learners' personal attributes (e.g., age & language background) on the results. In addition, the researchers delimited the study by focusing on writing ability and WM without dealing with the other skills (e.g., reading) and affective factors such as writing self-efficacy, among others. The future studies need to address these issues. In addition, they have to use mixed-methods designs in order to delve more deeply into the impacts of Duolingo-informed IMBM instruction on the language learners' writing performance and WM. Lastly, the relevant studies should be conducted in both the second and foreign language contexts to determine the generalizability

of the results obtained in the present study.

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