

## Impacts of Interactive Mobile-Based Multimedia on Iraqi EFL Learners' Vocabulary and Grammar Learning

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Research Paper

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**Abstract:** Technological advancements have been one of the major influences on language instruction and learning in recent decades. Interactive mobile multimedia constitutes one category of these advancements that takes the form of interactive mobile applications and engages learners in learning tasks beyond academic settings. This study scrutinized the extent to which Duolingo mobile application influenced Iraqi EFL learners' vocabulary and grammar learning. In addition, it endeavored to determine these learners' perspectives on this language-learning application. Accordingly, the researchers used a mixed-methods approach. To this end, in the quantitative phase, they used convenience sampling to select 50 intermediate-level Iraqi EFL learners at a university as participants. Moreover, they utilized vocabulary and grammar pretests and posttests to determine the efficacy of Duolingo-based treatment sessions. In addition, the researchers provided the experimental group with Duolingo-based treatment in 16 sessions in two months. More specifically, in this group, they asked the learners to do the vocabulary and grammar exercises provided by this application and to share their answers with the researchers and the other learners. Additionally, they conducted interviews with a number of the learners who had received the relevant treatment to determine their perspectives on this application. The results showed that Duolingo-based teaching significantly benefited the participants' acquisition of vocabulary items and the grammatical structures of the target language. Moreover, learners had favorable views on this application's efficacy and considered it as a viable language-learning instrument. The study discusses implications of these results for Iraqi teacher education courses, syllabus designers, and language teachers.

**Keywords:** Duolingo, Grammar, Interactive Mobile Multimedia, Iraqi EFL Learners, Vocabulary

### Introduction

A perusal of related literature (e.g., Kusmaryan et al., 2019; Li, 2023; Liu et al., 2016; Loewen et al., 2019) highlights the fact that the teachers have recently focused on interactive mobile multimedia in language teaching. This type of multimedia encompasses the digitally developed content that empowers language learners to take part in dynamic and adaptive language learning experiences on diverse types of mobile platforms, including smart mobile phones and tablet computers, among others (Li & Bonk, 2023; Liu & Leveridge, 2017; Marleni & Asilestari, 2018). Interactive multimedia has attracted attention due mainly to its availability in both academic and non-academic settings (Liu et

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al., 2014). In addition, the popularity of this multimedia type stems from its compatibility with learners' different language learning styles (Kessler et al., 2023; Malekzadeh & Najmi, 2015).

In language teaching, interactive mobile applications constitute one of the main types of interactive mobile multimedia that have been examined in multitudinous empirical studies (Kusmaryani et al., 2019; Yin et al., 2021). These applications encompass the various types of software installed on mobile devices that enable the learners to internalize the knowledge of the second language and to develop language skills using interactive lessons (Liu et al., 2022). They are regarded as effective language learning tools because they tend to reduce learners' foreign language anxiety (Lee & Lee, 2020; Liu et al., 2016). Moreover, they are likely to ameliorate learners' motivation and may improve their engagement in diverse types of learning tasks (Li & O'Rourke, 2022). In addition, these applications are extremely user-friendly, and their colorful interfaces make language learning an enjoyable experience for most language learners (AlAzzam-Khraiwish et al., 2021). Lastly, they can make the learners cognizant of their internal language learning abilities and enable all of them to participate in language acquisition in their classes (Fadda & Alaudan, 2020).

The scrutiny of the various mobile applications and their users indicates that Duolingo constitutes one of the most widely used applications across the world (Li & Bonk, 2023). This application involves courses on 43 languages ranging from English (that are studied in multitudinous contexts) to languages such as Welsh (which large groups of individuals do not study). It comprises a user-friendly, colorful, and interactive interface that attracts the learners' attention to various language features and expedites their language learning by helping them to use gamification instructional strategies (Kaid Mohammed Ali & Rashad Ali Bin-Hady, 2019; Li & O'Rourke, 2022). The above-mentioned characteristics of Duolingo highlight the need for various empirical studies to determine its utility for learning the various aspects of the target language.

The necessity of conducting this study is increasingly apparent in the EFL Iraqi context owing to the fact that Iraqi policymakers have highlighted the supremacy of technology-informed language learning over traditional learning approaches. In this regard, they have accentuated the need for the integration of technology into language classes to facilitate and expedite the learners' development of the language skills that are required for their global communication. Moreover, this study may make a significant contribution to language instruction in Iraq since it addresses an educational gap in this context by providing insights into how mobile applications (including Duolingo) can supplement classroom instructional materials. In this way, the study may determine solutions to certain problems including the limited language instruction resources and teacher shortage in Iraqi context. Lastly, the study is likely to deal with the gaps in the literature on the efficacy of mobile language teaching applications in Iraq and may prompt the researchers to conduct similar studies in different academic settings in Iraq.

## Literature Review

### Interactive Mobile-Based Multimedia

In recent years, the rise of mobile technology has had a major impact on individuals' access to information and their interaction with digital content (Yu, 2022; Zohrabi & Khalili, 2023, 2024 a, b). The recent advancements in this technology category have facilitated the use of interactive mobile-based multimedia (Alghasab et al., 2020). This type of multimedia integrates diverse media types (e.g., text, image, video) into a single platform that expedites individuals' active interaction with the pertinent content using methods such as touch, gestures, and input methods, among others (Alsaadat, 2018; Cai et al., 2021; Isaacs et al., 2023).

A glance at the research on interactive mobile-based multimedia indicates that the researchers have mainly focused on its six major types including podcasts and audio resources, social media and online communities, augmented reality and virtual reality, games and gamification, web-based platforms, and mobile applications (Chen et al., 2022; Handayani et al., 2021; Mustafa & Sailin,

2022; Refat et al., 2020; Sudina & Plonsky, 2023). Podcasts and audio resources encompass the interactive audio content that takes advantage of quizzes, discussion prompts, and structured audio lessons to facilitate learners' development of listening and speaking skills (Khalili et al., 2022; Perwita et al., 2021; Shortt et al., 2023). Social media and online communities refer to platforms such as Instagram, Facebook, and WhatsApp that expedite learners' acquisition of various aspects of the second language by allowing them to join groups and to engage in discussion with both native speakers and other language learners across the world (Alamer & Al Khateeb, 2021; Kumar & Goundar, 2023).

Augmented reality comprises the technology that overlays digital language content to learners' real world experiences using sounds, images, and sensory information. It enhances their perception of language-related information in their physical environment (Jiang et al., 2022). Virtual reality involves the simulations generated by computer devices and empowers the learners to interact with them using hardware such as controllers and headsets (Aydın & Çakır, 2022; Ghounane & Rabahi, 2021). It provides the language learners with an immersive experience of the simulated world and makes them feel like they are present within it and can interact with its elements in the process of language acquisition (Chin & Wang, 2021). Educational games refer to the interactive games that have been specifically developed to facilitate language learners' acquisition of target language skills and aspects (Xu et al., 2020). These games encourage the learners to set specific learning objectives, expedite their active participation in language learning process, and provide them with feedback on their language output (Li et al., 2022).

Web-based platforms encompass the online platforms that are accessible via mobile browsers and take advantage of video tutorials, quizzes, and forums to provide language learners with interactive language learning experiences (Kashanizadeh & Shahrokhi, 2021; Li et al., 2022). Lastly, mobile applications refer to the software that is specifically designed for mobile devices and takes advantage of diverse digital tools and features to provide language learners with an interactive learning experience (Ekici, 2021). These applications use gamification and interactive tasks to facilitate learners' personalized learning in their academic settings (Belda-Medina & Calvo-Ferrer, 2022; Lee, 2020). They have attracted considerable attention among the above-mentioned interactive multimedia types owing to the fact that they are convenient to use and constitute easily accessible language learning tools (Kan & Tang, 2020). In addition, they provide the learners with instant feedback, expedite their self-correction in task performance, and empower them to develop practical language skills by taking advantage of real-world scenarios (Khalili et al., 2024; Shirmardi et al., 2021).

Duolingo has attracted considerable attention among the various interactive language learning mobile applications (Nushi & Eqbali, 2017; Perez, 2020). This software constitutes a free language acquisition application that provides the learners with a gamified-informed platform that facilitates their language skill development (Khalili & Zohrabi, 2024; Teske, 2017). It is considered a more satisfactory application compared to similar applications owing to the fact that it provides language teachers with pedagogical resources that support learners' second language acquisition (Dobakhti & Khalili, 2024; Li & Bonk, 2023). Furthermore, it is accessible to a wide range of learners across the world and empowers them to take advantage of its adaptive learning system to expedite their personalized language acquisition (Budiyanto & Ridho, 2024; Sharififar et al., 2025). In addition, Duolingo takes advantage of gamification and makes the learners' language learning process more engaging and motivating by using game features such as points, leagues, and rewards among others (Shortt et al., 2023; Zohrabi & Khalili, 2025). Lastly, this application allows learners to attend courses in both widely spoken and less commonly taught languages at language institutes (Budiyanto & Ridho, 2024). The above-mentioned characteristics of Duolingo have resulted in its scrutiny in recent research on technology-mediated language learning (Shortt et al., 2023; Zavvari & Zarei Mavini, 2025). Nonetheless, the empirical studies of this application have not provided a satisfactory understanding of its utility owing to their weaknesses, contradictions, or limitations. More specifically, although a large number of these studies (e.g., Sung et al., 2016) have reported its effectiveness for teaching the target language, they have mostly used posttest-only designs and have

not ensured the other researchers about its genuine efficacy in language instruction. In addition, certain studies (e.g., Ma, 2017) have shown that the use of this application may result in the learners' attrition. That is, learners may stop using this application before developing their language skills in an effective way. Lastly, most of the studies of Duolingo (e.g. Kessler, 2021; Khalili et al., 2025) have not delved into the language learners' perspectives on this application in different academic settings. All of these issues justify the importance of research on the role of Duolingo in language acquisition in various contexts.

The significance of the studies of mobile applications including Duolingo is more noticeable in Iraqi context owing to three main reasons. First, there is a lack of information about the extent to which technology-informed language teaching approaches (including Duolingo-based language instruction) can supplement traditional language teaching in Iraqi context. Second, the related studies have not examined the possibility of using mobile applications including Duolingo to deal with the lack of adequate language teachers and language teaching materials in Iraq. Lastly, the pertinent studies have not investigated the possibility of integrating Duolingo into language teaching in public school settings in Iraqi context.

### **Empirical Background**

The positive features of Duolingo have encouraged researchers to use it in diverse settings. Some of the studies of this application have focused on its utility for improving the learners' vocabulary learning. For instance, Ajisoko (2020) carried out a study to specify the changes in learners' perspectives on mobile language learning applications following a Duolingo-based course. As Ajisoko (2020) reported, the relevant course benefitted learners' perspectives on the utility of this application for learning second language words.

In addition, certain empirical studies of Duolingo have investigated its utility for developing learners' different language skills and aspects. Regarding this line of research, Kazu and Kuvvetli (2022) conducted a quasi-experimental study to examine Duolingo's utility for ameliorating EFL learners' speaking skill. As they reported, this application significantly positively impacted their participants' speaking performance. Likewise, Xiangying et al. (2021) made an effort to determine the role of Duolingo in beginner-level language learners' reading and listening skill development. Based on the results of their study, Duolingo was effective in improving these receptive language skills. Similarly, Purwanto et al. (2022) strived to determine the extent to which Duolingo influenced language learners' listening ability and reported that it was a viable instructional tool in this regard. Besides Rachels and Rockinson-Szapkiw (2018) examined the effects of Duolingo on EFL learners' acquisition of simple past tense and reported that it significantly improved their uses of regular simple past verbs. Additionally, Fadda and Alaudan (2020) made an effort to determine the role of Duolingo in the amelioration of language learners' uses of past perfect tense. Their results indicated that the use of this application had an advantageous impact on the learners' uses of this tense in various situations.

Moreover, a number of pertinent studies have examined the extent to which Duolingo-based language instruction influences various learner factors. In this regard, Kessler, (2021) examined the effects of Duolingo-based instruction and e-journal writing on EFL learners' metacognitive awareness. His study showed that this approach significantly ameliorated the learners' metacognitive awareness in the process of their tasks. In addition, a few studies have focused on the gamification aspects of Duolingo. For instance, Li and O'Rourke (2022) examined the impact of the gamification strategies of Duolingo on adult EFL learners' language learning motivation. Their study's results highlighted that these strategies significantly ameliorated the learners' language learning motivation in their academic setting.

Notwithstanding, Duolingo's pertinent studies have disregarded certain research lines. First, they have not dealt with the other language aspects, such as grammar along with vocabulary. Moreover, they have mainly adopted quantitative approaches to research and have not delved into the

EFL learners' perspectives on Duolingo-based instruction using qualitative data collection techniques, such as interviews among the others. Moreover, most of these studies have been carried out in language institute settings and have not dealt with other settings, including universities. Lastly, none of the relevant studies of Duolingo have been carried out in the Iraqi context. This study strived to address these issues in the EFL context of Iraq. Accordingly, it endeavored to answer two questions:

**Research Question One:** Does Duolingo-informed interactive mobile multimedia-based instruction significantly affect Iraqi EFL learners' vocabulary and grammar learning?

**Research Question Two:** What are Iraqi EFL learners' attitudes towards Duolingo-informed interactive mobile multimedia-based instruction?

## Method

### Design of the Study

The present study used explanatory mixed-methods design (Creswell, 2009) to answer the questions. The researchers used this design since it enabled them to expound on the complex nature of Duolingo-informed language instruction in Iraqi context and could lead to richer insights in this regard. Moreover, the use of this design stemmed from the need to triangulate data collection and to enhance the credibility and validity of the results. Lastly, the researchers utilized this design owing to the fact that they aimed to contextualize the obtained data and to make informed decisions based on the findings. Accordingly, the researchers conducted their study in two consecutive phases. In the study's first phase, the researchers used vocabulary and grammar pretests and posttests to gather quantitative data on impacts of mobile interactive multimedia-based language instruction (i.e., independent variable) on EFL learners' vocabulary and grammar knowledge (i.e., dependent variables). In addition, the researchers collected qualitative data on their perspectives on interactive multimedia-based language instruction using interviews in the second phase.

### Participants

The researchers selected 50 intermediate-level EFL learners (23 male & 27 female) in two intact general English classes at a university in Iraq as the participants using convenience sampling. These learners' scores on Oxford Placement Test (OPT) (Allan, 2004) ranged from 40 to 47. They studied different majors, spoke Arabic, Kurdish, or Turkish as their mother tongue, and ranged in age from 19 to 26. They gave written informed consent to the researchers prior to the onset of the study. Table 1 provides the participants' demographics:

**Table 1**

*Demographic Information about the Participants*

Characteristic	N
Gender	
<i>Male</i>	23
<i>Female</i>	27
First Language	
<i>Arabic</i>	38
<i>Kurdish</i>	7
<i>Turkish</i>	5
Age Group	
19-22	33
23-26	17

## **Instruments**

### ***Proficiency Test***

In this study, OPT (Allan, 2004) was used to select the participants and to ensure their homogeneity. This test comprises three main sections: grammar, vocabulary, and cloze test. Each of these sections involves 20 items. The Cronbach's Alpha (CA) measure showed that the test was satisfactorily reliable (.89) in the present study. Additionally, Conformity Factor Analysis (CFA) results highlighted the fact that the validity index of this test (.92) was acceptable in the examined context.

### ***Vocabulary Pretest and Posttest***

The researchers used the textbook entitled *Intermediate Select Readings* (Lee & Gundersen, 2011) to develop a 40-item vocabulary test, which was utilized as the vocabulary pretest and posttest. Based on the results of CA measure, this test was reliable (.85) and could be used in the present study. Moreover, CFA results (.89) showed that this test was satisfactorily valid in the context of Iraq.

### ***Grammar Pretest and Posttest***

In this study, the researchers used the textbook entitled *Intermediate Grammar in Use* (Murphy, 2018) to develop a 40-item grammar test as the grammar pretest and posttest. CA analysis showed that the test was reliable (.87) and could be used in the Iraqi context. Additionally, on the basis of CFA results, the validity index of this test (.88) was acceptable.

### ***Interactive Mobile Multimedia Application***

Considering the study's main objectives, the researchers utilized Duolingo interactive mobile language learning application as the mobile multimedia application of the present study. This application was developed by Duolingo, Inc. in 2011 and offers language courses to learners in 43 languages. It is free and can be used by learners on various platforms. Its learning method is primarily based on gamification. In addition, it attempts to facilitate the learners' language acquisition by taking advantage of spaced repetition in daily lessons.

### ***Semi-Structured Interview Protocol***

In this study, an interview protocol was developed based on the related literature in order to determine EFL learners' perspectives on Duolingo application in their classes. It encompassed four semi-structured items including:

1. How was your experience of learning English using Duolingo?
2. Which aspects of Duolingo were interesting in your classes?
3. How did Duolingo influence your acquisition of English vocabulary items?
4. Which aspects of Duolingo affected your learning of English grammar?

To examine the validity of this protocol, first, the researchers provided five ELT professors with its items and asked them to comment on the relevant items. Second, they made a number of modifications to the protocol and developed its final version.

## Procedure

In this study, first, the researchers selected 50 intermediate-level EFL learners in two classes of a university as the participants and assigned one of these classes the experimental group or Duolingo Group (DG) and the other to the Control Group (CG). Second, they administered the vocabulary and grammar pretests to both of the groups to ensure their homogeneity before beginning the treatment.

Third, the researchers provided DG with mobile multimedia-based treatment in 16 sessions in two months (i.e., two sessions per week). More specifically, in this group, they asked all of the learners to install the Duolingo application on their mobile phones or tablet computers and informed them about the interface and different features of this application. Second, the researchers apprised the learners of the design of the Duolingo courses and their units. That is, they made the learners aware that they needed to use their background knowledge of the language to interact with the application and pay attention to the context of the vocabulary items and grammar structures to effectively complete the relevant language tasks. Additionally, in each unit, they asked the learners to do the vocabulary and grammar exercises provided by this application and to share their answers with the researchers and the other learners. More specifically, in regard to vocabulary, the researchers asked the learners to translate different types of sentences and texts from English into Arabic and vice versa. Moreover, they asked the learners to use flashcards (which involved English words along with Arabic translations) to learn new words and to take multiple-choice tests. In addition, the researchers prompted the learners to carry out matching tasks in which they matched words and phrases to their translations. On the other hand, regarding grammar, the researchers took advantage of fill-in-the-blank exercises to encourage the learners to apply their knowledge of English grammar in various contexts. Besides, they used word order tasks in which the learners needed to arrange words into correct orders to form grammatically correct sentences. Nonetheless, in CG, the researchers provided the learners with the meaning of the selected vocabulary items and the explicit grammar rules and prompted them to do the developed vocabulary and grammar exercises simultaneously.

Fourth, the researchers administered the vocabulary and grammar posttests to the learners in both of these groups to determine the efficacy of the mobile multimedia-based treatment. Fifth, the researchers conducted interviews with 10 of the DG learners to determine their attitudes towards this approach to language instruction. Finally, the researchers analyzed the study's data to answer the raised questions.

## Data Analysis

In light of the aims and design of the study, the researchers used MANOVA and t-test (Pallant, 2020) to perform the quantitative data analysis. To this end, they examined the assumptions of MANOVA. The results showed that the data within each group followed a normal distribution and the variance-covariance matrix of the dependent variables was equal across groups. As a result, the normality and homogeneity assumptions were not violated. In addition, the observations within and between groups were mutually independent. Therefore, the data did not violate the independence assumption (Pallant, 2020).

In addition, thematic analysis was utilized to analyze the qualitative interview data. More specifically, first, the researchers examined the interview transcripts several times. Second, they determined the underlying ideas in the transcripts and developed the primary codes. Third, they integrated the interrelated codes and developed the study's main themes (Creswell, 2009). The researchers ensured the trustworthiness of the findings by focusing on dependability, transferability, credibility, and confirmability. More specifically, they used peer researcher review to make sure that the findings were dependable. Additionally, they took advantage of thick description and provided detailed information about the methodology of the study to guarantee the transferability of its findings. Besides, the researchers used member checking to deal with the credibility of the findings. Lastly, they utilized audit trail and provided a transparent description of the research steps taken from

the beginning of the study to the development and reporting of findings to determine the confirmability of the obtained results (Creswell, 2009).

### Results

Preliminary analysis indicated that the quantitative data were compatible with parametric test requirements since their distribution was normal ( $p > .05$ ) (Pallant, 2020). Moreover, they were interval data and were collected independently (Pallant, 2020). As a result, the researchers had to use MANOVA and t-test to analyze the data (Pallant, 2020). Nonetheless, the researchers used an independent-samples t-test to ensure the homogeneity of groups in terms of their vocabulary and grammar knowledge. Table 2 provides the descriptive statistics on the vocabulary and grammar pretest performances of DG and CG, respectively:

**Table 2**

*Vocabulary and Grammar Pretest Performances*

Tests	N	M	SD	SEM
DG Vocabulary Pretest	25	19.64	2.139	.428
CG Vocabulary Pretest	25	20.76	3.192	.638
DG Grammar Pretest	25	19.68	2.015	.403
CG Grammar Pretest	25	20.60	3.452	.690

The researchers used two independent-samples t-tests to examine mean difference significance. Table 3 and Table 4 show these results, respectively:

**Table 3**

*The t-test of Vocabulary Pretest Performances*

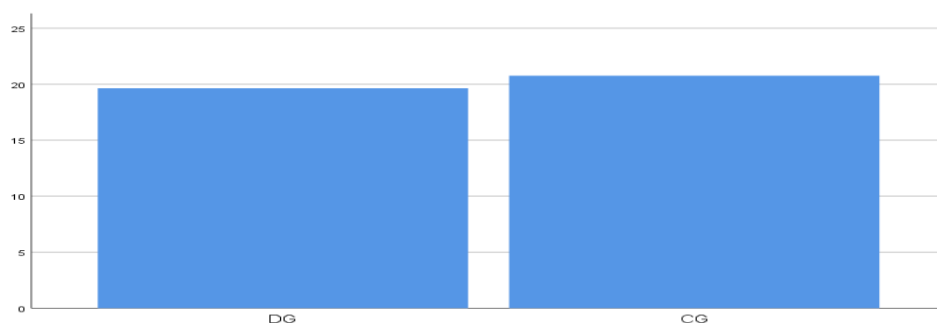
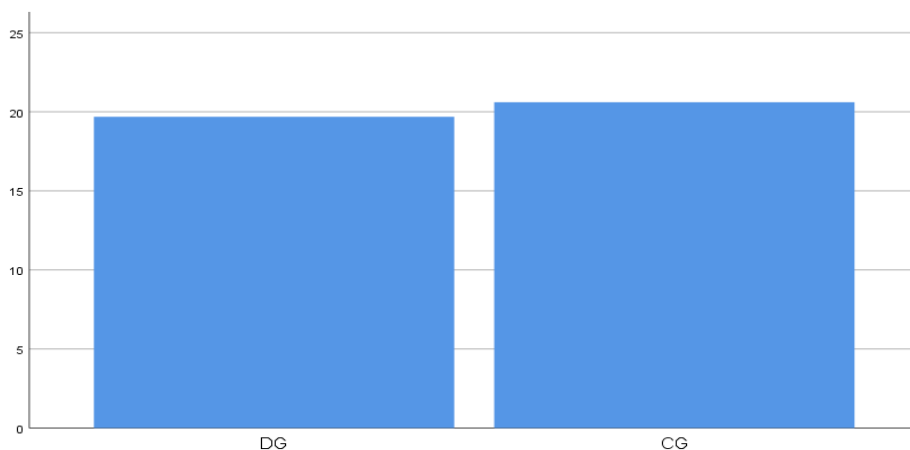
Variance	Levene's Test Sig.	t	df	Sig.
Equal Variances	.182	-1.457	48	.152

**Table 4**

*The t-test of Grammar Pretest Performances*

Variances	Levene's Test Sig.	t	df	Sig.
Equal Variances	.178	-1.151	48	.255

Table 3 and Table 4 showed no significant differences between the groups' vocabulary ( $p = .152$ ) and grammar ( $p = .255$ ) performances. Figure 1 and Figure 2 show these results:

**Figure 1***Vocabulary Pretest Performances***Figure 2***Grammar Pretest Performances*

Accordingly, the researchers analyzed the data to answer the research questions. The following part deals with each of these questions:

### Research Question One

Does Duolingo-informed interactive mobile multimedia-based instruction significantly affect Iraqi EFL learners' vocabulary and grammar learning?

#### *Effects of Mobile Multimedia-Based Instruction on Vocabulary and Grammar Learning*

The researchers compared the vocabulary pretest and posttest performances of DG. Tables 5 and 6 show the pertinent descriptive statistics:

**Table 5***Vocabulary Pretest and Posttest Performances of DG*

	M	N	SD	SEM
Pretest	19.64	25	2.139	.428

Posttest	32.28	25	3.273	.655
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**Table 6***Grammar Pretest and Posttest Performances of DG*

	M	N	SD	SEM
Pretest	19.68	25	2.015	.403
Posttest	31.56	25	3.355	.671

The researchers used two paired-samples t-tests to scrutinize the significance of the relevant differences. Tables 7 and 8 provide the relevant results:

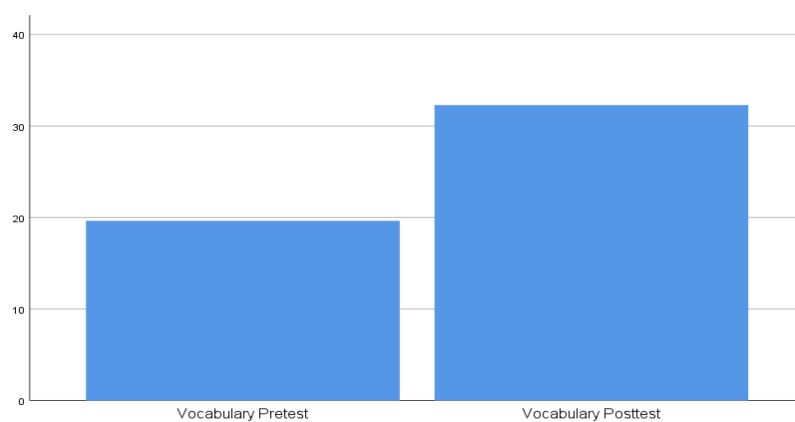
**Table 7***The t-test of Vocabulary Pretest and Posttest Performances of DG*

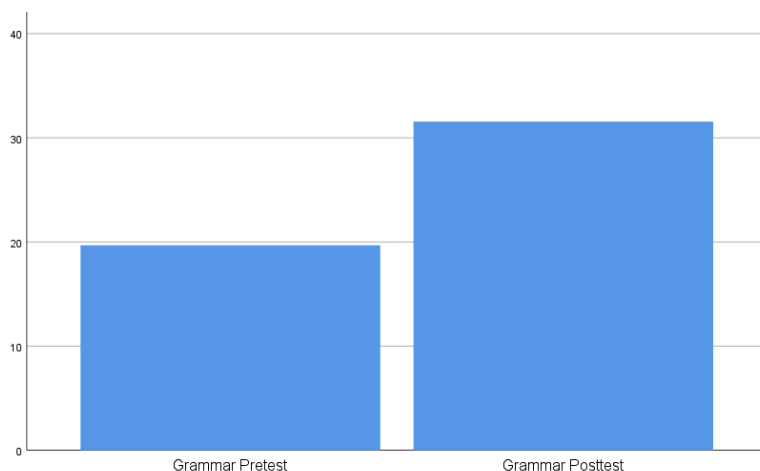
Pair 1	t	df	Sig.
Pretest-Posttest	-14.285	24	.000

**Table 8***The t-test of Grammar Pretest and Posttest Performances of DG*

Pair 1	t	df	Sig.
Pretest-Posttest	-17.559	24	.000

According to Table 7 and Table 8, there were improvements to DG's vocabulary performance ( $p=.000$ ) and grammar performance ( $p=.000$ ). Figures 3 and 4 show the relevant results:

**Figure 3***Vocabulary Pretest and Posttest Performances of DG*

**Figure 4***Grammar Pretest and Posttest Performances of DG*

Nonetheless, there was a need to make sure that DG outperformed CG on the vocabulary and grammar posttests. As a result, the researchers used MANOVA test. Table 9 shows the results of the multivariate test:

**Table 9***Results of Multivariate Test*

Test	Value	F	H df	E df	Sig.
Wilks' Lambda	.158	125.015 <sup>b</sup>	2.000	47.000	.000

As shown in Table 9, the Wilks' Lambda multivariate test result was significant ( $p=.000$ ). Therefore, the researchers examined the results of between-subjects tests. Table 10 provides the relevant results:

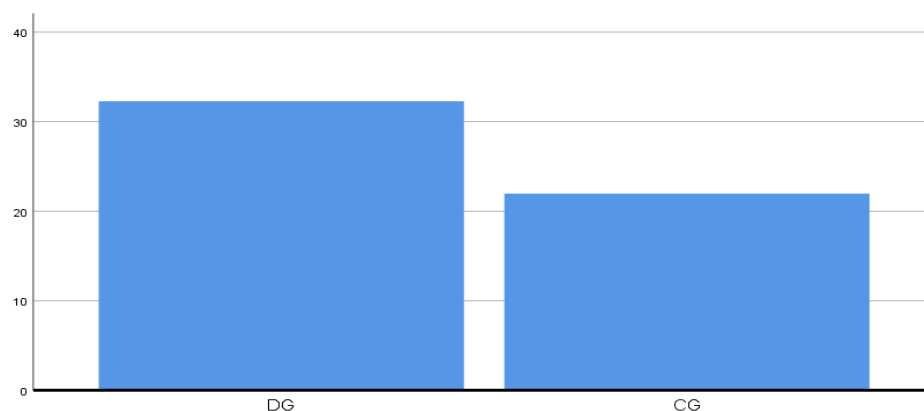
**Table 10***Results of Between-Subjects Tests*

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Vocabulary Posttest	1331.280	1	1331.280	193.641	.000
Grammar Posttest	1404.500	1	1404.500	186.686	.000

According to Table 10, DG outperformed CG on the vocabulary posttest ( $p=.000$ ) and grammar posttest ( $p=.000$ ). Figure 5 and Figure 6 show these results:

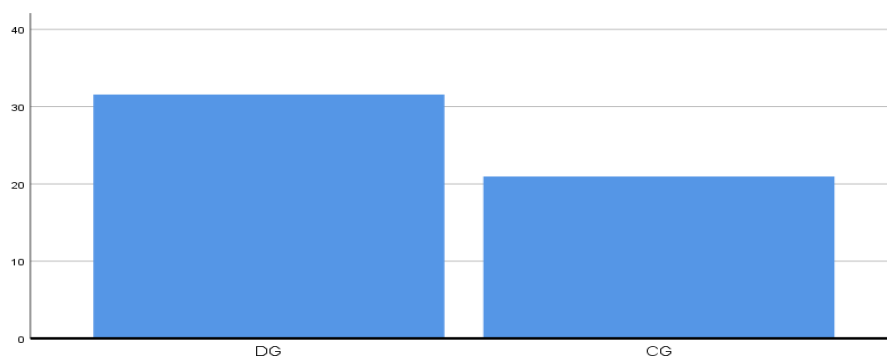
**Figure 5**

*Vocabulary Posttest Performances of DG and CG*



**Figure 6**

*Grammar Posttest Performances of DG and CG*



**Research Question Two**

What are Iraqi EFL learners’ attitudes towards Duolingo-informed interactive mobile multimedia-based instruction?

***EFL Learners’ Attitudes towards Interactive Mobile Multimedia-Based Instruction***

The researchers used thematic analysis to analyze the interview data and to extract their underlying codes and themes. Table 11 provides these findings:

**Table 11**

*EFL Learners’ Attitudes towards Mobile Multimedia-Based Instruction*

Codes	Themes
Enjoying the interface of the application Being interested in fun language learning activities	Interesting nature of interactive mobile application
Taking advantage of game-based learning strategies Using linguistic contexts to practice language	Learning-facilitative aspects of Duolingo

aspects	
Learning new words by means of repetition Guessing the meaning of different words by using background information	Compatibility of Duolingo activities with meaningful learning principles
Using examples to learn new grammatical structures Understanding the meaning of grammatical structures by relating them to different parts of the texts	Inductive nature of grammar learning in Duolingo activities

As shown in Table 11, the first major theme was the *interesting nature of interactive mobile applications*. Seven of the EFL learners in DG stated that the application adopted an enjoyable instructional approach. For instance, participant 2 stated that:

*“Duolingo’s colorful interface was beautiful. It used different colors to show that some of the words were new and had to be practiced in our tasks”.*

Likewise, participant 8 stated that:

*“The activities were fun. I enjoyed all of them. At first, some of the tasks were challenging. However, I learned to pay attention to the instructions to complete my tasks effectively”.*

In addition, theme two was *learning-facilitative aspects of Duolingo*. Nine participants noted that the tasks expedited their acquisition of different aspects of the target language. For example, participant 1 stated that:

*“It was like a game. I thought that I was playing a very intriguing mobile game that enabled me to understand and practice English”.*

Similarly, participant 5 noted that:

*“I made an effort to understand everything by talking advantage of the sentences and words in the reading texts and conversations. It was easy to understand some of the words because I had learned to make good guesses and to continue reading without stopping to check their meanings”.*

Moreover, according to Table 10, the third theme in the obtained data was the *compatibility of Duolingo activities with meaningful learning principles*. Six participants noted that Duolingo helped them practice the new vocabulary items many times during their courses. In this regard, participant 4 stated that:

*“In each new unit, I saw the words of the previous unit and tried to remember their meanings and to use them in new sentences”.*

Likewise, participant 9 noted that:

*“The activities and the reading texts were easy to understand because I knew most of the words. As a result, guessing the meaning of the new words was not very hard in most of the tasks”.*

Lastly, the fourth theme in the obtained data was the *inductive nature of grammar learning in Duolingo activities*. Seven of the participants highlighted the positive effect of inductive grammar learning on their ability to use various aspects of the target language grammar. In this regard, participant 4 noted that:

*“I did not need to memorize grammar rules. I saw a large number of sentences that involved the relevant grammar structures and learned to use them in my own sentences by paying attention to their various examples”.*

Additionally, participant 7 stated that:

*“In some of the texts, I guessed the meaning of the grammatical structures by understanding the order of the ideas in the texts of the stories. That is, the texts’ meanings helped me specify the pertinent structures’ various uses”.*

### Discussion

The present study strived to determine the utility of Duolingo-based language instruction in the EFL context of Iraq. Question one examined the impacts of interactive mobile multimedia-based instruction on Iraqi learners’ vocabulary and grammar learning. Based on the findings, this approach significantly ameliorated the participants’ acquisition of various vocabulary items and grammatical structures in their relevant academic setting. The result regarding vocabulary learning is in line with the findings of Flores (2015), Darmi and Albion (2017), Ajisoko (2020), Handayani et al. (2021), and Kessler (2021). According to their findings, interactive mobile multimedia-based applications benefited language learners’ acquisition of new vocabulary items in different settings.

Flores (2015) noted that the utility of mobile applications in his study stemmed from the spaced repetition of the words in various sections of the relevant course. As he explained, this kind of repetition exposed the learners to the uses of the examined words in various contexts and enabled them to comprehend their meanings. The similarity between the results of Flores’s (2015) study and the present study may be related to their comparable samples that involved university students who attended general English classes. This result and may highlight the efficacy of Duolingo-based language instruction in university settings.

Moreover, Darmi and Albion (2017) stated that, in their study, the interactive mobile application made the learners aware of their language learning capability and had an advantageous effect on their learning self-efficacy. According to them, learners’ self-efficacy prompted them to learn more words to complete their tasks satisfactorily. It can be argued that the results of this study supported Darmi and Albion’s (2017) findings owing to the fact that both of these studies used the Duolingo tasks that were familiar to the learners and built on their background knowledge.

In addition, Ajisoko (2020) also argued that the mobile application significantly reduced his learners’ anxiety and enabled them to pay conscious attention to the new words and internalize their meanings. It can be averred that Ajisoko’s (2020) study produced outcomes that were similar to the results of this study since it provided the learners with the opportunity to get used to Duolingo in an effective way.

Lastly, Handayani et al. (2021) noted that the mobile application satisfied their learners’ game-based needs and increased their language learning motivation. According to them, the increase in learners’ motivation prompted them to focus on the meanings of various words to express their intended meanings more effectively in the classroom context. The similarity between Handayani et al.’s (2021) results and the findings of this study may be attributed to the focus of both of these studies on translation tasks in the learners’ vocabulary acquisition process.

Consequently, the advantageous effect of interactive mobile applications on EFL learners’ word acquisition in this study may be related to its spaced repetition vocabulary instruction strategy, its role in reducing learners’ anxiety, and its positive impact on their motivation and self-efficacy. In addition, the result regarding the learners’ grammar acquisition underpins findings of Krashen (2014), Rachels and Rockinson-Szapkiw (2018), Kartal (2019), Fadda and Alaudan (2020), Ali (2021), Aydın and Çakır (2022), and Li and O’Rourke (2022). These studies reported that different interactive mobile applications significantly improved learners’ acquisition of grammatical structures.

Fadda and Alaudan (2020) argued that the efficacy of the application in their study emanated from its context-based focus on the grammatical structures. According to them, the relevant application exposed the learners to these structures in various texts and sentences and enabled them to process them effectively. It can be noted that Fadda and Alaudan’s (2020) results were similar to the results of this study since in both of these studies fill-in-the-blank exercises constituted main Duolingo grammar exercises.

Moreover, Ali (2021) noted that the mobile application was effective in his study since it adapted the learners' input to their language proficiency level. As he explained, the pertinent application used learners' output as the criteria for determining their input level. It did not provide them with the grammatical structures that were beyond their language ability. The similarity between the results of this study and Ali's (2021) study can be ascribed to their focus on the gamification features of Duolingo in grammar learning.

Finally, Aydın and Çakır (2022) noted that the positive effect of the interactive application on their participants' grammar knowledge stemmed from its example-providing nature. According to them, the relevant application provided the learners with one grammatical structure in each session and helped them to acquire its uses by highlighting it in various sentences. It can be stated that the present study and Aydın and Çakır's (2022) study produced comparable outcomes owing to the fact that they took advantage of Duolingo as the main medium of language instruction in the context of the classroom. Therefore, the utility of the interactive mobile application for teaching grammatical structures in this study may be related to its use of context, its capability to adapt the learners' input to their interlanguage level, and its use of multitudinous examples for teaching each of the taught structures.

In addition, the study's second research question examined Iraqi EFL learners' perspectives on interactive mobile multimedia-based instruction. The findings showed that these learners had beneficial attitudes toward this language teaching approach. More specifically, the learners were interested in the interface and features of the application, believed that it expedited their language learning, related its activities to their background knowledge, and enjoyed its indirect way of teaching the grammar rules of the second language. These results are compatible with the results of Yeboah and Ewur (2014), Alamer and Al Khateeb (2021), and Yin et al. (2021).

Yeboah and Ewur (2014) noted that in their study, most of the learners highlighted the game-based nature of language learning on mobile applications as the main factor that attracted their attention to it. According to them, this feature reduced the learners' anxiety and enabled them to enjoy learning the various aspects of the target language. It can be pointed out that Yeboah and Ewur's (2014) findings were comparable to the findings of this study since both of these studies empowered the learners to personalize their acquisition of the vocabulary items and grammar of the target language.

In addition, Alamer and Al Khateeb (2021) stated that in their study, the learners' positive attitudes towards mobile applications emanated from the fact that it enabled all of the learners to take part in the language tasks and made them aware of their language learning capabilities. The similarity between the results of this study and Alamer and Al Khateeb's (2021) results may be attributed to the fact that both of them familiarized the learners with the interface of Duolingo and its tasks in an effective way. Consequently, Iraqi EFL learners' favorable views on interactive mobile multimedia-based instruction in this study may be related to the fact that it provided them with game-based tasks, engaged them in the process of task performance effectively, and made them cognizant of their abilities in the process of language acquisition.

### **Conclusion and Implications**

This study examined the degree to which interactive mobile multimedia-based language teaching using Duolingo influenced Iraqi EFL learners' acquisition of the target language's vocabulary items and grammatical structures. In addition, the study made an effort to determine these learners' perspectives on this approach to language instruction. Based on the results, this mobile application significantly ameliorated the participants' vocabulary and grammar learning. In addition, the participants' perceptions of this approach were predominantly favorable.

The results are likely to have certain implications for various stakeholders. First, they accentuate the necessity of overhauling the EFL instructional materials, programs, and teacher manuals. Regarding the instructional materials, EFL syllabus designers in Iraqi context are

recommended to develop satisfactory local language teaching applications that facilitate learners' acquisition of the various language skills and aspects including vocabulary and grammar among the others. These applications have to comprise user-friendly interfaces that attract the learners' attention to language aspects and improve their language learning motivation. Moreover, they have to adapt the content of their courses to the learners' skill level and interlanguage development. However, the settings that do not have adequate facilities and infrastructure to develop their own applications can take advantage of effective applications, including Duolingo, in their language courses. Moreover, the syllabus designers may develop specific mobile-assisted language learning courses to corroborate the language learners' acquisition of the target language in the in-person courses. In addition, the syllabus designers must revise the teacher manuals by including a technology-based section in them. This section has to provide the teachers with adequate information on the various features of their local language learning mobile applications or the international applications. Moreover, it should help them use the relevant applications to expedite their language learners' acquisition of various language skills and aspects.

Second, the findings underline the required modifications to Iraqi education courses for EFL instructors. In this regard, course content should be revised by including a technology-based module in it. The pertinent module has to raise the instructors' awareness of technological advancements, including mobile applications, in the process of language teaching. Moreover, it has to furnish them with detailed information on the diverse features of the popular mobile applications, including Duolingo. This kind of information can empower the teachers to take advantage of the relevant applications as tools for ameliorating their learners' language learning and for engaging all of them in the process of language task performance. Additionally, there is a need to provide the teacher educators of the relevant courses with technology-based language teaching education. In this way, teacher educators can consolidate their information about the technological advancements and may include the discussions of mobile language learning applications including Duolingo in their courses. In addition, they are likely to empower teachers to use the relevant applications effectively in their classes and in various settings.

Lastly, the study results showed that EFL teachers should be knowledgeable about interactive applications. They can scrutinize pertinent research synthesis to select appropriate applications for teaching the target language in their classes. Moreover, they are recommended to participate in national and international language teaching events such as webinars, teacher education courses, and conferences that focus on using interactive mobile applications in language instruction.

The present study had a number of limitations since it used convenience sampling (which may reduce the generalizability of its results) and was not able to determine the degree to which findings were influenced by the learners' attributes (e.g., first language). Moreover, the study was delimited by selecting intermediate-level participants in university settings. More studies are needed to rectify these inadequacies. Moreover, future studies have to focus on language skills (e.g., speaking) that were not examined in the present study. Additionally, these studies have to examine the efficacy of the other interactive mobile applications in language instruction. Lastly, future studies must be conducted in various academic settings to determine the results' generalizability.

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The authors declare that they have no conflicts of interest.

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