








Research Article

MALL and EFL Learners' Speaking: Impacts of Duolingo and WhatsApp Applications on Speaking Accuracy and Fluency

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Regarding the importance of using MALL in learning English, this study aimed to investigate the effects of Duolingo and WhatsApp applications on developing the speaking accuracy and fluency of Iranian EFL learners. To fulfill this objective, three groups of Iranian intermediate EFL learners were selected as the participants of this research. After that, all groups took the speaking pretest and then received the treatment. One group was taught ten conversations from Family and Friends Book 5 using the Duolingo application, and the other group was taught the same conversations using the WhatsApp application. The third group, considered the control group (CG), was instructed on the conversations in a traditional classroom. After teaching the conversations, a speaking posttest was administered to all groups to compare their performances after the treatment. The collected data were analyzed using the one-way ANOVA test. The results revealed that two experimental groups (EGs) had better performances than the CG on the speaking posttest. In addition, the outcomes showed that two EGs performed similarly on their speaking posttests. Eventually, the conclusions and the pedagogical implications of this research were explained.

1. Introduction

Today, L2 practitioners must embrace and adopt new technology and its potential benefits to keep abreast with present innovations and changes [1]. Getting more and more popular, educational technology has influenced education systems overpoweringly. Technology-based language

learning has emerged as one of the most prominent areas of study in foreign language teaching. The growth of technology in the modern world has altered the accessibility of data, which has ramifications for the method learners engage and learn in the classroom. The use of smartphones in the classroom enables learners to access material that was previously only available via encyclopedias. Learners may

now access every other kind of information directly in the palm of their hands via their cellphones. Consequently, instructors must take advantage of technology advancements, including them in the teaching-learning process as a tool. These innovations appear to have already gained acceptance among learners. On the contrary, learning environments are still falling behind in this technology advancement [2]. Lam and Lawrence [3] assert that technology may contribute to the facilitation of the teaching and learning process and the development of abilities of students as effective self-learners. Learners are more engaged and enthusiastic about learning when technology is used.

Mobile-assisted language learning (MALL) is widely regarded as a subset of technological advancements in language learning. MALL alludes to language exercises that may be carried out using smartphones at any time and from any place without being confined by a geographical area or a particular time [4]. Mobile phones, which include transportable and personal portable gadgets such as laptops and personal digital assistants (PDAs), tablets, smartphones, and mobile phones, among others, make learning more convenient for students and instructors alike. Sharples [5] asserts that mobile phones are appropriate for contemporary education. In reality, the truth that they are omnipresent has resulted in MALL being extensively recommended in the educational environment across the world.

As stated by Kukulska-Hulme and Shield [6], mobile adaptive learning (MALL) makes use of personal and portable technologies that enable “continuity or spontaneity of access and engagement across diverse contexts of usage” and “alternative modes of learning” (p. 273). MALL is putting M-learning to use in the field of language learning. According to Arancón et al. [7], MALL is “a teaching and learning approach that makes use of mobile phones or other portable devices that have some type of wireless connection, such as phones, PDAs, and tablets, among other things” to teach and learn (p. 1190). According to O’Malley et al. [8], the term “mobile-assisted language learning” (MALL) refers to any type of learning that takes place when the learner is not at a fixed, pre-determined location or learning that takes place when the learner takes advantage of the learning opportunities offered by mobile technologies. According to Rahimi and Miri [9], MALL is any language learning activity that takes place via the use of mobile devices. When learning a new language, MALL is a unique and entertaining method. MALL is regarded as an excellent answer to the restrictions of foreign language learning caused by time and location constraints [10]. According to Crompton [11], M-learning is the process of learning across different settings, via social and content exchanges, and through the use of personal electronic devices.

Utilizing the WhatsApp application is like shopping at a mall, and it has quickly become one of the most widely used social networking apps on mobile phones and personal computers [12]. This application is very popular and easy to use since it can send photos, audio, documents, and videos individually and can also be done in groups [13]. This cross-platform program may be loaded on various smartphones,

including iPhones, Android devices, BlackBerry devices, and Nokia devices. It enables users to communicate with one another for free through the Internet. Members may also exchange images, music files, and movies with one another. WhatsApp provides the possibility to establish a group of people who may connect using the messaging app. The group manager is the group originator, who also serves as its administrator. The group creator can add and remove members. Members are notified through e-mail whenever a message is sent by any members [14].

MALLs are also available in various forms, such as Duolingo, an application that provides an enjoyable and straightforward platform for learning other languages. According to Shrum and Glisan [15], the platform is constructed in the manner of a game, with stages and difficulties to overcome. To gain points and perform many activities, each phase poses a unique difficulty. Founded in November 2011 by Luis Von Ahn and Severin Hacker, Duolingo is a free language-learning program for mobile devices. According to their tagline, “free language instruction for the whole globe,” more than 30 million people have signed up for the service, according to the company’s website. It provides a variety of languages for English speakers and languages for non-native speakers of the English language. As one of the language learning applications, Duolingo can help someone develop their vocabulary knowledge in communication. Through the Duolingo application, the students gain the English language quickly based on their own will [16]. Using online applications like Duolingo can allow teachers and students to continue to communicate and carry out the English learning process without having to meet face-to-face using Internet media [17].

The mentioned applications are valuable tools for improving speaking skills of EFL learners. The previous studies indicated that MALL could enhance speaking skills of EFL learners in remarkable ways [18–20]. Speaking is one of the important skills in learning English, and it has two main components: accuracy and fluency. Accuracy is a straightforward notion to grasp since it is universally recognized as the ultimate objective of all researchers. According to Skehan and Foster [21], accuracy is defined as the generation of target language based on the rule systems of the target language. Accuracy is defined by Housen and Kuikken [22] as “error-free” communication. A distinction was made between two sorts of grammatical accuracy measurements, which were particular measures of correctness and general measures of accuracy, by the researchers [23, 24]. Even though the idea of fluency is frequently employed within applied linguistics, there is no universal consensus on what is considered to be fluent communication in any language [25]. In their definition of fluency, Ellis and Barkhuizen [23] stated that it is “the creation of words in real-time without unnecessary halting or hesitation” (p. 139).

Regarding the importance of speaking skills for EFL learners, the current research intended to improve speaking accuracy and fluency of Iranian EFL learners using the Duolingo and WhatsApp applications. In addition, this research aimed to know which application can affect the speaking accuracy and fluency of Iranian EFL learners.

2. Literature Review

When it comes to teaching and learning activities, media is one of the educational tools that can be employed, and it may help make teaching more efficient and engaging. Numerous different types of media are used in the classroom to offer activities to students. These include textbooks and photographs, playing cards, computer programs, videos, projectors, and other devices. According to Robert [26], instructional media and learning technologies offer instructors some tools to engage learners more deeply in the learning process via multimedia and technology.

M-learning is an innovative and particular element of educational media. The introduction of mobile learning in 2001 was met with little enthusiasm; nonetheless, some individuals were aware of the notion of mobile learning and were even able to envisage the capabilities of mobile devices in educational settings [27]. The development of mobile learning may be traced back to the development of electronic learning, which in turn originated from remote learning. Mobile devices are the main components in M-learning, with two leading features: portability and connectivity. Concerning connectivity, it is necessary to design a portable system capable of connecting to and communicating with the learning website using a wireless network of the device to access educational materials on a global scale, such as short message service (SMS) and mobile e-mail among other things. When it comes to mobility, it should be highlighted that it allows students to move mobile devices around while also bringing learning resources with them [28].

The following characteristics of mobile devices were reported by Klopfer et al. [29]: mobility: mobile devices can be taken to various locations because of their small size and weight; (b) social interactivity: students can exchange data and collaborate through mobile devices; (c) context-sensitivity: the data on the mobile devices can be gathered and responded uniquely to the prevailing location and time; (d) connectivity: mobile devices can be connected to other devices, data collection devices, or a prevalent network by establishing a shared network; (e) customization: the activity platform may be tailored to each learner's unique learning style.

There are different types of mobile applications, and in this research, the effects of Duolingo and WhatsApp were examined on speaking accuracy and fluency. In 2009, WhatsApp was launched as a text and voice chat service. Due to the ease and variety of its use, it has been a massive hit since its release in 2010. WhatsApp offers free PC, laptop, and mobile phone messaging and calling via its platform [30]. As a bonus, it can be used on various devices, including laptops and smartphones. Wi-Fi and mobile Internet may be used for one-on-one or group conversations [31, 32]. Because it allows users to send and receive text messages, photos, videos, and audio files, WhatsApp has grown to be a significant player in the world of social media and the field of English language instruction. Users of mobile phones may send and receive fast text messages using WhatsApp Messenger [33]. As a result, English learners may rely on online social media platforms like WhatsApp to help them obtain knowledge and share information in a clear and organized

manner [34, 35]. As an additional point of contention, English learners may share the PDF file with their teachers directly, rather than requesting each other for the book reference and page number to refer to any misinterpretation of an argument [36, 37]. In addition, WhatsApp has become a worldwide platform for networking competition and message exchange. WhatsApp is used by thousands of people worldwide regularly [38, 39].

Duolingo is one of the mobile applications to learn English on smartphones that everyone can access every time and everywhere. People only need smartphones and the Internet, and the students certainly have those things [40, 41]. According to Krashen [42], learners are motivated through a series of tasks, primarily via translation, using the Duolingo application. As a result, Duolingo is a well-known tool for improving one's command of the English language. For those who are interested in practicing their English in a fun and engaging way, Munday [16] points out that the Duolingo app is a cutting-edge gaming program designed to make the process of learning the English language easier. Moreover, according to White [43], Duolingo, an online language learning tool, enables anyone to attend free language classes since they translate.

The research will be based on sociocultural theory. Culturally mediated and communicative processes as intrinsically cognitive processes that are not separate from humanistic themes of self-efficacy, agency, and the potential to lead a satisfactory if not fulfilled life are central to sociocultural theories influenced by Vygotsky [44]. As a result, "a dialectic unity in which publicly obtained speech completes privately originated thought" exists between social contact and the internal cognitive process of thinking [45] (p. 6). It is impossible to engage in mental activity without interacting with people in a social setting. As a result, human cognition depends heavily on interpersonal connections and culturally generated media [46]. Continual engagement with the cultural and historical background and other individuals is essential to learning. Culturally produced artifacts, such as language and technology, mediate all communications and interactions with people and the world [46-48].

Some experimental studies were conducted to examine the impacts of using the Duolingo and WhatsApp applications on English language learning. Duolingo was researched by Bezerra de Sousa et al. [2] to see how effective it is as a tool to aid in the study of English as a foreign language (EFL). The inquiry concentrated on the increase of vocabulary knowledge in writing, with a particular emphasis on improving writing skills. It was discovered that the proof was gathered from pupils' performance both before and after they used the tool. The respondents were divided into two groups: Group A, a CG, which consisted of twenty-eight 6th graders (eleven girls and seventeen boys), and Group B, an EG, which consisted of twenty-three 6th graders (eleven girls and twelve boys), all of whom were between the ages of 10 and 13 years old at the time of the study. The findings of this research revealed that Duolingo could be regarded as a viable tool for enhancing vocabulary in language classes since it had a beneficial impact on motivating elements and vocabulary acquisition.

Fadda and Alaudan [49] studied the efficiency of utilizing the Duolingo program in learning English in a TESOL classroom at the Saudi Electronic University (SEU), which uses a blended learning method to teach English as a second language. Eighty people who actively engaged in the research provided the data for the study. All participants were divided into two groups: an EG and a CG. The EG was subjected to using the Duolingo language learning system in conjunction with online learning. At the same time, the CG was expected to follow the traditional methods of teaching, which included online learning in conjunction with face-to-face instruction. The study's quantitative analysis revealed that students who used Duolingo in conjunction with online learning performed much better in vocabulary growth, basic grammatical sentences, and fluency in the English language taught. It was simple for them to use and control, and they loved learning with it because of the usage of mobile devices in their hands, gamification, and the diversity of activities available. In the case of pronunciation, however, a different outcome was seen, with students who used conventional approaches achieving superior results. The research concluded that Duolingo is an essential tool in the learning process in a TESOL classroom.

During the first semester of the academic year 2020–2021, AlAzzam-Khraiwish et al. [50] evaluated the impact of WhatsApp on the development of speaking skills for fifth-grade EFL students in the context of a classroom setting. This was accomplished by carefully selecting a representative sample of 46 male students enrolled at Jijin Secondary School for Boys to achieve their goal. Ahead of time, the participants were separated into two groups: a CG consisting of 21 students and an EG composed of 25 students. The quasi-experimental approach was used in this research to apply the experiment's findings. Pretest and posttest were administered using a performance test in the form of an interview, with the instrument serving as both a pretest and a posttest. Furthermore, this test was utilized to determine whether or not there were any differences between the two groups. The research findings revealed statistically significant differences between the two groups, as well as in their mean scores, with the EG outperforming the CG in speaking, as a consequence of the proposed technique of using WhatsApp.

Alamer and Al Khateeb [51] investigated the impact of utilizing the WhatsApp messaging program on learners' motivation. Two groups of Saudi participants ($N = 447$) were enrolled in the English language department at two prominent institutions. A quasi-experimental design was used for both groups. A considerable improvement in the effects of Time 1 autonomy on Time 2 autonomy and the impact of Time 1 autonomous motivation on Time 2 autonomy was found in the structural model only in the EG, as evidenced by the data. According to the findings, the ANOVA with a two-time repeated measure demonstrated a significant rise in autonomous motivation among students only in the EG.

The literature review indicates that using WhatsApp and Duolingo applications can improve learning English. Despite their effectiveness, their role in developing speaking

skills of Iranian EFL learners has not been examined. Therefore, this study intended to inspect the effects of the WhatsApp and Duolingo applications on the speaking accuracy and fluency of Iranian EFL learners. As a result, the following research questions were developed:

RQ1. Does using the WhatsApp application develop Iranian EFL learners' speaking accuracy and fluency significantly?

RQ2. Does using the Duolingo application develop Iranian EFL learners' speaking accuracy and fluency significantly?

RQ3. Is there any significant difference between the effects of the WhatsApp and Duolingo applications on developing speaking accuracy and fluency of Iranian EFL learners significantly?

3. Method

3.1. Research Design. A quasi-experimental design was used in this research since the random selection was absent. Accordingly, the participants of this study were selected based on a nonrandom sampling method. This study used a quantitative method design, including pretest and posttest. This study consisted of one CG and two EGs while focusing on WhatsApp and Duolingo as the independent variable and speaking accuracy and fluency as the dependent variables. The control variables of the study were gender, age, and proficiency level of the participants.

3.2. Participants. The researcher selected 90 intermediate participants of 135 EFL learners learning English in Parsian institute located in Ahvaz, Iran, to accomplish this research. The researchers also used the Oxford Quick Placement Test (OQPT) scores to select more homogeneous volunteers from the community. Based on the test results, the students who scored between one standard deviation (SD) above and one SD below the mean were determined as the intermediate. The participants participating in this research were all male students aged 18 to 33 who were randomly divided into two EGs (Duolingo and WhatsApp) and a CG. There were 30 participants in each group. The researchers selected all the participants from male students because they were available, and they could access them more easily than their female classmates.

3.3. Instruments. OQPT was the first tool employed in the current investigation to homogenize the subjects. This tool was used to gather data on the competency of students. It consisted of 60 multiple-choice items, all of which the participants responded, and those with scores ranging from 40 to 47 were classified as intermediate.

The second and most crucial instrument used in this study was a researcher-created speaking pretest. Four subjects from the textbook of learners were covered in the pretest (i.e., Family and Friends 5). The students were instructed to speak for 2 to 3 minutes on a specific subject, and their responses were recorded for the second-rater. The

researchers scored the test based on the criteria of Hughes's [52] speaking checklist. Pearson correlation analysis was used to assess the inter-rater reliability of the pretest ($r = .79$).

The third instrument was a posttest of speaking. The topics of this test were selected from the mentioned textbook. The subjects were almost the same as the topics of the pretests. The inter-rater reliability of the posttest was calculated using Pearson correlation analysis ($r = .81$) to determine the reliability of the posttest. Four English instructors confirmed the validity of the pre- and posttests with extensive expertise. The 4th tool was a speaking checklist [52], which was used to assist the raters in grading the presentations of respondents.

3.4. Procedures. In the first step, the OQPT was administered to 135 students, and 90 of them who were at the intermediates were selected as the target participants of the study. After choosing the target participants, they were randomly divided into three groups, namely, two EGs and one CG. Then, the researchers employed a related speaking pretest to the three groups, and then, the treatment was started. One of the EGs received the treatment using the WhatsApp application, and ten conversations were taught to this group via using the WhatsApp application. In each online session, one conversation was trained for this group. The text and the audio file of the conversation were sent to this group on WhatsApp. The students were required to practice them individually, in pairs, and groups. The same conversations were taught to the other EG using the Duolingo applications. Like the WhatsApp group, the text and the audio file of each conversation were sent to this group on the Duolingo application. In the EGs, the students were responsible for their learning. On the other side, the participants of the CG were deprived of online instruction. They were taught traditionally: the researcher attended the class, played the audio file of the conversation, and explained the conversion of students. The speaking posttest was conducted after the intervention to determine whether or not the intervention had any influence on fluency and accuracy of learners while speaking. The course was divided into 13 sessions, each lasting 50 minutes. The participants were homogenized at the first session, and in the following session, they were pretested on their knowledge. The therapy was administered throughout ten sessions, with the last session consisting of posttest of speaking for each of the three groups.

4. Results

The results of the study are divided into two parts: first, the results of the fluency pre- and posttests are reported; second, the results of the accuracy pre- and posttests are depicted.

4.1. Effects of Duolingo and WhatsApp Applications on Speaking Fluency. Tables 1 to 5 analyzed the speaking fluency pretests and posttest scores, and the gained results were depicted.

Based on the results that the SPSS gave us (Table 1), the CG mean score is 13.83, and the mean scores of the EGs, including Duolingo and WhatsApp groups, are 14.10 and 14.86, respectively. All groups were at the same speaking fluency level, and there was no significant difference between their fluency pretests.

Table 2 shows the inferential statistics of all groups on the speaking fluency pretests. These statistics firmly say that there was no significant difference between the speaking fluency pretests of the three groups (the Sig value is higher than 0.05).

Table 3 shows the scores of the CG and EGs on the fluency posttests. The mean scores of the CG, the Duolingo group, and the WhatsApp group are 15.20, 16.33, and 17.56, respectively. To determine whether the difference between the mean scores of groups was significant or not, a one-way ANOVA was run in the following table.

Table 4 indicates the scores of the three groups on the fluency posttest. Based on this table, Sig (0.00) is less than (0.05); therefore, the difference between the fluency posttests of groups was significant. It can be concluded that the EGs outflanked the CG on the fluency posttest. A post hoc Scheffe test was used in the following table to see which group did better on the fluency posttest.

Table 5 shows the comparisons between the CG and the EGs. Based on this table, the EGs were significantly different from the CG on the fluency posttest. We can say that the treatment affected the performance of the EGs positively. The table also indicates that the EGs did equally on the fluency posttest.

4.2. Effects of Duolingo and WhatsApp Applications on Speaking Accuracy. In the following tables, the data related to the pretests and posttests of speaking accuracy of all groups were analyzed, and the results are shown.

Based on the descriptive statistics in the above table (Table 6), all performances of three groups on the accuracy pretest were almost the same. The mean score of CG is 13.23, the mean score of the Duolingo group is 13.76, and the mean score of the WhatsApp group is 14.13.

Table 7 depicts the inferential statistics of the three groups on the accuracy pretest. Since Sig (0.21) is greater than (0.05), the difference between the groups was not significant at $p < 0.05$. All three groups performed the same on the accuracy pretest.

Table 8 displays the mean scores of the three groups on the accuracy posttests. The mean score of the CG is 14.73, the mean score of the Duolingo group is 16.70, and the mean score of the WhatsApp group is 17.30. Based on the mean scores of the three groups, it seems that the EGs gained better scores on their accuracy posttests.

Table 9 presents the inferential statistics of the three groups on the accuracy posttest. Since Sig (0.00) is less than (0.05), the difference between the groups was significant at $p < 0.05$. It can be deduced that the EGs outperformed the CG on the accuracy posttest.

Table 10 compares the scores of all groups on the accuracy posttests. This table shows that there was a significant

TABLE 1: Descriptive statistics of the speaking fluency pretest.

	N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
CG	30	13.83	1.83	0.33	13.14	14.52	11.00	18.00
Duolingo	30	14.10	1.86	0.34	13.40	14.79	10.00	17.00
WhatsApp	30	14.86	2.08	0.37	14.09	15.64	12.00	19.00
Total	90	14.26	1.95	0.20	13.85	14.67	10.00	19.00

TABLE 2: Inferential statistics of the speaking fluency pretest.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	17.26	2	8.63	2.31	0.10
Within groups	324.33	87	3.72		
Total	341.60	89			

TABLE 3: Descriptive statistics of the speaking fluency posttest.

	N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
CG	30	15.20	2.41	0.44	14.29	16.10	12.00	19.00
Duolingo	30	16.63	1.73	0.31	15.98	17.28	15.00	20.00
WhatsApp	30	17.56	1.40	0.25	17.04	18.09	15.00	20.00
Total	90	16.46	2.11	0.22	16.02	16.90	12.00	20.00

TABLE 4: Inferential statistics of the speaking fluency posttest.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	85.26	2	42.63	11.84	0.00
Within groups	313.13	87	3.59		
Total	398.40	89			

TABLE 5: Post hoc Scheffe test, multiple comparisons (fluency posttests).

(I) groups	(J) groups	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
CG	Duolingo	-1.43*	0.485	0.01	-2.65	-0.21
	WhatsApp	-2.36*	0.48	0.00	-3.58	-1.14
Duolingo	CG	1.43*	0.48	0.01	0.21	2.65
	WhatsApp	-0.93	0.48	0.16	-2.15	0.28
WhatsApp	CG	2.36*	0.48	0.00	1.14	3.58
	Duolingo	0.93	0.48	0.16	-0.28	2.15

*The mean difference is significant at the 0.05 level.

TABLE 6: Descriptive statistics of the speaking accuracy pretest.

	N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
CG	30	13.23	1.88	0.34	12.52	13.93	10.00	17.00
Duolingo	30	13.76	2.04	0.37	13.00	14.53	10.00	17.00
WhatsApp	30	14.13	2.02	0.37	13.37	14.89	10.00	18.00
Total	90	13.71	2.00	0.21	13.29	14.13	10.00	18.00

TABLE 7: Inferential statistics of the speaking accuracy pretest.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	12.28	2	6.14	1.55	0.21
Within groups	344.20	87	3.95		
Total	356.48	89			

TABLE 8: Descriptive statistics of the speaking accuracy posttest

	N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
CG	30	14.73	2.40	0.43	13.83	15.63	10.00	18.00
Duolingo	30	16.70	2.24	0.41	15.86	17.53	11.00	20.00
WhatsApp	30	17.30	1.96	0.35	16.56	18.03	10.00	20.00
Total	90	16.24	2.45	0.25	15.73	16.75	10.00	20.00

TABLE 9: Inferential statistics of the speaking accuracy posttest.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	108.15	2	54.07	11.03	0.00
Within groups	426.46	87	4.90		
Total	534.62	89			

TABLE 10: Post hoc Scheffé test, multiple comparisons (accuracy posttests).

(I) groups	(J) groups	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
CG	Duolingo	-1.96*	0.57	0.00	-3.39	-0.54
	WhatsApp	-2.56*	0.57	0.00	-3.99	-1.14
Duolingo	CG	1.96*	0.57	0.00	0.54	3.39
	WhatsApp	-0.60	0.57	0.57	-2.02	0.82
WhatsApp	CG	2.56*	0.57	0.00	1.14	3.99
	Duolingo	0.60	0.57	0.57	-0.82	2.02

*The mean difference is significant at the 0.05 level.

difference between the posttest scores of the CG and the posttest of the EGs ($p < 0.05$); in addition, the findings show that there was not a significant difference between the scores of the EGs ($p < 0.05$).

5. Discussion and Conclusion

After collecting and evaluating the data and drawing conclusions, the researchers go on to the discussion part, where they will respond to the questions and compare and contrast their findings with those of earlier studies. According to the results of the present research, all three groups were at almost the same level of speaking fluency and accuracy before receiving the treatment, but they had different performances on their posttests. The one-way ANOVA and post hoc Scheffé test results indicated that the EGs outflanked the CG on both the fluency and accuracy posttests. This achievement can be ascribed to the Duolingo and WhatsApp instruction advantages over traditional teaching.

Our study findings agree with Marleni and Asilestari [53], who examined the effects of WhatsApp application on speaking skills of students, and their results indicated that using WhatsApp application made a significant difference between the speaking performances of the CG and the EGs in favor of the EG. Also, the current study results are in line with AlAzzam-Khraiwish et al. [50] whose research on the effects of applying WhatsApp on improving speaking skills of EFL learners showed that the EG who had received the instruction via WhatsApp outperformed the CG on the speaking posttest. Furthermore, Handayani et al. [54]

advocated our study, whose research revealed that speaking skills of students enhanced significantly after incorporating WhatsApp group into English language learning.

In addition, our study is supported by the results of Alamer and Al Khateeb [51], who inspected the impacts of utilizing the WhatsApp application on improving the motivation of EFL learners. Their results demonstrated that the WhatsApp application significantly increased the motivation of the participants in the EG. Besides, our research is advocated by the theoretical foundation proposed by Alamer [55] and the experimental results gained by Kartal [56] who discovered that the use of WhatsApp in language-learning situations can contribute to the enhancement of students' autonomy, the decrease of their stress, and the development of their language skills.

The present research outcomes are congruent with Ajisoko [57] whose study confirmed the positive effects of Duolingo in developing students' vocabulary knowledge. Moreover, the current research outcomes are in line with Bezerra de Sousa et al. [2], who surveyed the effects of Duolingo on vocabulary learning of EFL learners. They indicated that the Duolingo application improved vocabulary knowledge among EFL learners. Furthermore, the current research findings are consistent with Fadda and Alaudan [49] who examined the effects of Duolingo application on learning English in a TESOL class. The research analyses showed that the students who used Duolingo had a better vocabulary and grammar development. Also, the findings in this study are compatible with the research performed by Pramesti [58] that revealed that the Duolingo

application was an effective device for learning English since it has several benefits to support learners' learning process.

One reasonable explanation of the gained results in the current study can be that the EG participants could convey their mobile devices wherever they went to use the WhatsApp and Duolingo applications to learn and practice English. The EG participants had the opportunity to learn and practice English at any place and time that they liked. The WhatsApp and Duolingo applications exposed the EG participants more to language learning, resulting in better speaking accuracy and fluency. The advantages of the WhatsApp and Duolingo applications could help the students develop their speaking accuracy and fluency. The students access the mentioned applications in the class settings and at their homes. This frequent availability can be the reason why the EGs did better than the CG. In addition, the WhatsApp and Duolingo applications not only permit students to send and receive messages free of charge but also suggests many other functions such as the sending of various sorts of media, including videos, audio, and photos, in addition to recording voice and sending it straightaway to other members. These features can be the reasons why the EGs do better on their speaking posttests.

This research compared the effects of WhatsApp and Duolingo on developing the speaking fluency and accuracy of Iranian EFL learners. The results indicated that both applications effectively improved the speaking fluency and accuracy of EFL learners, and no significant difference was found between the two applications. As a matter of fact, in today's technologically sophisticated era, mobile phones constitute a substantial and vital form of communication for most people. Language learning and communication are centered on the use of social technology. Indeed, among EFL students in various classroom environments, the WhatsApp and Duolingo programs have been widespread, enabling them to connect with others in educational and non-instructional situations.

Based on the results, we claim that learning a language via online devices is more attractive and practical for EFL learners. Online learning can improve English learners' motivation and reduce their learning anxiety; it can attract students' attention; it assists introverted learners in expressing their opinions without shyness. Chatting in social media can improve the typing ability and self-confidence of learners. Therefore, employing social networks, especially the WhatsApp and Duolingo applications, are suggested in EFL contexts.

This research may have ramifications for English language learners in general. Technology can link language learners who are learning a foreign language to one another. When learners use online technologies to keep in touch, they can better absorb the information they are presented with. This link and flow of information may assist learners in developing the capacity to generate new knowledge at any moment. Many changes have occurred due to the fast advancement of technology, both in general and in the acquisition of a language in particular. For example, one of the great revolutions of learning has been the realization that learning no longer exists as an individual activity but as a

process that permits pupils to thrive in the digital age. By forming a WhatsApp group, the outcomes of this research may aid students in communicating with their professors and classmates, transmitting knowledge, and assisting learners in feeling more energetic and energized. Using the WhatsApp and Duolingo applications, students can work as a team that helps them improve their cooperative learning. Online applications provide learners with access to a time and place for education. With online applications that can take place at home or in a place of their choice, there is less chance for students to miss classes.

Numerous EFL instructors traditionally treat speaking skills. Moreover, in teacher-centered classes, learners have a passive role in learning, and they cannot participate in classroom activities. The findings of this study can help teachers involve learners in the learning process and abandon taking the full responsibility of teaching and bringing up autonomous students. Because such applications boost the quality and quantity of education without significantly straining instructors, this research is advantageous to them. It also places a portion of the responsibility for teaching on the learners' shoulders, which benefits them. Teachers also can have more student-centered classes by applying the WhatsApp and Duolingo applications in their teaching. The WhatsApp group can be utilized as a collaborative learning medium between students and teachers online or offline, and as a technology-based learning application, it can also develop students' abilities in English, particularly in speaking.

In Iran, mobile-based apps such as WhatsApp and Duolingo are not particularly popular or suitable among EFL instructors and students since they have not received enough training in how to incorporate these programs into the learning process. Contrary to popular belief, it is anticipated that the outcomes of this research and similar studies would encourage EFL material makers and syllabus designers to consider including such tools and apps in their materials. It is proposed that people change their attitude on such instruments and see them as a platform for learning. By paying more attention to some of the advantages of online applications, educational practitioners are also creative in designing a learning process by using the different facilities offered by this technology, one of which is learning English through the WhatsApp group.

As with any research plan, the present study met several limitations that can impact the generalizability of the results. One limitation refers to the age of the subjects of this study, which was 18 to 33 years old. Therefore, the results should be generalized to other age groups very carefully. Next, studies are suggested to consider and work on different age ranges. The sample of this study was limited to 90 participants; therefore, this cannot be generalized to a large number of EFL learners. Future research can include more subjects to get more valid results. This study was carried out on male students, and the female students were not involved. Upcoming research with a similar topic is suggested to include both female and male students. The other limitation refers to the period time of the instruction, which lasted only 13 sessions. Future researches are suggested to extend the

amount of time to measure maintenance of instruction effects. The study was done on Iranian EFL learners; it can be carried out in other countries. Only intermediate students were recruited in this research; subsequent studies can look at different levels to see how far the benefits of the WhatsApp and Duolingo applications extend.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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