PAPER

The Effectiveness of an Interactive WhatsApp Bot on Listening Skills

Behnam Behforouz[1](✉),
Ali Al Ghaithi[2]

[1]University of Technology and Applied Sciences, Shinas, Oman

[2]Sohar University, Sohar, Oman

Behnam.Behforouz@
utas.edu.om

ABSTRACT

The present paper attempted to measure the effectiveness of an interactive WhatsApp bot on the listening skills of Omani English as a Foreign Language (EFL) learners. For this purpose, 40 Omani intermediate EFL learners were divided into two groups: a control and an experimental in a higher education institution. A pretest was conducted to ensure the homogeneity of listening skills among all the participants. While both groups received instructions and exercises on listening in class, an interactive WhatsApp bot was designed for the experimental group to receive more instructions and training without time and place limitations. Later, a posttest and a delayed posttest were conducted to compare learners' performance. The study results showed smooth progress of both groups in listening exams during the posttest and delayed posttest; however, the experimental group's performance was significantly high. The findings of the study are efficacious and helpful for teachers and learners.

KEYWORDS

interactive, WhatsApp bot, EFL, listening

1 INTRODUCTION

Recently, there have been tremendous developments in using chatbots in various fields. Notably, education is a critical subject in which chatbots and virtual assistants are being progressively used [1]. According to [2], chatbots are software programs that can identify patterns from inputs and deliver results based on the input. When chatbots are meant to comprehend users' requirements using artificial intelligence (AI) approaches and respond to them in natural language, they are referred to as virtual assistants.

The use of chatbots in education has significantly increased, with the main objective being to increase each student's knowledge, often on a specific subject. The primary purpose of these chatbots is to acquire new information in the same manner as that of a human instructor [3], [4]. Chatbots are currently utilized to supplement learning and education as virtual assistants or agents. Natural Language Processing advancements are responsible for the increased use of chatbots [5]. Widely accessible

processing powers and communication technologies have accelerated the development and implementation of chatbots in education [6]. Furthermore, chatbots may assist higher education institutions in improving their current services, reducing personnel costs, and developing novel services [7].

Perez et al. [4] classify educational chatbots into two categories. The first type is service-oriented chatbots providing assistance for student questions during registration, admissions, and library services. In contrast, the second type is teacher-oriented chatbots, which function as virtual assistants in the classroom [8] to develop knowledge, increase student engagement, and provide insightful feedback [9].

To converse with a human interlocutor at a specific level of discussion through text or voice, chatbots mix artificial intelligence (AI) with natural language processing [4], [10]. Based on a study by [1], chatbots are virtual assistants who respond appropriately to queries. Other researchers [11], [12] have used a text-based chatbot that commonly answers inquiries by following a built-in rule set.

AI refers to systems or technologies that imitate human intelligence and change based on acquired data [13]. Chatbots are software programs [11], [12] that can quickly grasp inquiries and provide more efficacious responses [3]. Uses of chatbots include the following: Chatbot's FAQ [3], [14]; ELIZA, a pioneering application of natural language processing that emulates human-machine interaction [15]; colMOOC, a virtual assistant that engages in dialogue with users of MOOC platforms to encourage student participation [16]; StudBot, a chatbot explicitly designed for use in scholarly data systems [17]; and chatbots with artificial intelligence that serve as course instructors, such as Sammy [18]. The educational environment has given chatbots much recognition in various learning scenarios.

2 LITERATURE REVIEW

2.1 Chatbots and educational context

According to [19], the majority of chatbots used in universities and colleges are teacher-oriented chatbots. According to [20], a selection of students who interacted with a chatbot reported feeling good about their experiences. In addition, according to [21], [22], [23], [24], chatbots are used by students to pose questions, obtain answers, and obtain personalized help.

Yin et al. [25] found that there was not a significant distinction between the learning outcomes of undergraduate learners who were randomly assigned to experimental and control groups (whether or not a chatbot was involved); however, the study found that learners who interacted with the chatbot were more motivated. [26] created a chatbot for students studying computer science for use in goal-oriented requirement modeling. Students considered the chatbot effective and expressed an interest in future use.

Research conducted by [27] combined chatbots and online classes to promote students' mental wellness, and found that chatbots assisted self-learning, increased motivation, and decreased stress. The capacity of students to connect with their teachers by posing questions is a necessary learning process that may lead to improved academic achievement [28], [29].

Furthermore, according to [30], [31], learners are also able to raise inquiries because they are continuously afraid of receiving unfavorable feedback from their teachers. To address these challenges, some teachers interact with their pupils outside the classroom using social media platforms such as Facebook Messenger and instant messaging services such as WhatsApp. However, the teacher does not have sufficient time to

answer queries and provide pupils with timely, personalized feedback. Unplanned interactions between students and instructors create knowledge gaps among the learners. Because students always seek accurate and timely responses, a late response to a student's query is a serious concern [32]. In this setting, chatbots are helpful when course teachers cannot adequately respond to student questions at any given time of the day [33].

To help students review learning materials, chatbots may imitate interactive discussions based on human-like dialogue [34], [35], [36], enhance self-efficacy and academic performance, and promote adaptable learning [37]. Additionally, chatbots may help with this issue by starting discussions depending on the context of the student, giving the impression that each student is being personally addressed [7], [38]. A chatbot may act as a middleman between learners and teachers, allowing learners to quickly govern their learning and progress without being constrained [39]. Furthermore, chatbots tend to elicit inquiries from learners who may be hesitant to participate in traditional learning environments [31].

Instant Messaging (IM) programs seem to have many opportunities for educational uses, primarily due to the kind of communication that IM generates, which "enables many individuals to talk" despite being physically apart, parties may converse with one other at the same time in a multi-party discussion or polylogue [40]. One common instant messaging program is WhatsApp, which is often used for private and public communication. According to [41], it is an ideal tool for academic purposes because it allows for speedy and engaging multimedia knowledge sharing in real-time one-to-one or closed-group discussions. It also offers a rich environment for multimodal communication because of its visual, linguistic, and audio aspects. WhatsApp appears to have some advantages for academic use, including the ability to increase motivation and encourage cooperation [42]; to offer empowerment, a feeling of companionship, friendliness, and satisfaction [43]; to enhance communication between teachers and students [44], [45], and to support peer assessment [46]. However, WhatsApp's ability to foster communication between instructors and pupils, encourage a more direct and personal connection between them and among students, and enable opportunities for participation and collaboration within and outside of class is the most important feature for L2 development [47].

Chien et al. [48] looked at practice tasks for English conversation using the LINE Chatbot messaging program. Seventy-three students were asked to participate in educational activities, including a 4-week English conversation task with both speaking and listening. The control and experimental groups were recruited from the participants. Both groups of students engaged in after-school learning activities using LINE Chatbot. The control group signed up for the LINE Chatbot to participate in conversation exercises without competition, whereas the experimental group joined the chatbot and participated in conversation activities with competition. The findings revealed that the LINE Chatbot improved students' listening and speaking skills in each group.

Kim [49] studied the impact of chatbots on English hearing and reading abilities with 46 college students. They were randomly divided into control and experimental groups. The number of participants in the experiment was 24, and the number of students in the control group was 22. The experimental group had conversations with a chatbot called Elbot for 16 weeks, whereas the control group participants did not chat with Elbot. The pre-and posttests were conducted before and after the chatbot was used to verify the results. The main findings are as follows. First, the members of both groups considerably improved their reading and listening abilities. However, the experimental group had more significant gains on the post-listening exam. In addition, the students in the experimental group improved their listening skills from intermediate to advanced after motivating them to communicate with the chatbot.

Fryer and Carpenter [50] conducted empirical research to investigate the possible educational functions of chatbots. In this research, 211 learners were instructed to interact with two distinct chatbots, and the results of a short survey were reviewed. These findings indicate that chatbots may improve students' language acquisition. In addition, the chatbot allows opponents to enhance their listening and reading abilities. The chatbot also encourages foreign language learners to exercise their listening and reading abilities.

2.2 WhatsApp and listening skills

Fauzi and Angkasawati [51] investigated the impact of utilizing listening logs via WhatsApp on EFL learners' listening ability in the Department of English Education at Palangka Raya University. Learners' listening ability is rated poor, which limits their English competence. Then, using the WhatsApp app on smartphones, an experiment was conducted to see whether utilizing listening logs would increase students' understanding of listening skills. The experiment, conducted over three weeks, focused on honing four skills related to listening comprehension: recognizing central ideas or primary gist, recognizing supporting details, detecting message mood, and identifying new terminology. A pre-experimental design with a single-group pretest-posttest structure was employed in this investigation. According to the study findings, EFL students' listening comprehension significantly improved when they practiced listening using WhatsApp listening logs.

Kartal [52] investigated how WhatsApp, a mobile instant messaging application, is used to improve language acquisition. Thirty-seven papers were selected to examine the impact of WhatsApp on language acquisition, and 37 papers were chosen. The main topics of the analysis were study duration, number of precipitances, keywords, datasets, sample sizes, and advantages for language learning. These findings indicate that WhatsApp has been used in various language acquisition methods. WhatsApp has been employed in multiple language acquisition methods. According to the research, WhatsApp can be used to develop four language skills (speaking, writing, listening, and reading), integrative proficiency in languages, and vocabulary. In addition, this study found that WhatsApp helps learners enhance agency and interaction and decrease linguistic anxiety.

Hoe et al. [53] evaluate the efficacy of utilizing WhatsApp messaging as an educational tool for improving listening abilities. Two-group pre- and posttest designs were used in this experimental study. Sixty students participated in this study. During the research, 30 learners in the experimental group received listening exercises and drills via the WhatsApp messaging app as therapy, while another 30 students in the control group received traditional listening skills instruction from another teacher. The results revealed that the experimental group learners' listening scores were much higher than those of the control group. These findings suggest that WhatsApp messaging applications can be utilized to teach foreign language listening skills.

Yuniarti [54] conducted an examination utilizing WhatsApp to improve students' acquisition of advanced listening abilities in English language lessons by analyzing their opinions and tracking their development after using the program to facilitate learning English. The study sample included 32 female and four male pupils. Data were gathered via a student survey and observation by the teachers. According to the results, WhatsApp improved students' learning and passion, assisted learners in acquiring English abilities, deepened their listening, and gained knowledge from errors.

Another study by [55] focused on analyzing the impact of WhatsApp as a medium to develop listening skills for a group of 26 tenth-grade senior high school students. Students received 4 months of training using WhatsApp as the facilitator. Students were sent some activities as assignments, and they were responsible for participating in the activities accordingly. The result indicated that students significantly progressed from the pretest, with an average score of 69 to 86.96 in the posttest of listening comprehension. So, it was concluded that WhatsApp played a positive role in the improvement of listening skills among learners.

According to [25] and [32], to analyze the predominance of chatbots, it is vital to examine how they promote learning theory in various kinds of learning settings. The present research ascertains the extent to which the WhatsApp bot may boost Omani learners' English listening skills. As a result, this research will contribute to the existing body of information concerning learning through chatbots, usability, and functionality. This will also keep experts informed about the use of chatbots in education. The following question is the main focus of this paper:

1. Does the WhatsApp bot affect Omani EFL students' English listening skills?

3 METHOD

3.1 Participation

The participants of this study included 40 Omani intermediate EFL learners randomly selected from the General Foundation Program (GFP) from one of the universities in Oman. The participants' first language was Arabic, with ages ranging from 18 to 19. They were chosen from the intermediate based on the university placement test. Learners who were a combination of males and females were randomly assigned to two control groups, with 20 students in each group.

3.2 Research instruments

To measure the impact of the interactive WhatsApp bot on English listening skills among Omani students, the researchers designed a listening pretest, posttest, and delayed posttest to monitor participants' performance before and after implementing the treatment. All the tests consisted of three tasks, including True and False, Fill in the Blanks, and Multiple Choice. Each test had 15 questions, i.e., 5 questions were specified for each type of question.

To ensure the validity and reliability of the tests, questions were validated by two Ph.D. holders in Applied Linguistics, followed by piloting with 30 Omani intermediate EFL learners in three different sessions. The results of the questions were measured by SPSS software version 16.0. Table 1 below shows the results of reliability using Cronbach Alpha:

Table 1. Reliability of pretest, posttest, and delayed posttest

Type of Tests	Cronbach's Alpha	N of Items	N of Participants
Pretest	.850	15	30
Posttest	.995	15	30
Delayed posttest	.740	15	30

To practice the listening activities in the class, the book series named North Star GCC (Gulf Cooperation Council) second edition was used accordingly. A total number of 6 units were covered during the semester.

Using Python programming, an interactive WhatsApp bot was designed for listening practices. Then, the program was associated with a local phone number. This bot was implemented and practiced with the experimental group.

For each listening practice, the researcher designed 15 interactive questions, 5 questions, multiple choice questions, 5 questions, and 5 True and False statements. In the True/False section, students received the audio in the beginning accompanied by 5 statements. In multiple-choice interactive questions, students received a statement with a missing word and three choices. The students had to find the answer from the audio communicated through the WhatsApp bot and choose the correct answer among the alternatives. In the fill-in-the-blank questions, students received the audio first, followed by statements with the blanks to be filled correctly. These questions were written in the bot database and were updated before conducting the treatment for each session. In all types of questions and sessions, if the students answered the questions correctly or wrongly, they got feedback from the bot. In case of a wrong answer, students could listen to the audio again and try their second or more attempts.

3.3 Procedures

The study was conducted during the regular academic semester in the fall of 2023 for 5 weeks. Both the control group and the experimental group followed their teachers' instructions to learn listening skills, but the experimental group practiced listening outside of the classroom by using a WhatsApp bot to answer various types of questions, including true/false, fill, and multiple-choice. In the beginning, the researchers demonstrated a session for the experimental group on how to use the WhatsApp bot to practice listening outside the classroom and described what to do if there were any technical problems. The questions could be practiced an infinite number of times.

The study was implemented in 5 weeks, in 10 sessions. In the first week, the researchers gave both groups a listening pretest to ensure the homogeneity of learners based on their listening skills. After that, both groups were participating in their English learning classes determined by the university's curriculum and delivery plan. However, the experimental group used the WhatsApp bot as an extra tool to practice listening during the treatment outside the classroom. During the treatment, the students had to send a message to the bot, and the bot sent them specific listening practices for the session. Since two practice sessions were specified for students, there were time limitations for the experimental group to communicate with the bot. Each section appeared separately and in order. If students did not finish their first task, they couldn't answer the second type of question. In week 6, the posttest was conducted to measure the performance of both groups, and 3 weeks later, the delayed posttest was conducted for recall and retention.

3.4 Data Analysis

The descriptive statistics of the groups are presented here in addition to the report of the normality tests. First, a within-group comparison is conducted for the control and experimental groups. Then, a Mann-Whitney U test is conducted to compare the scores of the experimental and control groups. The descriptive statistics, including the two groups' mean and standard deviation scores, are shown in Table 2.

Table 2. Descriptive statistics for the pretest, posttest, and delayed scores of the two groups

Groups		Pretest	Posttest	Delayed Posttest
Control	Mean	11.2000	13.0500	12.0500
	N	20	20	20
	Std. Deviation	3.33404	2.79991	2.08945
	Minimum	5.00	8.00	8.00
	Maximum	17.00	18.00	15.00
Experiment	Mean	12.7000	17.8500	15.2500
	N	20	20	20
	Std. Deviation	2.67739	2.08440	1.97017
	Minimum	8.00	14.00	12.00
	Maximum	18.00	20.00	19.00

As shown in Table 2, the mean scores for the control group's pretest, immediate posttest, and delayed posttest are 11.2, 13.05, and 12.05. Also, the mean scores for the experimental group's pretest, immediate posttest, and delayed posttest are 12.7, 17.85, and 15.25, respectively. Before testing the related research hypothesis, it is necessary to find the data distribution's normality for the pretest, posttest, and delayed scores. To do this, the researcher conducted a Kolmogorov-Smirnov test.

Table 3. Result of the Kolmogorov-Smirnov test of normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Con_Pre	.155	20	.200
Con_Post	.207	20	.025
Con_Delayed	.175	20	.108
Exp_Pre	.145	20	.200
Exp_Post	.259	20	.001
Exp_Delayed	.152	20	.200

As indicated in Table 3, the normality of distribution was not confirmed for any of the score sets ($p < .05$), except for the pretest of the control and experimental groups ($p > .05$). Therefore, the non-parametric Wilcoxon test was used to compare the pretest, posttest, and delayed posttest scores within each group. The following table shows the result of the inferential test for the control group.

Table 4. Result of the Wilcoxon test for the control group

	Con_Post – Con_Pre	Con_Delayed – Con_Pre
Z	−3.859	−2.062
Asymp. Sig. (2-tailed)	.000	.000

The Wilcoxon signed-rank test in Table 4 showed that there was a statistically significant difference between the pretest and posttest of the control group

($Z = -3.85$, $p < .05$). There was also a statistically significant difference between the pretest and delayed posttest of the control group ($Z = -2.062$, $p < .05$). The next table compares the scores within the experimental group.

Table 5. Result of the Wilcoxon test for the experimental group

	Exp_Post – Exp_Pre	Exp_Delayed – Exp_Pre
Z	−3.941	−3.959
Asymp. Sig. (2-tailed)	.000	.000

In Table 5, the Wilcoxon signed-rank test showed that there was a statistically significant difference between the pretest and posttest of the experimental group ($Z = -3.941$, $p < .05$). There was also a statistically significant difference between the pretest and delayed posttest of the experimental group ($Z = -3.959$, $p < .05$). The next table compares the scores between the control and experimental groups.

Table 6. Result of the Mann-Whitney U test for the comparison of both groups

	Post Score Comparison	Delayed Score Comparison
Mann-Whitney U	.000	.000
Z	−4.432	−3.980
Asymp. Sig. (2-tailed)	.000	.000

As Table 6 shows, there was a statistically significant difference between the listening posttest scores of the two groups ($U = .00$, $p < .05$). There was also a statistically significant difference between the listening delayed posttest scores of the two groups ($U = .00$, $p < .05$). Therefore, the participants of the experimental group performed better in the reading posttest and delayed posttest.

4   DISCUSSION

The main purpose of the current study was to implement an interactive WhatsApp bot in English language learning environment to measure its effects on the listening performance of Omani EFL learners. The study results revealed that the experimental group that received extra explanation and practice over WhatsApp outperformed their counterparts in the control group. Although the control group showed smooth progress from the pretest to the posttest, their progress was not significant compared to the experimental group, and it was the effect of traditional intervention teaching in the class. Thus, it can be concluded that the interactive WhatsApp bot plays an important role in language learning and teaching in the Omani EFL context.

The current study's findings align with the one of [55], in which it was detected that using WhatsApp helped the learners progress in their scores from the pretest to the posttest. In addition, it was concluded that WhatsApp could be considered an efficient and strong application to improve the learners' listening skills. The results of the study agree with the finding of [51], in which they measured the effect of implementing logs via WhatsApp on the listening performance of EFL students. In this study, the experimental group was invited to join a WhatsApp group for 3 weeks. After conducting the essential tests, it was found that listening logs using

WhatsApp improved the listening performance of EFL learners. The main reason for such results was practicing materials outside of the classroom through WhatsApp.

In another study by [56], similar results were found. The study used the WhatsApp application to evaluate the performance of students in inferential listening skills at Sokoto State University. To this end, the researcher designed a Listening Performance Test (LPT) to measure students' performance in various listening activities. The explanation, ethical considerations, and exercises were explained and communicated to the experimental group using the WhatsApp application. The results showed that those students in the experimental group who received inferential listening skills by WhatsApp performed positively and firmly in the pretest and posttest.

Another study that revealed similar results to this paper was conducted by [57], in which the effectiveness of WhatsApp was measured against the learners' listening skills. In this study, the topics were introduced and communicated with the students using the WhatsApp application. The vocabulary list was distributed among the students, and various questions were sent to the students by voice notes. The study's findings showed students' significant progress in listening skills from the pretest to the posttest.

5 CONCLUSION

Chatbots are assistant agents in helping learners to communicate regarding their language learning inquiries [58], [59]. Dewi [57] believes that implementing the WhatsApp application helps improve the listening skills of students. In the current paper, an interactive WhatsApp bot was designed and implemented in a university with 40 Omani intermediate EFL learners divided into control and experimental groups. Both groups received the instructions in the class; however, extra materials, including exercises and their answers, were communicated to the experimental group via an interactive WhatsApp bot. Although the class participation control group showed progress in the posttest and delayed posttest, the results of performance by experimental groups revealed a significant amount of progress in the mentioned tests as the result of using an interactive WhatsApp bot.

The study has proven to be effective for both teachers and students simultaneously. Based on the findings of this study, it was fathomed that utilizing bots in language learning can aid students in improving their listening skills. As a result, these bots will grant them ongoing access to the resources that will help them advance more quickly. Teachers can also use these bots to provide extra instruction, testing, or materials to their students as supplemental tools, as technology and artificial intelligence's influence on daily life and academics are indispensable.

This work has several restrictions, issues, and ideas for additional investigation.

- The study's population was chosen from Omani intermediate EFL students at one of Oman's institutions, which makes it challenging to generalize the findings for this study. Other student competency levels, such as elementary, upper intermediate, advanced, and higher education students, should also be considered to make a generalizable conclusion.
- As each institution manages its technical tools and resources, additional research in other parts of Oman or other nations could create a more accurate map of how technology affects education.
- Lastly, the WhatsApp bot was utilized in this study to practice listening. The impact of bots in other applications like Messenger can be studied further, and it may be helpful to have different abilities like writing, grammar, and punctuation, to name a few.

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7 AUTHORS

Dr. Behnam Behforouz is an English Lecturer in English Language Center (ELC) at University of Technology and Applied Sciences, Shinas, Oman. He is the head of the ELC Research Committee and a member of the Research & Consultancy Committee at the university above. He has been teaching English in various Iranian and Omani universities since 2009. His main areas of interest are TESOL, Applied Linguistics, Language Education, and Educational Technologies (E-mail: Behnam.Behforouz@utas.edu.om).

Ali Al Ghaithi is an English Lecturer at the Foundation Department of Sohar University in Oman. Currently, he is a Ph.D. candidate focusing on Applied Linguistics. Ali got his master's degree from University of Putra Malaysia. He started his career as an English lecturer in 2018. Ali is interested in research studies that mainly implement Artificial Intelligence in teaching and learning processes (E-mail: AGhaithi@su.edu.om).