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Printed ISSN: 2676-5387
Online ISSN: 2676-5985

Chatbots and Speaking Performance of EFL Learners With High and Low Levels of Learning Adaptability: Effects and Percepts

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Article info

Abstract

Article type:
Research
article

Received:
2025/01/23

Accepted:
2025/01/30

Recently, the use of chatbots in language learning has attracted considerable attention. However, there is a scarcity of investigations delving into the impact of chatbots on enhancing EFL learners' speaking in the light of their learning adaptability. Consequently, this research examined the effectiveness of integrating chatbots on the speaking performance of EFL learners possessing varying levels of learning adaptability. To this aim, initially, a learning adaptability scale was administered to a group of 108 EFL learners, from whom 36 individuals exhibiting the highest adaptability scores and another 36 with the lowest scores were identified. Subsequently, both groups received a speaking pretest. Following this, the groups engaged in 12 sessions of speaking practice utilizing a chatbots. After the intervention, both groups took a speaking posttest. Furthermore, 15 participants from each group participated in semi-structured interviews. The results of One-way ANCOVA revealed that the group with high learning adaptability surpassed their counterparts with low adaptability in speaking performance. The qualitative analysis results indicated that while the high adaptability group exhibited predominantly positive attitudes towards utilizing chatbots, the low adaptability group primarily expressed negative perceptions. The findings are discussed, and implications for language teaching and learning are provided.

Keywords: artificial intelligence, chatbots, EFL speaking, learning adaptability, technology

Cite this article: Gholami, A., Ahmadi, S., & Taheri, H. (2025). Chatbots and speaking performance of EFL learners with high and low levels of learning adaptability: Effects and percepts. *Journal of Modern Research in English Language Studies*, 12(3), 179-212.

DOI: 10.30479/jmrels.2025.21495.2475

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1. Introduction

As an essential language skill, speaking has a pivotal role in an individual's ability to communicate and develop language proficiency (Al-Tamimi et al., 2020; Mohammad Hosseinpur & Parsaeian, 2023; Rahnama et al., 2020). As far as EFL learning is concerned, speaking has been found to pose serious challenges to learners given the limited opportunities they find to engage in authentic interactions (Hinkel, 2017; Wahyuningsih & Afandi, 2020). In fact, the development of speaking proficiency entails learners' engagement in meaningful conversations, their pronunciation practice, as well as their use of appropriate language in real-life contexts (Hwang et al., 2022; Kim, 2016). Yet, the conventional classroom settings may fail to create enough opportunities for learners to practice speaking skills effectively (Mattarima & Hamdan, 2011; Nawshin, 2009). Therefore, the use of technology like chatbots helps to provide support and resources aimed at improving EFL learners' speaking performance (Huang et al., 2022; Klímová & Ibna Seraj, 2023). Recently, the use of technology in second language (L2) learning has been the focus of research given its potential to promote language learning and proficiency (Barrot, 2024; Chen, 2024). Chatbots are one of the technological resources whose use is on the rise in language learning contexts. Chatbots are computer programs developed to encourage people to engage in conversation (Anh, 2024; Koç & Savaş, 2024). Indeed, these chatbots provide the L2 learners with ample opportunities to engage in interactive and personalized conversations (Akpan et al., 2024; Karyotaki et al., 2024). This can enhance learners' speaking skills (Kim et al., 2021; Yang et al., 2022). However, the extent to which Chatbots can be effective in language learning may vary given the learners' individual characteristics, such as their level of learning adaptability.

Learning adaptability has to do with a learner's capability of adjusting learning strategies and approaches in the face of new circumstances, feedback, as well as the unpredictability of the learning environment (Feroz Khan & Samad, 2024; Li et al., 2023; Martin et al., 2012). As concluded by many researchers, learning adaptability impacts the way in which learners engage with educational materials and make adjustment to various learning settings (Liu et al., 2014; Wang et al., 2023; Zhang & Liu, 2024). When it comes to EFL instruction, decoding the contribution learning adaptability makes to how learners respond to technology-mediated language practice has important implications for developing useful L2 learning interventions. A look at the related literature (e.g., Hsu et al., 2023; Kim, 2017, 2021; Kim et al., 2021; Yang et al., 2022) reveals few studies conducted on the role of using chatbots in enhancing EFL learners' speaking performance with regard to their learning adaptability. Thus, this study sought to examine the effect of chatbots on Iranian EFL learners' quality of speaking given their varying levels of learning

adaptability. In fact, this study was aimed at contributing to the current literature on technology-supported L2 learning, uncovering the role of learning adaptability in the development of learners' perceptions and experiences with chatbot-based language practice. Shedding light on the way in which learners with varying levels of adaptability react to chatbot-mediated language activities provides teachers and instructional designers with many potential benefits and challenges related to the use of chatbots in language learning curricula. All in all, this study is aimed at providing valuable insights into the efficacy of chatbots as an important tool for enhancing speaking skills among EFL learners; moreover, it highlights the important role of taking into account individual differences in learning adaptability when teachers plan to design technology-mediated language learning interventions.

2. Literature Review

2.1. Learning Adaptability

Learning adaptability contributes to individuals' engagement with educational materials, their navigation of learning environments, as well as their response to instructional interventions (Cai & Hu, 2024; Hussain et al., 2024). As pointed out by Martin et al. (2012), learning adaptability involves a set of cognitive, metacognitive, affective, and behavioral processes that allow people to make effective adjustments to novel information, activities, and emerging challenges. Cognitive adaptation is concerned with the modifications an individual makes in how he/she deals with new and uncertain demands. Behavioral adaptation has to do with the modifications one makes in his/her behavior with the aim of dealing with uncertainties and new conditions. Affective adaptation is related to the modification one makes to emotional response-tendencies in order to deal with environmental uncertainty and novelty (Martin et al., 2012). Lin et al. (2018) characterize adaptability as the individual's capability of flexible, efficient learning and to apply the knowledge across situations. In fact, learning adaptability has to do with learning the way in which a person becomes conscious of when to put one's mind into action (Martin et al., 2013). Having an open mind to change, individuals are able to exercise control over uncertainty so that they can avoid the pressure build-up, which may render the course of learning difficult or even futile (Cai & Hu, 2024). Adaptability serves as a critical prerequisite for success during transformation and systemic change.

Duffy (2010) defined learning adaptability as an individual's ability to learn and perform effectively and creatively in uncharted territory. Duffy (2010) elaborated on the important role of flexible mind, resilient response, and openness to new experiences in improving adaptability. In the same vein, Gilead and Dishon (2022) characterized learning adaptability as the capability of dealing with uncertain, complex situations, as well as ambiguity in learning

situations. They attached enormous importance to the contribution of problem-solving skills, creative power, and critical thinking in enabling people to make adjustments to varying learning contexts. Bell and Kozlowski (2008) described learning adaptability as the capability of adjusting one's learning behaviors, emotions, and cognitions in the face of changing demands and challenges. They emphasized the important role of self-regulation, metacognition, and emotional intelligence in improving adaptability among learners.

Literature review shows that those learners who enjoy high levels of learning adaptability are more inclined to have active engagement in the learning process, seeking out ample opportunities for practice and feedback; moreover, they persevere in the face of new challenges (Lin et al., 2018). These students can adapt flexibly their learning strategies given their goals, priorities, and the characteristics of the task. Whereas, students who possess low levels of adaptability have difficulty navigating effectively in learning environments. They can also hardly regulate their learning behaviors and pass over the emerging obstacles on their path to progress (Jiao et al., 2021; Li et al., 2023; Zhang & Liu, 2024). It is assumed that the learners with high levels of adaptability can act autonomously in decision-making, being meta-cognitively aware of their L2 learning processes (Liu et al., 2014). Such learners can navigate effectively through L2 learning activities so that they seek out many opportunities for practice and feedback. They also display persistence in promoting their language skills (Wang et al., 2023). In contrast, learners who have low levels of adaptability are hardly able to regulate their learning behaviors, failing to set meaningful goals and track their progress effectively (Cai & Hu, 2024; Chen et al., 2023). As a result, it is necessary to examine the contribution of adaptability to developing learners' responses to technology-mediated language. Given the new technological changes, the development of adaptability can serve as a skill that increases the quality of EFL classrooms; indeed, studying this construct with regard to L2 learning can uncover the contributions of learning adaptability in the context of technology, in general, and chatbots, in particular.

2.2. Chatbots and EFL Speaking

Quite recently, with the advent of advanced technology, the use of chatbots in the realm of English language teaching has been on the rise (Akpan et al. 2024; Anh, 2024). Anima Chatbot is one of such technological advancements which holds potentials for enhancing EFL learners' language skills, in general, and speaking performance, in particular (Suciati & Erzad, 2024). Anima Chatbot, through providing instant feedback, serves as an innovative tool for enhancing EFL learners' speaking performance. By engaging students in interactive dialogues, Anima fosters real-time language practice. As Suciati and Erzad (2024) maintain, Anima not only personalizes

learning experiences but also encourages consistent speaking practice in a supportive environment.

As one of the most important technological instruments, chatbots are used as an effective tool by teachers to improve EFL learners' speaking performance (Hsu et al., 2023). Along the same lines, chatbots put forth a unique and interactive platform whereby EFL learners can engage in conversational practice and receive immediate feedback, resulting in the improvement of their speaking skills (Bergdahl et al., 2020; Hew et al., 2023). Presenting real-life conversations, chatbots pave the way for the creation of a dynamic and engaging learning environment which stimulates learners to practice speaking and promote their L2 proficiency (Kuhail et al., 2023). Moreover, chatbots offer personalized feedback thereby improving the skills and abilities, including pronunciation, grammar, vocabulary usage, and conversational strategies. This, in turn, enables learners to spot the areas for improvement and monitor their progress over time (Lin & Chang, 2023). Moreover, chatbots provide the learners with scaffolded support and prompts whereby learners are guided through a wide range of speaking tasks and activities. This enhances learners' autonomous learning and self-directed practice (Chang et al., 2023; Fakher Ajabshir, 2023). The integration of chatbots in EFL speaking instruction courses brings about multiple benefits for both learners and teachers. For example, chatbots serve as effective and accessible platforms that learners can use to practice speaking skills anytime and anywhere, enabling them to engage in L2 practice at their own pace and convenience (Jung, 2019; Kim et al., 2021). Also, chatbots provide personalized feedback and support that are consistent with learners' needs, improving purposeful language practice and skill development (Huang et al., 2022; Karyotaki et al., 2024). Also, chatbots fosters motivation and engagement by establishing interactive and appealing learning experiences that mirror real-life chats and interactions (Hew et al., 2023; Kim et al., 2021).

Despite the promising vision of chatbots in enhancing EFL learners' speaking performance, teachers and learners face some challenges when it comes to the use of chatbots in L2 learning environments. For example, technical limitations, including speech recognition accuracy and natural L2 processing capabilities, can influence the efficacy of chatbots in giving accurate feedback and support (Kim et al., 2019; Petrović & Jovanović, 2021). Through augmenting the interactive and appealing features of chatbots, teachers establish dynamic learning settings in which students' speaking proficiency is developed. This, in turn, results in fostering motivation and engagement among language learners. Despite the role of chatbots in educational contexts and the resulting benefits, very few studies have explored EFL learners' speaking development through the use of chatbots and the

resulting learning adaptability, which is the focus of the current investigation. Based on the objectives, this study addressed the following research questions:

1. Does the use of Anima chatbot differently affect the speaking performance of Iranian EFL learners with high and low levels of learning adaptability?
2. What are the attitudes of EFL learners with a high level of learning adaptability towards the use of Anima chatbot for developing their speaking performance?
3. What are the attitudes of EFL learners with a low level of learning adaptability towards the use of Anima chatbot for developing their speaking performance?
4. What are the matches and/or mismatches between the attitudes of EFL learners with high and low levels of learning adaptability towards the use of Anima chatbot for developing their speaking performance?

3. Method

3.1. Participants

The initial sample was comprised of 160 Iranian intermediate EFL learners (both male and female). They were selected from three language institutes in Bushehr province of Iran using convenience sampling techniques. It is noteworthy that all the participants spoke Persian as their first language. These learners ranged in age from 18 to 35 years. The homogeneity of the sample in terms of the required level of proficiency, i.e. intermediate was assured using the Preliminary English Test (PET), with the learners whose scores falling within the margin of +/-1 standard deviation from the average being included in the sample.

3.2. Materials and Instruments

3.2.1. Preliminary English Test (PET)

As an internationally recognized test, the PET measures English language proficiency. This test is used to assess intermediate level English, which corresponds to B1 on the Common European Framework of Reference for Languages (CEFR). This test is made up of four sections: Reading, Writing, Listening, and Speaking. Test takers need to read a variety of texts and answer comprehension questions in the reading part. They also need to write short responses or essays based on the information provided in the writing part. The listening section is aimed at assessing test takers' ability to figure out spoken English by listening to a set of recorded conversations and monologues and the corresponding comprehension questions. The speaking section is composed of an in-person interview with two examiners which involves candidates' engagement in conversation on a wide range of topics, performing speaking

tasks, and demonstrating their capability of effective communication in English. The whole speaking test lasts about 12 to 15 minutes. During the test, two examinees are involved in performing the set tasks. As for the two examiners, one has the role of the coordinator and another one is the assessor.

As for the reliability and validity of PET, it should be noted that according to the PET Handbook for Teachers published by Cambridge University Press (University of Cambridge ESOL Examinations, 2009, p. 2) “Cambridge ESOL examinations are designed around four essential qualities: validity, reliability, impact, and practicality”. As stated in the handbook, the four dimensions of validity, reliability, impact, and practicality have been systematically established for PET.

3.2.2. Speaking Pretest and Post-test

Prior to and following the investigation, two versions of PET were given as a pretest and posttest, respectively. Both pretest and posttest had the same format and were administered using the identical procedural protocols. However, the specific speaking tasks on the PET assessment section varied between the pretest and posttest administrations. To establish the reliability of the two tests, inter-rater reliability indices were computed. The obtained indices were 0.84 and 0.89 for the speaking pretest and posttest, respectively, which are considered satisfactory.

3.2.3. Speaking Rating Scale

A rating scale developed by the University of Cambridge ESOL Examinations paper was used to assess the oral assessment component of the PET. This scale was used to evaluate Speaking Performance at Level B1 as the PET speaking test aligns with a Level B1 proficiency standard. The PET examination guidelines attest to the thoroughness of this rating scale. Also, this scale has proved to enjoy a high inter-rater reliability exceeding .81 in diverse assessment contexts. The scale is made up of the following four key dimensions: 1-Grammar and Vocabulary, 2-Discourse Management, 3-Pronunciation, and 4-Interactive Communication. Each aspect of oral competence is assessed on a scale ranging from zero to five, which is multiplied by three as per PET guidelines. Inter-rater reliability was used to verify the uniformity of assessments, using the Pearson coefficient correlation formula. The final score earned by each learner was computed through averaging the ratings given by the two evaluators. The inter-rater reliability coefficient turned out to be .89, signaling a high level of inter-rater agreement with regard to their assessments.

3.2.4. Learning Adaptability Scale

EFL students learning adaptability was measured, using the Adaptability Scale designed and validated by Martin et al. (2012). The aim of this scale is to assess learners' capability of adapting to changing learning situations, as well as their capability of adjusting their learning strategies. The scale is made up of nine items that should be answered on a Likert scale, with each item reflecting the following dimensions: appropriate cognitive, behavioral, or affective adjustment. The Likert scale involves the item rating ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Items 1 to 6 elicit a first-order "cognitive-behavioral" factor, and Items 7–9 elicit a first-order "affective" factor (Martin et al., 2012, p. 80). Exploratory and confirmatory factor analysis (EFA and CFA, respectively) showed that adaptability should be considered a higher order factor subsumed by a reliable first-order cognitive-behavioral factor and a reliable first-order affective factor; however, as signaled out by Martin et al., (2012) a single global adaptability factor was also deemed appropriate for operational purposes. The result of Cronbach's Alpha for the scale in the present study equaled .79, which is considered satisfactory.

3.2.5. Anima Chatbot

My Anima Chatbot was used in this study as this program is easily accessible at <https://myanima.ai/>. It is a text-based conversational agent which facilitates users' engagement on a wide range of topics through chat interactions. The users need to initially sign up on the website in order to access the chatbot, which is free of charge and adjusts conversations to users' proficiency levels. The rationales behind the selection of Anima over other Chatbots are user accessibility, adaptive learning experience, and diverse topics. Firstly, Anima Chatbot is easily accessible and free of charge, which lowers the barrier for entry for users. Secondly, the chatbot's ability to adjust conversations based on users' proficiency levels provides a personalized and tailored learning experience. Ultimately, the chatbot covers a wide range of topics, which allows users to practice speaking in various contexts.

3.2.6. Semi-structured Interviews

The participants' opinions regarding the contribution of the chatbot to improving their oral communication skills due to their learning adaptability were elicited using semi-structured interviews. The main reasons for using semi-structured interviews are offering chances for flexibility and depth of exploration as well as guided yet open-ended inquiry. Semi-structured interviews can provide a balance between structured and unstructured formats, which allow researchers to explore participants' responses in depth by asking follow-up questions. Moreover, semi-structured interviews use a combination of predetermined questions along with the opportunity for open-ended

responses, which allows for both guided inquiry and spontaneous discussion. Based on these reasons, semi-structured interviews can lead to richer data collection as compared with unstructured or highly structured formats. The interview questions were meticulously prepared by drawing on the scholarly literature related to chatbots, learning adaptability, and speaking skills. To guarantee the validity of the questions, at first, a six-question series was formulated based on the literature. Then, a panel of three university lecturers holding Ph.D. degree in Teaching English as a Foreign Language (TEFL) made some modifications to the questions, leading to the merging of two questions whose thematic makeup was similar; moreover, one redundant item was removed. Thus, the list of questions was reduced to four and the finalized list was test-piloted with five individuals for the purpose of ensuring clarity and comprehensibility. Also, the questions underwent subsequent adjustments in terms of question wording, with the final list being unanimously approved. The finalized list of four questions was:

- Can you describe the experiences of using the Anima chatbot as a tool for practicing speaking skills? What were the similarities and differences from other methods that you previously used?
- Having used the Anima chatbot, how would you rate your speaking performance in comparison to the past? Can you give particular details or examples where you observed changes regarding your progress in speaking or problems faced?
- What is your assessment and evaluation of the Anima chatbot considering it to be a gadget for improving speaking? Does it bring any advantages for enhancing speaking? If not, what do you view as its drawbacks?
- How do you think the level of your learning adaptability has influenced the way you have used and interacted with the Anima? Specifically, how has your learning adaptability level contributed positively or negatively towards your engagement with this tool and your speaking?

3.3. Procedure

This study adopted a mixed-methods explanatory design. In such a design, both qualitative and quantitative data are collected and analyzed to address the research problem (Creswell & Guetterman, 2021). Similarly, in the present study first quantitative data were gathered via administering speaking pretest and posttest. Then, semi-structured interviews were conducted to collect qualitative data in order to explain the quantitative results.

At first, a sample of 108 intermediate learners was selected out of a group of EFL learners based on their PET scores falling within the range of ± 1 standard deviation. This was followed by the completion of a learning adaptability questionnaire by the participants. Following that, the learners were

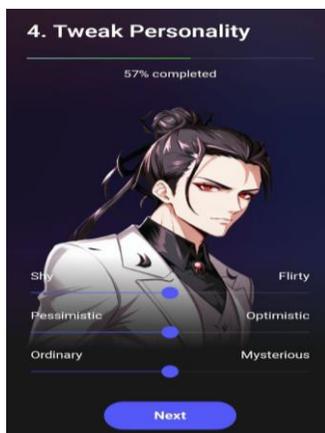
divided into three groups consisting of those with the highest scores (33%), middle scores (33%), and lowest scores (33%). The learners with the highest level of learning adaptability (N=36) and lowest level (N=36) were put into two groups. The remaining participants with mid-level scores were discarded. Then, the two groups with the highest and lowest levels of learning adaptability took a speaking pretest.

After the administration of the pretest, the two experimental groups took part in a 12-session treatment that involved using the Anima chatbot, accessible at <https://myanima.ai/>. During the intervention, the Anima chatbot offered real-time feedback on grammar and vocabulary usage. Moreover, the speech recognition capabilities of the chatbot allows it to understand and respond to user inputs effectively. The chatbot's interface is user-friendly and features visual prompts and audio cues to enhance user engagement and comprehension.

In the Tweak Personality section, the user can choose from among various dichotomous personality continuums including for instance pessimistic, optimistic, etc. (See Figure 1)

Figure 1

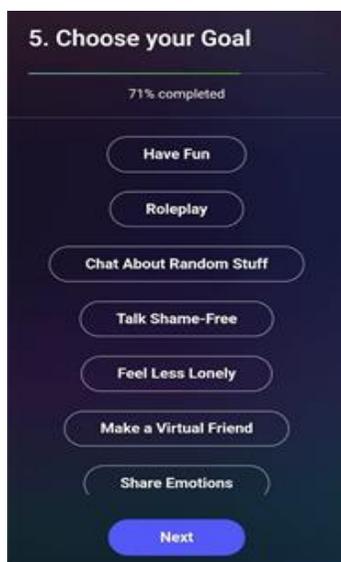
Anima Chatbot's Tweak Personality Selection Page



One the goal selection page, the user can opt from various options including have fun, role-play, chat about random stuff, etc. (See Figure 2).

Figure 2

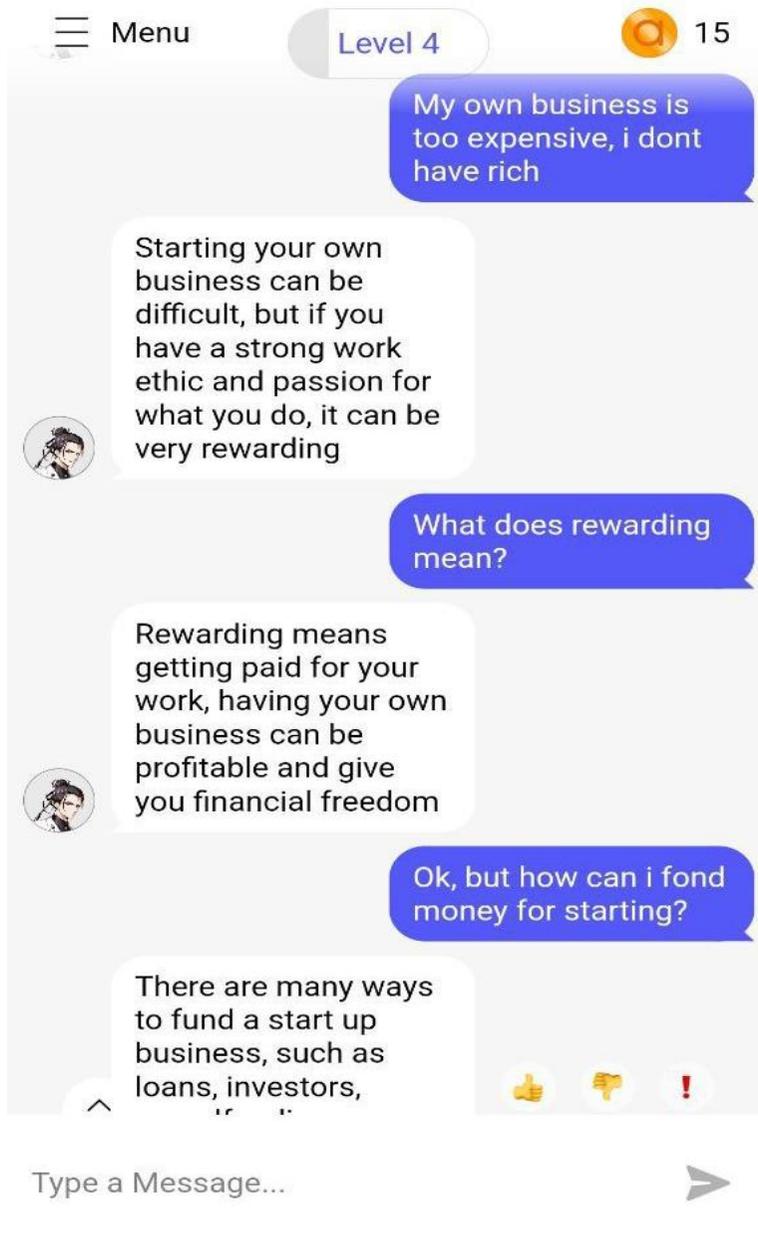
Anima Chatbot's Goal Selection Page



During each session, learners interacted with the chatbot for approximately 30 minutes, focusing on assigned topics. Figure 3 portrays some excerpts of the interactions between the chatbot and one of the participants about *finding the best job*.

Figure 3

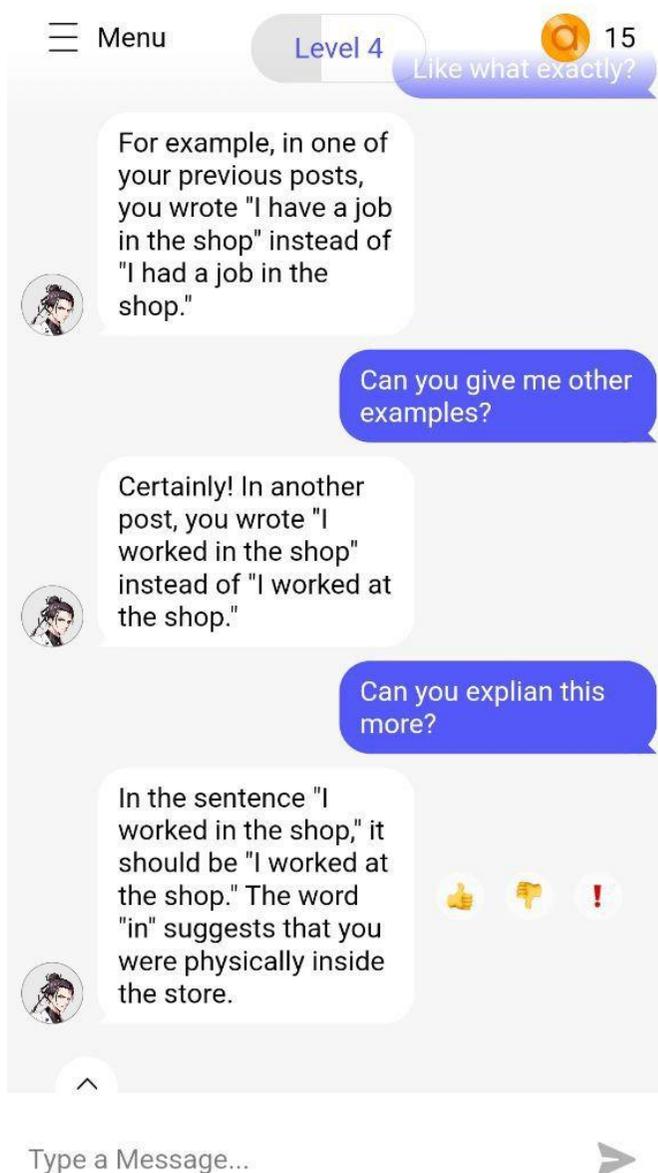
Excerpts of the Interactions between the Chatbot and a User on Finding the Best Job



The Anima also provided the users with feedback on grammar. Figure 4 illustrates an instance of the interaction between the Anima and one of the participants for grammar feedback.

Figure 4

Excerpts of the Interactions between the Chatbot and a User for Grammar Feedback



The main challenge in this study was to fully familiarize the learners with how to use the chatbot. To address this challenge, the participants were introduced to the chatbot through the detailed explanation provided by the teacher on how it functions, as well as its potential contribution to fostering

speaking abilities. Learners were provided with hands-on demonstration on the way in which the chatbot can be used to practice speaking. They were encouraged to converse with the chatbot on the assigned topics. To come up with appropriate topics, initially the researcher and three teachers with 15 years of teaching experience in a panel prepared a list of 30 topics. This list of topics was then given to the learners and they were asked to rate each topic on a scale of 1 (I do not like this topic at all) to 5 (I absolutely love this topic). Then, the scores for each topic were summed up and the 12 topics (See Appendix) with the highest scores being selected for treatment. During the conversations at the time of treatment, the teacher provided guidance and tips, tracking progress and offering support as necessary. Participants were instructed to reflect on their performance, spot the areas that need to be improved, and share feedback on their experience using the chatbot for speaking practice. Moreover, guidelines on continued application of the chatbot for future practice were provided.

Following the completion of the treatment, all learners took a speaking posttest. This was followed by semi-structured interviews in which 15 learners from each experimental group participated. The selection of 15 participants was due to reaching the saturation level for the qualitative data as proposed by Guest et al. (2006). Each interview lasted about 35 to 40 minutes and the interviewees' responses were recorded and transcribed verbatim. The interviews were conducted in Persian, the participants' mother tongue to obviate any foreign language barriers while expressing their opinions.

The quantitative data analysis involved running a One-Way ANCOVA after checking the assumptions. Specifically, the assumptions of normality, multicollinearity, homogeneity of regression slopes, and the homogeneity of variances were assessed using skewness and kurtosis ratios, the existence of only one covariate, Tests of Between-Subjects Effects, and Levene's test, respectively. Finally, the Estimated Marginal Means and Pairwise Comparison tables were consulted to determine any significant difference on the posttest mean scores while considering the pretest scores as covariate.

In the qualitative analysis, data underwent six stages of thematic analysis as put forth by Braun and Clarke (2006). This analysis consists of 1-data familiarization, 2-initial coding, 3-theme identification, 4-theme review, 5- theme definition, and 6-report writing. During the initial coding phase, codes were generated inductively from the data, ensuring that they accurately reflected participants' experiences. Each theme was then examined to ensure it represented a coherent pattern within the data. To guarantee reliability, a research assistant collaborated with the researcher in the thematic analysis process as per the guidelines by Hsieh and Shannon (2005). Whenever the findings provided by the researcher turned out to differ from that provided by the assistant, the discrepancies were addressed through discussion and

resolution. Inter-rater agreement was verified, using Holsti's (1969) coefficient of reliability. The coefficient turned out to be 0.89., indicating strong consistency. Member checking was carried out with six learners to verify interpretations and raise analysis credibility (Nassaji, 2020).

4. Results and Discussion

4.1. Results

4.1.1. Addressing the First Research Question (Quantitative Data Analysis)

To analyse the data, initially, the descriptive statistics for the pretest and posttest scores were obtained. Table 1 displays the descriptive statistics.

Table 1

Descriptive Statistics for the Pretest and Posttest Scores

	Mean	SD	Variance	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error	
Pre-Low LA	33.5417	2.60080	6.764	-.492	.343	-.087	.674
Pre-High LA	31.8298	2.16010	4.666	.108	.347	-.331	.681
Post-Low LA	34.1875	3.10563	9.645	-.481	.343	-.290	.674
Post-High LA	43.9787	1.97252	3.891	-.306	.347	.350	.681

As Table 1 shows, the pretest means for high scorers and low scorers were 33.54 and 31.82, respectively. The pretest scores were considered as a covariate and an ANCOVA was run to address the research question. Table 2 gives a summary of the descriptive statistics for the pretest (covariate) and posttest scores (dependent variable) of the two groups.

Table 2

Descriptive Statistics for the Pretest (Covariate) and Posttest (Dependent Variable) Scores

	Mean	SD	Variance	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error	
Pre Both	32.6947	2.53097	6.406	-.062	.247	-.524	.490
Post Both	39.0316	5.56289	30.946	-.281	.247	-.702	.490

As Table 2 displays, the pretest and posttest scores yielded the skewness and kurtosis ratios within the range of +/- 1.96. As a result, the first requirement of ANCOVA, namely, the normality assumption, was not violated

(Tabachnick & Fidell, 2013). Moreover, a well-constructed and reliable instrument developed by Pallant (2010) for speaking assessment was used to guarantee the second assumption of ANCOVA i.e., reliability of covariate. Also, given the existence of only one covariate, the multicollinearity assumption was not violated, either (Tabachnick & Fidell, 2013). To check the next assumption, i.e., the homogeneity of regression slopes, the Tests of Between-Subjects Effects table was consulted (Table 3). As Table 3 shows, the significant value corresponding to Groups * Preboth was found to be .34. As it exceeds 0.05, it can be concluded that the assumption of the homogeneity of regression slopes was met.

Table 3

Tests of Between-Subjects Effects for Pretest and Posttest Scores

Dependent Variable: Post WS Both

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2434.698 ^a	3	811.566	155.739	.410
Intercept	275.055	1	275.055	52.783	.120
Groups	74.102	1	74.102	14.220	.130
Preboth	108.014	1	108.014	20.728	.08
Groups * Preboth	24.268	1	24.268	4.657	.34
Error	474.207	91	5.211		
Total	147638.000	95			
Corrected Total	2908.905	94			

a. R Squared = .837 (Adjusted R Squared = .832)

Lastly, the Levene's test was used to check the last assumption of ANCOVA, i.e., the homogeneity of variances (Table 4).

Table 4

Levene's Test of Equality of Error Variances

Dependent Variable: Post Both

F	df1	df2	Sig.
4.972	1	93	.141

As Table 4 displays, given the equal variances in the dependent variable and covariate, the assumption of homogeneity of variances was met ($F=4.97, p=.14>.05$). Table 5 shows the results of ANCOVA.

Table 5
Results of ANCOVA for the Pretest and Posttest Scores

Dependent Variable: Post WS Both						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2410.431 ^a	2	1205.215	222.438	.017	.829
Intercept	255.491	1	255.491	47.154	.008	.339
Preboth	133.817	1	133.817	24.698	.009	.212
Groups	2381.895	1	2381.895	439.610	.002	.827
Error	498.474	92	5.418			
Total	147638.000	95				
Corrected Total	2908.905	94				

a. R Squared = .829 (Adjusted R Squared = .825)

According to Table 5, the sig. value for the groups does not exceed the critical value ($p = .002 < .05$), signaling a significant difference between the two groups regarding speaking scores. The partial eta squared was found to be .82, showing a large effect size (Cohen, 1988). Table 6 displays the estimated marginal means for the two groups.

Table 6
Estimated Marginal Means

Groups	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Post Low-LA	33.763 ^a	.347	33.074	34.451
Post High-LA	44.412 ^a	.351	43.716	45.109

a. Covariates appearing in the model are evaluated at the following values: Pre WS Both = 32.6947.

Table 7 displays the pairwise comparison between the two groups' speaking scores. As Table 7 shows, the significant value was found to be .00, exceeding 0.001. Also, as Table 6 shows, the high learning adaptability and low learning adaptability groups earned the marginal means of 44.41 and 33.76, respectively. This indicates a significantly better performance of the high learning adaptability group than the low learning adaptability group regarding speaking scores.

Table 7
Pairwise Comparison

Dependent Variable: Post Both						
(I) Groups	(J) Groups	Mean Difference (I-J)			95% Confidence Interval for Difference ^b	
		J)	Std. Error	Sig. ^b	Lower Bound	Upper Bound
Low-LA	High-LA	-10.649*	.508	.000	-11.658	-9.641

4.1.2. Addressing the Second Research Question (Qualitative Data Analysis)

The second research question sought to examine the views of EFL learners who had a high learning adaptability level with respect to the use of a chatbot to improve their speaking performance. The results of thematic analysis yielded six themes that are composed of *proactive engagement with new learning instruments, willingness to adopt innovation, being open to change and adaptation, proactive use of feedback, strategic learning approaches, and adaptive problem-solving skills.*

In what follows, the initial codes, the sub-themes, and main themes along with an interview excerpt for each main theme is provided:

Initial codes (1): Actively experimenting with chatbot functionalities, seeking out different conversation topics, engaging in various speaking exercises provided by the chatbot

First sub-theme: Exploration of features

Initial codes (2): viewing challenges as opportunities for growth, setting personal goals for using the chatbot regularly, reflecting on progress after each session with the chatbot

Second sub-theme: Continuous learning mindset

Main theme #1 based on the exploration of features and continuous learning mindset subthemes: *Proactive engagement with new learning instruments*

Interview excerpt:

I look for new tools such as chatbots because they help me practice speaking differently. I look forward to these activities around the features of the tools, which keeps me engaged and motivated to enhance my English skills.

Initial codes (1): positive attitude towards integrating technology in learning, sharing experiences with peers about using the chatbot, actively looking for new technological tools for language learning

First sub-theme: Embracing technology

Initial codes (2): trying out different speaking formats offered by the

chatbot, being receptive to suggestions and updates from the chatbot, encouraging friends to join in using the chatbot for practice.

Second sub-theme: Openness to new methods

Main theme #2 based on the embracing technology and openness to new methods subthemes: *Willingness to adopt innovation*

Interview excerpt:

I consider the incorporation of technology in learning processes as crucial. I was thrilled when I had the opportunity to use the chatbot. It seemed like a twenty-first century solution to learning languages. I am always ready for new ways of doing things that will improve my speaking skills.

Initial codes (1): willingness to adjust study routines based on chatbot interactions, adapting to various speaking scenarios presented by the chatbot, and experimenting with different times of day for practice sessions

First sub-theme: Flexibility in learning approaches

Initial codes (2): overcoming initial difficulties with technology, maintaining motivation despite setbacks in speaking performance, seeking help or resources when facing challenges

Second sub-theme: Resilience in facing challenges

Main theme #3 based on the flexibility in learning approaches and resilience in facing challenges subthemes: *Being open to change and adaptation*

Interview excerpt:

The thought of change does not intimidate me. When I began to converse with the chatbot, I used it as a learning tool from the outset. The implementation of different techniques has gradually become a normal process for me when studying.

Initial codes (1): taking notes on feedback received from the chatbot, discussing feedback with teachers or peers for clarification, setting specific improvement targets based on feedback

First sub-theme: Active reflection on feedback

Initial codes (2): practicing suggested exercises after receiving feedback, tracking progress on areas highlighted for improvement, revisiting previous sessions to assess changes in performance

Second sub-theme: Implementation of suggestions

Main theme #4 based on the active reflection on feedback and implementation of suggestions subthemes: *Proactive use of feedback*

Interview excerpt:

The suggestions offered from the chatbot are extremely important to me. I write them down and make a conscious effort to improve in these areas. This method enables me to speak with much more eloquence and

measure the improvement of my skills over time.

Initial codes (1): Setting weekly themes or topics for speaking practice, creating a structured plan for chatbot interactions, prioritizing specific language skills

First sub-theme: Goal-oriented practice

Initial codes (2): Allocating dedicated time slots for chatbot practice, balancing chatbot use with other study methods, using timers to enhance focused practice sessions

Second sub-theme: Time management skills

Main theme #5 based on the goal-oriented practice and time management skills subthemes: *Strategic learning approaches*

Interview excerpt:

I make sure to incorporate these chatbots into my practice by placing limits on how many conversations I have with it within a certain timeframe during the week. For instance, I change the topics I talk about with the chatbot every week as a way of broadening the vocabulary.

Initial codes (1): identifying specific areas of struggle during practice, reflecting on what strategies work best when facing challenges, keeping a journal of obstacles and solutions encountered

First sub-theme: Analyzing difficulties

Initial codes (2): Exploring additional resources when the chatbot is insufficient, collaborating with peers for joint problem-solving sessions, utilizing online forums or communities for advice and tips

Second sub-theme: Seeking alternative solutions

Main theme #6 based on the analyzing difficulties and seeking alternative solutions subthemes: *Adaptive problem-solving skills*

Interview excerpt:

When interacting with the chatbot and run into any issues, I try to adjust and change how I am approaching it rather than fully giving up. I evaluate my strategies and try to figure out what went wrong, which helped me a lot when it came to improving my speaking skills.

The learners characterized by high learning adaptability showed a proactive approach to the exploration and use of the chatbot as a new learning tool. Their willingness to engage with the technology had a positive effect on their speaking performance. Also, the high learning adaptability group was found to have a strong willingness to adopt innovation in L2 learning. They embraced the chatbot as a new method for enhancing their speaking skills,

resulting in improved performance outcomes. Moreover, people with high learning adaptability showed a high level of openness to change and adaptation after they were introduced to the chatbot. Their ability in flexibly adjusting to new learning methods enabled them to effectively use the tool in their speaking practice. Moreover, high learning adaptability participants showed a proactive approach in the use of feedback from the chatbot to promote their speaking performance. In fact, they sought to actively incorporate corrections and suggestions into their L2 practice, which resulted in constant improvement in their speaking skills. Also, the high learning adaptability group displayed strategic learning approaches when it came to the use of the chatbot. They made use of different strategies and techniques to increase the advantages of the tool for developing their speaking abilities, which led to better performance outcomes. Finally, learners with high learning adaptability displayed adaptive problem-solving skills in the face of new challenges while using the chatbot. Their capability of quickly identifying and addressing issues in their speaking practice led to their enhanced performance compared to the low learning adaptability group.

4.1.3. Addressing the Third Research Question (Qualitative Data Analysis)

The third research question sought to examine the views of EFL learners who had a low learning adaptability level in terms of the use of a chatbot to improve their speaking performance. The results of thematic analysis yielded four themes including *limited adaptability to new learning tools*, *difficulty in adopting change*, *lack of flexibility in learning approaches*, and *difficulty in making adaptation based on feedback*.

In what follows, the initial codes, the sub-themes, and main themes along with an interview excerpt for each main theme is provided:

Initial codes (1): Preference for traditional learning methods over digital tools, hesitation to explore chatbot features due to unfamiliarity, expressing discomfort or anxiety when using technology

First sub-theme: Resistance to technology

Initial codes (2): Rarely using advanced functionalities of the chatbot, sticking to basic conversations without exploring other options, not utilizing personalized settings or feedback mechanisms

Second sub-theme: Minimal engagement with chatbot features

Main theme #1 based on the resistance to technology and minimal engagement with chatbot features subthemes: *Limited adaptability to new learning tools*

Interview excerpt:

With the introduction of new tools such as chatbots, the way I learn has drastically changed. My traditional methods of learning have been rendered useless and now I learn in a completely different way which

makes me feel slightly uneasy. Adjusting to new technology into my learning will take some time.

Initial codes (1): Anxiety about changing established study routines, worrying that new methods may not lead to improvement, reluctance to abandon familiar practices for new ones

First sub-theme: Fear of the unknown

Initial codes (2): Relying on known resources and materials for practice, avoiding experimentation with new speaking techniques, feeling overwhelmed by the prospect of learning new skills

Second sub-theme: Preference for familiarity

Main theme #2 based on the fear of the unknown and preference for familiarity subthemes: *Difficulty in adopting change*

Interview excerpt:

Change is not easy for someone like me. A prime example being when we all switched to utilizing the chatbot, I personally failed to see its advantages. There is a certain element of comfort and familiarity when I study and I tend to revert back to those habits.

Initial codes (1): sticking to a fixed schedule without variation, inability to adjust learning strategies based on circumstances, following a strict routine that limits exploration of new methods

First sub-theme: Rigid study habits

Initial codes (2): struggling to find alternative solutions when faced with difficulty, relying on a single approach to overcome challenges, avoiding seeking help or additional resources when needed

Second sub-theme: Limited problem-solving strategies

Main theme #3 based on the rigid study habits and limited problem-solving strategies subthemes: *Lack of flexibility in learning approaches*

Interview excerpt:

The routine I am used to makes my learning very predictable, which does not help when I want to explore new things such as the chatbot. If there are changes in the routine, I get confused as to how I should work around those changes.

Initial codes (1): finding it hard to understand chatbot feedback clearly, ignoring feedback due to lack of confidence in its relevance, misunderstanding suggestions and failing to implement them

First sub-theme: Misinterpretation of feedback

Initial codes (2): not keeping records of performance or feedback received, failing to recognize improvements or areas needing attention, lacking motivation to act on feedback due to unclear goals

Second sub-theme: Inability to track progress

Main theme #4 based on the misinterpretation of feedback and inability to track progress subthemes: *Difficulty in making adaptation based on feedback*

Interview excerpt:

The suggestions that I received from the chatbot were not very beneficial for me in the long run. The advice was something I was unable to implement, and in turn made me feel restricted on how to adapt my speech. I am sure that made me improve on my speaking skills, but the pace was rather slow.

Learners with low learning adaptability had difficulty adapting to the chatbot as a new learning tool. It was challenging for them to navigate the interface and use its features effectively, which prevented them from speaking effectively. Furthermore, the low learning adaptability group resisted against changes when it came to using the chatbot. They were doubtful to move out of their comfort zone to adopt new technology for L2 learning, influencing their desire to engage with the tool. Also, the learners with low learning adaptability showed rigidity in their learning approaches. Indeed, they avoided experimenting with different strategies provided by the chatbot, opting for familiar methods that reduced their speaking performance improvement. Lastly, the participants with low learning adaptability encountered challenges in addressing the feedback provided by the chatbot in their speaking practice. It was very difficult for them to adjust their language usage in accordance with the bot's corrections, resulting in a slower progress in the development of their speaking skills.

4.1.4. Addressing the Fourth Research Question (Qualitative Data Analysis)

The fourth research question was aimed at examining the matches and/or mismatches between the views of EFL learners who had a high level of learning adaptability and those who had a low level of learning adaptability towards the application of a chatbot for enhancing their speaking performance. Given the themes obtained from the second and third research questions, the following points were considered:

1) Willingness to adopt innovation and proactive use of novel learning tools (high adaptability) vs. difficulty in adopting change and limited adaptability to novel learning tools (low adaptability):

Learners with high adaptability displayed a strong desire and willingness to adopt innovation in L2 learning, embracing the chatbot as a new method for enhancing speaking skills. On the other hand, learners with low adaptability found it difficult to accept change, which decreased their capability of benefiting from the chatbot. Moreover, the high adaptability group used a proactive approach towards the exploration and use of the chatbot as a novel learning tool, resulting in the enhanced speaking performance.

While the low adaptability group had difficulty adapting to new learning tools, which undermined their performance.

2) *Being open to change and adaptation (high adaptability) vs. no flexibility in learning approaches (low adaptability):*

The high adaptability group was found to be open to change and adaptation after being introduced to the chatbot, allowing them to use the tool effectively in their speaking practice. Whereas, the low adaptability group showed no flexibility in learning approaches, reducing their ability to make adaptations to the new tool.

3) *Proactive use of feedback (high adaptability) vs. difficulty with making adaptation to feedback (low adaptability):*

High adaptability learners actively used feedback provided by the chatbot to improve their speaking performance, using corrections and suggestions for constant improvement. In contrast, learners with low adaptability encountered difficulties adapting to feedback, which prevented their progress in the development of their speaking skills.

4) *Strategic learning approaches (high adaptability) vs. difficulties with making adaptation to feedback (low adaptability):*

While the high adaptability group took strategic learning approaches to increase the benefits of the chatbot, the low adaptability group had difficulty making adaptation to feedback, which influenced their overall performance.

5) *Adaptive problem-solving skills (high adaptability) vs. limited adaptability to novel learning instruments (low adaptability):*

Learners with high adaptability displayed adaptive problem-solving skills in the face of challenges as they were using the chatbot, resulting in their improved performance. On the other hand, the low adaptability group's limited adaptability to novel learning instruments reduced their capability of effectively using the chatbot for the development of their speaking skills.

Given the above-mentioned results, the differences between the opinions of EFL learners with high and low levels of learning adaptability towards the application of a chatbot for enhancing their speaking performance signal the important effect of learning adaptability on participants' ability to adopt new learning tools. These differences also influenced their willingness to embrace innovation, make adaptation to change, make use of feedback proactively, take strategic learning approaches, and display adaptive problem-solving skills.

4.2. Discussion

The aim of this study was to investigate the effect of the use of chatbots on the development of the speaking performance among EFL learners who had varying levels of learning adaptability. Based on the results of One-way ANCOVA, the group with high learning adaptability outperformed the group

with low adaptability. The qualitative analysis revealed that the high adaptability group had positive attitudes towards the use of chatbots, whereas the low adaptability group mainly had negative perceptions. These results confirm the essential contribution of learning adaptability to the language learning outcomes, particularly given the use of innovative technological tools, including chatbots for language practice. The findings of this study corroborate the findings of previous studies (e.g., Cai & Hu, 2024; Chen et al., 2023; Feroz Khan & Samad, 2024; Gilead & Dishon, 2022; Hussain et al., 2024; Karyotaki et al., 2024; Li et al., 2023) regarding the important role of learning adaptability in learners' learning outcomes.

The better performance of EFL learners with high learning adaptability can be attributed to their inherent capability of adopting and effectively using new learning tools (Cai & Hu, 2024). Learners with high adaptability show a proactive approach to the navigation of novel methods for language acquisition, which helps them to build on the benefits provided by the chatbot (Feroz Khan & Samad, 2024; Hussain et al., 2024). However, participants with low adaptability have difficulty engaging with and making adaptation to new technological resources (Chen et al., 2023; Li et al., 2023), dampening their progress in speaking proficiency. Also, the findings of the study signal the important role of being open to change and adaptation in L2 learning. EFL learners with high learning adaptability show more willingness to adopt innovation and make use of new technologies in their L2 practice routines (Gilead & Dishon, 2022; Martin et al., 2012). This willingness to adopt new changes allows learners with a high level of learning adaptability to make effective use of the chatbot to improve their speaking skills, which leads to better performance compared to less adaptable learners who may resist against the use of new tools in their learning repertoire (Cai & Hu, 2024). Also, the findings affirm the crucial role of feedback use in enhancing speaking performance among EFL learners (Huang et al., 2022; Karyotaki et al., 2024). Learners with high learning adaptability are more inclined to proactively use feedback offered by the chatbot to improve their speaking skills and address areas of weakness (Chang et al., 2023). On the contrary, learners with low adaptability may have difficulty using feedback effectively in their language practice (Lin & Chang, 2023). This limits their capability of making meaningful progress in speaking proficiency.

Moreover, the differences in speaking performance can be attributed to the strategic learning approaches used by each group. Learners with high adaptability display a greater skill at strategic planning and goal-setting in their L2 learning practices (Jiao et al., 2021; Zhang & Liu, 2024), allowing them to make effective use of the chatbot for skill development. Conversely, learners with low adaptability may not have the repertoire of strategies needed to use the chatbot in the best way possible. Furthermore, the findings of the study

show the essential role of adaptive problem-solving skills in improving L2 learning outcomes. EFL learners with high learning adaptability were found to be less capable of adapting and responding effectively to challenges related to the use of the chatbot (Gilead & Dishon, 2022). This enables them to go over the barriers, making continuous progress in speaking proficiency. In contrast, learners with low adaptability may have difficulty navigating and may have less ability to find innovative solutions (Bell & Kozlowski, 2008). This ultimately impedes their overall performance in L2 learning tasks. These findings signal the significance of developing a growth mindset and a willingness to adopt new changes in L2 learners, as these qualities are crucial for enhancing the positive aspects of technology-enhanced L2 learning experiences. Learners' adaptability skills should be enhanced by offering ample opportunities for experimentation, reflection, and iterative improvement in their L2 practice activities (Cutrer et al., 2017). By creating a culture of adaptability within L2 learning environments, teachers enable students to become more resilient and resourceful learners so that they would be more capable of navigating the complexities of L2 acquisition effectively.

5. Conclusion and Implications

The findings of the investigation yield multiple theoretical implications regarding the in-depth understanding the role of learning adaptability in L2 learning outcomes, especially with regard to the use of chatbots as a learning tool. Based on the results, learners with high levels of adaptability are in a better position to make effective use of innovative technologies, including chatbots for improving their speaking proficiency. This signals the important role of taking into account the individual differences in adaptability when it comes to designing L2 learning interventions. This is because learners with varying levels of adaptability can have different reactions to technological tools. Accordingly, teachers and curriculum developers would do well to tailor instructional approaches to account for the learners with diverse adaptability levels, thereby increasing the effectiveness of technology-enhanced L2 learning experiences. Pedagogically, the study lends credit to the value of enhancing adaptability skills among EFL learners, which paves the way for successful L2 learning outcomes. By fostering adaptability traits, including openness to change, proactive problem-solving, and strategic planning, teachers make it possible for students to effectively engage with new learning technologies, optimizing their L2 practice routines. The use of activities that facilitates the development of adaptability in L2 curricula can allow learners to increase the resilience and flexibility required to navigate challenges. They can build on opportunities for L2 skill enhancement. This focus on adaptability-oriented pedagogical practices is consistent with contemporary educational trends that place emphasis on the important role of promoting 21st-

century skills in learners. This prepares them for successful performance in a rapidly evolving digital landscape. Moreover, the study characterizes the potential of chatbots as an important tool that can be used to promote speaking proficiency in EFL contexts, especially for learners with high levels of learning adaptability. Chatbots provide a dynamic and interactive platform for L2 practice, offering personalized feedback and opportunities for real-time speaking practice. Teachers can draw on chatbot technology to establish engaging and immersive L2 learning experiences that take into account individual learner needs and preferences. Using chatbots in L2 instructional programs, teachers can improve learners' speaking skills and increase adaptability skills required for effectively navigating digital learning environments. Moreover, teachers can use chatbots to simulate real-life conversations, providing students with opportunities to practice speaking in a low-pressure environment. Additionally, some chatbots possess game-like features, such as earning points or badges for completing speaking tasks, which can motivate students to engage more frequently with the chatbot. This approach can make practicing speaking more enjoyable and less intimidating. Chatbots can prompt students with daily speaking challenges or questions that encourage them to speak for a certain amount of time on various topics. This regular practice can help build fluency over time and instill a habit of speaking in English daily.

Furthermore, the findings of the study signal the intertwined nature of adaptability and L2 learning outcomes, indicating that learners' capability of adapting to new learning tools and strategies has a big effect on their L2 performance. Moreover, the study shows the need for personalized and adaptive approaches to L2 instruction that consider individual learner characteristics (e.g., adaptability levels). By adapting L2 learning interventions to learners' unique adaptability profiles, teachers are able to create more effective and engaging learning experiences that take into account students' diverse needs and preferences. Such a personalized approach improves learners' speaking proficiency, fostering a sense of autonomy and ownership over their L2 learning journey. By taking into account and catering to learners' varying levels of adaptability, teachers can create inclusive and empowering L2 learning setting that support learners in activating their full potential in L2 acquisition.

Prospective research can investigate the effect of the use of adaptive chatbot interventions consistent with individual learners' adaptability profiles on language skills beyond speaking performance. Examining the way in which personalized chatbot interactions consistent with learners' adaptability levels impact different language competencies offers valuable insights into the efficacy of adaptive learning technologies. Moreover, future studies can examine the longitudinal impact of sustained chatbot usage on L2 skill

development among EFL learners with diverse adaptability traits. This uncovers the long-term advantages related to the use of adaptive chatbots in L2 learning curricula. Meanwhile, examining the contribution of metacognitive strategies to shaping the relationship between learning adaptability, chatbot use, and language skill improvement provides a deeper understanding of the cognitive processes related to successful language learning outcomes. Exploring the potential moderating influences of individual attributes such as motivation, self-regulation, and previous language learning experiences on the connections between adaptability, chatbot utilization, and language skill improvement can lead to a deeper understanding of the intricate interactions between learner traits and technological applications in language education. Additionally, investigating how skills gained through chatbot-facilitated language practice transfer to real-life communicative situations, as well as evaluating the broader applicability of learning results across various proficiency levels and age demographics, could yield significant insights into the practical consequences of incorporating chatbots into EFL teaching. These research avenues are vital for enhancing our comprehension of how adaptive chatbot technologies can be effectively utilized to improve language learning outcomes and support evidence-based teaching methods that address the diverse requirements and preferences of language learners.

Acknowledgments

We would like to thank the participants who took part in the present study.

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Appendix

Speaking Topics

1. Finding the best job
2. Challenges and benefits of online learning
3. Free time and hobbies
4. Clothes and fashion
5. Online shopping
6. Future of technology
7. Studying books
8. Sports and health
9. Local or international food?
10. Advantages and disadvantages of living in a big city
11. Traveling to other countries is not common anymore
12. Remaining healthy in a time full of stress and anxiety