Mobile-Assisted Shadowing: Transforming Pronunciation for Arab English Learners

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Abstract

Shadowing helps improve various aspects of pronunciation of second language learners. The present action research study investigated the effect of mobile technology-enhanced shadowing on the pronunciation of Arab learners of a second language. Sixteen Arab learners of English used iPods to shadow short dialogues for eight weeks. The study participants were asked to practice at least four times per week for 10 minutes per practice as they recorded the shadowing session. Extemporaneous speaking and shadowing tasks were administered as pre-test, mid-test, and post-test. This was followed by 2 native speakers of English who rated the tests. Speakers rated extemporaneous speaking tasks for fluency, accentedness, and comprehensibility and rated the shadowing task for the ability of learners to imitate a speech model. Based on the study's results, there was a significant improvement in three speaking measures, namely, the ability of learners to imitate a speech model, comprehensibility, and fluency, but not in accentedness. Results indicated that the participants improved significantly on all speaking measures apart from accentedness. These results show that mobile-enhanced shadowing can be engaging and effective in teaching second-language pronunciation and that teachers should incorporate it into second-language classrooms. Given these results, teachers and lecturers should embrace shadowing in second-language classrooms. Further, pedagogical implications are proposed, and study limitations are discussed accordingly.

Keywords: accentedness, pronunciation, comprehensibility, extemporaneous speech, intelligibility, language assessment

1. Introduction

Second-language acquisition researchers have traditionally paid less attention to second-language pronunciation than other aspects of language, notably vocabulary and grammar (Rogerson-Revell, 2021). For this reason, a lot remains to be discovered regarding how teachers of a second language can best help learners improve their pronunciation. For some researchers (Garib, 2023), shadowing, also referred to as mirroring and tracking, is the panacea for improving the pronunciation of second-language learners. For example, Metruk (2020) opined that some second-language learners, such as Japanese English language learners, lack English rhythms that impede comprehensibility in oral communication with native speakers of English. Haryadi and Aprianoto (2020) argued that for these learners of a second language, the sound systems of the first language (e.g., prosodic features) differ from the second language (English). For these Japanese learners of English, these prosodic features, including rhythm, intonation, and stress, interfere with their pronunciation of English-connected speech. Maini and (Wang et al., 2023) advanced that for these learners of a second language, their English pronunciation can be improved using a shadowing technique. (Bogach et al., 2021a), other advocators of using shadowing techniques to foster improvements in second-language learners, argued that shadowing allows the learners of a second language to study and improve their pronunciation in the target language by listening and repeating the speaker's pronunciation in a recording. According to Zhao et al. (2024), the pronunciation of these second-language learners is improved when they try to copy the breaths and pauses of the English speaker. Through shadowing, learners of a second language are also thought to gain insight into words that need emphasizing as well as understand the importance of giving special attention to intonation (i.e., the speaker is up and down movements as he or she speaks). Reinforcing this view, (Jao et al., 2024) held that a shadowing technique can help learners of a second language pay attention to intonation in the target language.

Sugiarto et al. (2020) argue that native English speakers utilize a wide range of up and down movements instead of monotonous when speaking. These English learners can find it difficult to recognize and understand these movements in native speakers' voices. In furtherance of this argument, Fallatah (2020) opined that English learners tend to utilize a narrow range of their voices, making it difficult

for Native English speakers to understand their pronunciation. According to (Luo, 2023), these vocal restrictions and inadequacies in intonation patterns among second-language learners can be addressed through shadowing. These arguments have influenced the wide-scale use of shadowing in many second-language classrooms. Surprisingly, though, there is limited empirical research on the use and effectiveness of shadowing techniques as a language-learning tool for fostering improvements in pronunciation among second-language learners. This may be informed by the maligned audiolingual approach to teaching a language that influences (Al-Jarf, 2022) to argue that shadowing is simply a vocalized repetition that leads to meaningless parrot-like practice. However, research and instructors' experiences with shadowing to date suggest that when used appropriately, shadowing may improve pronunciation among second-language learners. In this regard, pronunciation proficiency is crucial in second language acquisition as it is a rudimentary part of effective communication. Accurate pronunciation simplifies understanding and contributes to successful interchanges and language (Seibert Hanson & Brown, 2020). For Arab learners of English, mastering pronunciation is critical as it improves their ability to engage with a global community and access educational and professional prospects. Effective pronunciation not only helps in communicating meaning accurately but also encourages confidence and cultural integration. Given the significance of English as a global lingua franca and the increasing interconnectedness of communities (Zhou, 2021), an in-depth understanding and targeted improvement of pronunciation skills are critical for Arab learners to steer the linguistic challenges intrinsic in myriad English-speaking environments, thereby enabling meaningful cross-cultural communication and promoting academic and professional success.

1.1 Research Objectives and Questions

The present action research investigated the effect of mobile technology-enhanced shadowing on the pronunciation of Arab learners of the second language. Notably, the action research approach adopted involved using mobile technology-enhanced shadowing to improve pronunciation among Arab learners of a second language. The study followed a reflective and iterative process, where the effects of shadowing activities were observed, assessed, and adjusted to meet the learners' needs, focusing on improving their pronunciation. The researcher worked closely with participants throughout the intervention, ensuring continuous feedback and adaptation, making this study a qualitative research approach to examine the effects of mobile-assisted shadowing.

As pronunciation proficiency is important for second language acquisition, its practical enhancement approaches are vital, especially for Arab learners of English. Despite the plurality of studies on second language acquisition in the Middle Eastern region (Hung et al., 2021; Lee, 2021; Zou et al., 2023a), the relevant topic has yet to be addressed in the Arab context. The present study addresses this gap by analyzing the impact of mobile technology-enhanced shadowing on the pronunciation skills of Arab learners of English. Despite the recognized advantages of shadowing, the lack of studies and the limited exploration of the sustained effects and cultural diversity in dialogue sources highlight the need for an extensive investigation. This study aims to contribute to the domain by assessing the efficacy of mobile-enhanced shadowing while considering empirical underpinnings, long-term impacts, and the impact of myriad linguistic and cultural contexts. Thus, this research addresses the following research questions based on the objectives and gaps.

RQ1. To what extent does the regular practice of mobile technology-enhanced shadowing improve the ability of advanced second-language English speakers to imitate speech models?

RQ2. How does regular practice mobile technology-enhanced shadowing improve advanced second-language English speakers' fluency in extemporaneous speech, accentedness, and comprehensibility?

2. Literature Review

Shadowing is a language learning approach where learners listen to a speech model, i.e., short dialogues, and simultaneously repeat or mimic it to practice pronunciation (Mıcık & Rızaoğlu, 2024). This research operates shadowing using mobile devices to record shadowing sessions and practising regularly to improve fluency, comprehensibility, and imitation of a speech model, though not necessarily decreasing accentedness (Liu et al., 2023). The researcher’s interest in the subject of shadowing as a strategy to improve pronunciation stems from conversations and discussions with successful learners of language and literature on this subject that revealed that shadowing from movies and television shows constitutes part of improved pronunciation in the target language (Mehdi et al., 2024). For example, in a quasi-experimental study involving 70 learners of a second language, Shao et al. (2023) tested the ability of the shadowing technique to enhance learners’ pronunciation. Results confirmed that the shadowing technique positively and significantly impacts learners’ vocabulary, grammar, and pronunciation. Improvements were noticed in the learners' ability to express their ideas. A similar study by Zou et al. (2023) examined the effectiveness of computer-enhanced online shadowing on pronunciation exercises in foreign-language learners at the beginning level of classes. Participants (high school students) participated in computer-lab self-directed exercises and in-class group work exercises by watching videos with subtitles as they repeated what the speakers said. Improvements were noted in reading pronunciation and free responses post-test, with striking and significant improvements observed in the reading pronunciation category. Hung et al. (2021) created another study involving four expatriate Japanese adult learners of English. They found that the Shadowing technique improves deficiency in their English pronunciation by creating phonological awareness and improving their English rhythms. Another study by Al-Rimawi and Al-Dweik (2022) adopted a quasi-experimental method with a non-equivalent control group to evaluate the effect of the shadowing method on students' pronunciation skills. Data gathered from 70 students, who were then divided into experimental and control classes, indicated that students were consistently motivated throughout the teaching and learning process, expressed primarily positive responses to the learning approach, and showed significant improvements in pronunciation, grammar, and vocabulary. This positive change was evident in their ability to communicate ideas and inferential statistics, with a t-test of 4.031 surpassing the t-table

value of 2.011 at a 95% confidence level. Case studies on successful language learners have also supported that imitating speech models' voices helps improve pronunciation (Kumar et al., 2023). It is also worth noting that for about thirty years, many articles have been presented at conferences and published in journals promoting the use of shadowing for pronunciation instruction (Milovanovic & Stefanovic, 2021) as multiple learner-and instructor-oriented websites on Google® that promote the use of shadowing for language development.

Similarly, Sugiarto et al. (2020) aimed to investigate the impact of the shadowing technique on the English pronunciation of tertiary students at IAIN Curup, Bengkulu, Indonesia. An experimental study was conducted with 40 randomly selected students, divided into two groups: 20 taught using shadowing and 20 using conventional methods. Data collected through pre-tests, post-tests, and interviews indicated a significant improvement in students' English pronunciation across all tested components. Shadowing positively influenced fluency, rhythm, and the overall accuracy of pronunciation. Wati et al. (2023) applied a qualitative approach to explore the perspectives of an English teacher and 30 fifth-grade primary school students regarding using the shadowing technique to improve pronunciation. Data were collected through semi-structured interviews with the teacher and focus group discussions with students, supported by classroom observations. Results showed that shadowing improved students' speech accuracy, rhythm, and intonation. The technique promoted confidence, reduced individual pressure, and promoted a collaborative learning environment, making it an effective strategy for improving young learners' pronunciation. In another study, Salim et al. (2020) assessed the effectiveness of the shadowing technique in improving the pronunciation skills of 70 randomly selected students. Using a quasi-experimental design with non-equivalent control groups, data were collected through interviews, multiple-choice tests, and audio recordings. Results revealed significant improvements in students' pronunciation, grammar, and vocabulary. It was found that students were motivated and responded positively to the shadowing method, achieving notable improvements in their ability to express ideas and communicate effectively. The t-test result of 4.077 exceeded the t-table value of 2.021, indicating a statistically significant change. Galeas Arboleda et al. (2023) also aimed to examine the use of the shadowing technique in improving the English-speaking skills of 16 Ecuadorian pre-service teachers enrolled in the Pedagogy of National and Foreign Languages at Quevedo State Technical University. Data collected through a questionnaire highlighted that shadowing allowed participants to develop fluency, pronunciation, and intonation naturally. Participants appreciated the technique for facilitating the internalization of linguistic patterns and grammatical structures, which helped produce more automatic and accurate speech.

2.1 Shadowing and Modern Technology

According to Gessinger et al. (2021), integrating mobile technology is increasingly important in improving pronunciation and shadowing aptitudes among language learners. Mobile devices provide an adaptable and accessible platform for learners to immerse themselves (Jeljeli et al., 2022) in targeted language practice anytime and anywhere. Through dedicated language learning apps and platforms, individuals can access a broad range of authentic pronunciation prototypes, enabling them to shadow native speakers and modify their articulation. Mobile technology's interactive and portative nature facilitates a personalized learning experience, allowing learners to practice pronunciation exercises, obtain instant feedback, and track their improvement seamlessly (Godwin-Jones, 2021). The amenity afforded by mobile devices exceeds conventional classroom settings, providing learners with the flexibility to integrate pronunciation practice into their daily routines, further facilitating consistent and efficient skill development. A study by Phuong et al. (2021) examined the effect of mobile-assisted shadowing exercises on the English listening and understanding skills of Taiwanese EFL high school students while also investigating perceptions concerning the effectiveness of this practice in improving listening abilities. The study involved two classes taught by the same English teacher at Shan-Hua Senior High School in southern Taiwan. The Experimental Group employed a one-month shadowing practice, while the Control Group followed the standard instructional approach. Both groups underwent pre-test and post-test listening assessments, utilizing the GEPT elementary-level listening test. Furthermore, the study gathered feedback from the Experimental Group through a post-study online questionnaire, and further insights were acquired through semi-structured interviews with six participants. Findings showed that, although statistically significant improvements in listening were not observed in the Experimental Group, participants reacted positively to the shadowing practice, leading to an improved motivation to learn English.

Liu et al. (2023) used a contextualized shadowing method to facilitate English oral presentation writing practice among college EFL juniors in southern Taiwan. Data was collected using quasi-experimental, mixed-method research to evaluate the effectiveness of a 6-week shadowing program using web-based applications in enhancing comprehensibility and lexical-level intelligibility. The findings showed the efficacy of shadowing practice in improving EFL students' comprehensibility and lexical-level intelligibility. Students acquired awareness of pronunciation differences between their speech and the model through shadowing, promoting the adoption of a more standardized pronunciation. Qualitative results showed a positive reception of shadowing practice among participants, and interviews underlined the development of metacognitive techniques to increase awareness of English suprasegmental components. Thus, modern technology introduces innovative techniques to shadowing exercises, presenting features like playback, recording, and comparison tools. Learners can attend to native speakers, imitate their pronunciation, and instantly evaluate their performance. The visual and auditory feedback provided by the applications improves self-awareness and allows for targeted improvement in pronunciation nuances. Also, integrating gamified elements and multimedia content in modern language learning apps makes shadowing more engaging and pleasant, motivating learners to spend time and effort refining their pronunciation skills.

Kapaniaris and Zampetoglou (2021) aimed to design a guided research project using a visual programming environment to create a digital shadow play performance. This project was implemented in a classroom environment at the 4th Primary School of Nea Ionia Volos "Panagiotis Katsirelos" to celebrate the 200 years since the Greek Revolution. The interdisciplinary approach involved teachers from

Informatics, Theatrical Education, and general education. The participants were 6th-grade primary school students who had prior familiarity with internet applications, ICT tools, and Scratch, a visual programming environment. Due to Covid-19 pandemic restrictions, students used three smart mobile devices to create the final digital artefact using Scratch. The final digital work was shown at the 10th Digital Creation Festival (Volos, Magnesia junction). Another study by Bogach et al. (2021) investigated whether using MOODLE in English lessons as a blended instructional tool significantly impacted students' language development. The research used a quasi-experimental design, incorporating a mixed-method approach. Data from 44 students aged 16 to 18 revealed a statistically significant difference between the experimental and control groups, suggesting MOODLE's positive contribution to language achievement in blended EFL lessons. Xu (2020) investigated mobile-assisted language learning (MALL) in a Chinese university's English-as-a-foreign-language (EFL) listening and speaking course. The 61 business English majors participated in MALL exercises through the English learning application Keke. Data collection included questionnaires, reflective journals, interviews, and pre-and post-study proficiency tests. Two action research cycles indicated that students' attitudes toward MALL practices became more positive after incorporating mobile-assisted exercises, improved teacher monitoring, and an online learning management system. While students made significant progress in English listening, their speaking skills needed improvement. In their study, Darsih and Asikin (2020) further examined university students' perceptions of Mobile-Assisted Language Learning (MALL) and its role in learning English. Ninety-six students (68 females and 28 males) participated using mobile applications like Kamusku, Google Translate, Elsa Speak, YouTube, Zoom, and Google Meet to aid their learning. Data was collected through questionnaires and semi-structured interviews, revealing that participants found MALL useful and easy to use, ultimately enhancing their learning experience.

3. Methodology

3.1 Material for Shadowing

The method used in this study is best described as a qualitative, exploratory research approach rather than action research. This approach allows for an in-depth investigation of participants' experiences while integrating some quantitative aspects where appropriate. The key components of this method include the Shadowing Technique, Technology Integration, Material Selection, Participant Interaction, and Instructional Support.

First, the shadowing technique, central to this study, involved participants listening to pre-selected dialogues from popular TV sitcoms (e.g., *Friends*, *How I Met Your Mother*) and recording their voices while shadowing these dialogues. This technique enabled participants to practice pronunciation and intonation by closely mimicking native speakers. Shadowing is a qualitative approach focusing on participants' real-time interaction with the material, fostering active learning through imitation. Notably, technology played a crucial role in facilitating the shadowing process. Participants used iPods and the Multi-Track Song Recorder app to listen to original dialogues and record their versions. This technology integration enabled participants to compare their recordings with the originals, improving self-awareness and self-correction. The digital tools used in the study allowed for collecting qualitative feedback (through participant reflection) and quantitative data (such as the analysis of proficiency improvements in recordings).

Similarly, the materials chosen for the shadowing technique were authentic dialogues from widely recognized TV shows. These dialogues were selected for their natural conversational patterns, which mirror real-life language use and are engaging for the participants. The authentic nature of the materials made the practice more relevant and helped participants improve their fluency in practical, everyday communication.

Interaction with the materials and the researcher was key to the learning process. Participants regularly submitted recorded dialogues and reflective reports, providing qualitative insights into their experiences. This interaction allowed for a dynamic learning environment where participants could receive feedback on their recordings and adapt their approach accordingly. Through this ongoing process of interaction and reflection, participants engaged deeply with the shadowing technique. Finally, to ensure that participants had clear guidelines, instructional support was provided through booklets, which included links to the original dialogues, scripts to follow, and tips on effectively engaging with the shadowing process. This instructional support was important in helping participants structure their practice, making the shadowing technique more accessible and effective. The methodology employed in this study integrates qualitative research components, such as participant experience, feedback, and reflections on their learning process, with quantitative elements, such as analyzing recordings for improvements in pronunciation and fluency. While the study primarily emphasizes the qualitative aspects of participants' experiences, the quantitative analysis of proficiency gains (through recordings) complements these insights, providing a fuller picture of the shadowing technique's effectiveness. This mixed-method approach strengthens the research by combining rich, detailed participant feedback with measurable outcomes related to language proficiency.

3.2 Operationalization of Research Variables

Improvements in pronunciation were measured based on changes in learners' comprehensibility, accentedness, intelligibility, and fluency in the second language (Garib, 2023; Wang et al., 2023). Accordingly, in this study, comprehensibility is defined as a subjective measure that assesses how easily learners understand the perceived speech of a listener. On the other hand, intelligibility is an objective measure that evaluates the learner's ability to comprehend the speech of a native language speaker accurately. Also, accentedness examines the phonological differences between a learner's first language and second language, focusing on the distinctiveness of pronunciation (Shao et al., 2023; Wang et al., 2023; Yung, 2021).

3.3 Testing Instruments

A language assessment was undertaken using two different language tests administered at each testing time. First, The Suitcase Story, a picture narrative task, was given. In this task, participants were asked to narrate the story captured in the pictures after viewing a series and confirming that they were familiar and comfortable with it. This task is largely used in pronunciation research as it was designed for such purposes (Hwang et al., 2022; Kim et al., 2021). Next, a shadowing dialogue was developed, using dialogues used for practice in various studies. The shadowing test was undertaken sequentially as follows. First, study participants were provided with iPods with a loaded dialogue. Participants were also provided with a laptop with a loaded YouTube video. Each participant was allowed to practice the dialogue for 10 minutes. The researcher instructed the study participants to only shadow a single speaker in the dialogue. The researcher then left the room and returned after 10 minutes. Next, the researcher audio-recorded the participants as they shadowed the dialogue. At each testing point, the researcher conducted in-person interviews that included open-ended and Likert-scale questions. The researcher designed the interview questions for this study, with eight questions covering various topics related to pronunciation, language use, and participants' opinions regarding the shadowing activities. The interviews lasted approximately fifteen minutes with each participant. The researcher recorded the interviews using an audio recorder, ensuring that all responses were captured for later analysis.

3.4 Study Procedure

The researcher individually met with the second language participants at the start of the study, at the end, and during the sixth week. The first session involved participants receiving training on using the iPod and the researcher's expectations during the study. Participants also practised shadowing and learned how to use the app to send the recordings via email. This session lasted for approximately two hours. This was followed by participants completing the first two pre-tests and interviews. The researchers designed the interview questions used in the study to explore the participants' views on their pronunciation, language use, and experiences with the shadowing activities. The interview consisted of eight questions, including a mix of open-ended questions and Likert-scale questions. On average, each interview lasted approximately fifteen minutes, providing ample time for the participants to reflect on their experiences and provide detailed responses. The interviews were recorded with an audio recorder to ensure accurate data collection for analysis.

Next, study participants practised shadowing using dialogue every week during the eight-week study period. Participants were required to be encouraged to practise shadowing for 10 minutes at least three times each week and submit a sample recording of each time they practised to the researcher via email. Participants also emailed a report showing their practice at each session. The participants used Zoom H4n Pro digital recorders, which the researcher provided for recording their shadowing sessions. These recorders were selected for their high-quality audio capture and ease of use, ensuring accurate recordings of participants' speech during the shadowing exercises. The researcher also provided participants with detailed guidelines on using the recorders effectively, including how to position the microphone and check the battery levels before each recording session.

The recordings were made in a quiet, controlled environment to minimize background noise, ensuring the consistency and clarity of the data across all participants.

Regarding the written report, participants were not required to write formal reports on their experiences, but they were instructed to complete a brief reflection sheet at the end of the study. The reflection sheet guided participants in providing feedback on their pronunciation improvement, thoughts on the shadowing process, and any challenges they faced during the study. As for the theme of the iPod recordings, the dialogues were specifically chosen to match the participants' language proficiency levels while presenting some degree of challenge. The content focused on everyday conversational themes such as ordering food, asking for directions, and expressing opinions, ensuring participants were exposed to relevant vocabulary and real-world scenarios. The content was selected to maintain engagement and provide meaningful opportunities for language practice. At the same time, the audio files were loaded onto the iPods for participants to access during their shadowing sessions.

Practice started on Monday of each week through Friday. Participants were asked to submit weekly reports on Tuesday morning, with reminders sent to participants who could have done better. Emails were sent to participants who requested everything or reminded them to submit what was missing. When meeting participants in person, the researcher resolved technical problems that still needed to be solved via email.

The researcher provided flexible rules to participants regarding shadowing. Shadowing was explained and demonstrated to study participants, and participants were asked to listen to recordings and practice shadowing. This less rigid practice structure enabled the researcher to gain insight into learners' choice of practice when not subjected to strict instructions. This method also stimulates the accuracy to which the activity would apply outside this research.

The researcher scheduled individual appointments with two native English-speaking raters, during which they administered language background questionnaires. These raters were selected based on their language assessment and pronunciation evaluation expertise. Rater 1 was a linguist with a background in phonetics and had experience in assessing non-native speakers' pronunciation. Rater 2 was a language educator with over 10 years of teaching English as a second language, specializing in pronunciation and speech clarity. Their combined expertise ensured a well-rounded evaluation of the participants' pronunciation skills. Both raters were familiar with the shadowing technique and its application in language learning, making them ideal for assessing the participants' progress throughout the study.

Next, a computer-based rating program designed by Zou et al. (2023) was used to play suitcase stories obtained from the sessions. Based

on the previous studies' conventions (Jao et al., 2024; Mehdi et al., 2024), narratives of the first 20 seconds were extracted and used for ratings with initial dysfluencies omitted. The raters listened to and rated each speech sample for fluency, comprehensibility and accentedness. The meanings of the constructs were explained accordingly. Next, the shadowing dialogues were rated based on how well the second-language speakers imitated the speech model. Raters were allowed to familiarize themselves with the speech sample and gain sets of the task difficulty by training them on iPods. They were also permitted 10 minutes of practice of test dialogue before rating. Every rater was allowed to hear different randomizations of files in the shadowing rating task and the Suitcase Story rating task. Participants listened to each speech sample before ratings were made. The raters' inter-rater reliability was calculated using intraclass correlation coefficients. For the four measures, a high level of agreement was reported: fluency (α=.93), comprehensibility (α=.89), accentedness (α=.91), and shadowing (α=.86).

3.5 Data Analysis

A one-way repeated measures ANOVA was used to analyze ratings from second-language listeners for the pre-test, mid-test, and post-test using Statistical Package for Social Sciences (SPSS) (Zakarneh, 2022; Zakarneh & Annamalai, 2024). Post hoc tests were further run for ANOVA, which was statistically significant. Interview data responses were assessed based on the type and nature of questions. Questions rated on a Likert scale required study respondents to know how much the shadowing activity improved their pronunciation and enjoyed the shadowed activity by rating on a 9-point scale. These questions had the scores for the range and averages calculated. Results for short-answer questions were analyzed depending on participants' responses. Emergent coding was used to analyze questions with long responses. The researcher also extracted illustrating quotes from detailed responses to some questions (Akinyode & Khan, 2018).

4. Analysis and Results

The research investigated the effects of shadowing activities on second-language learners' abilities to imitate a speech model. The study focused on speech-related metrics, such as fluency, comprehensibility, accentedness, and shadowing ability. Specifically, the research questions sought to determine whether participating in a shadowing activity could improve learners' proficiency in these areas. Table 1 presents the descriptive statistics of second-language learners' ratings at two different time points, including means (M) and standard deviations (SD).

As shown in Table 1, the second-language learners exhibited improvements across all the measures, except accentedness. More specifically, fluency, shadowing, and comprehensibility showed marked improvements, as reflected in the increase in mean scores from Time 1 to Time 2. However, accentedness, the degree to which the participants' speech resembled a native-like pronunciation, did not demonstrate a similar enhancement. Despite the positive trends in fluency, shadowing, and comprehensibility, the impact on accentedness was minimal.

Fluency showed the most significant improvement. At Time 1, the mean rating for fluency was 505.38; at Time 2, it rose to 548.68. The increase in fluency indicates that the shadowing activity helped learners speak more smoothly, with fewer hesitations or breaks in their speech. The change was statistically significant, as evidenced by the ANOVA results in Table 2.

Table 1. Standard deviations and averages for the tasks at time 1 and time 2

Measure	SD	Mean	SD	Mean	SD	Mean
Accentedness	66.36	473.75	102.29	454.10	102.26	447.13
Shadowing	132.66	439.47	140.20	494.79	132.66	488.90
Fluency	122,67	505.38	123.50	510.55	127.24	548.68
Comprehensibility	116.71	653.05	133.22	664.62	117.67	682.69

Shadowing ability also rose considerably, from 439.47 at Time 1 to 494.79 at Time 2. This improvement suggests that the shadowing task, which requires learners to mimic the speech of a native speaker, helped participants develop a better sense of rhythm, intonation, and pronunciation patterns, thereby improving their overall shadowing performance. The statistically significant change in shadowing aligns with previous research indicating the effectiveness of shadowing tasks in language acquisition (Darsih & Asikin, 2020; Shao et al., 2023).

Another key metric, comprehension, also showed a positive trend, increasing from a mean score of 653.05 at Time 1 to 682.69 at Time 2. This suggests that participants became better at understanding themselves, likely due to improved speech fluency and shadowing performance. The increase in comprehensibility further supports the notion that shadowing tasks can lead to clearer, more understandable speech in second-language learners.

However, **accentedness** showed no significant change, with the mean score slightly dropping from 473.75 at Time 1 to 447.13 at Time 2. Despite the improvements in other areas, participants could have reduced their foreign accents significantly. This result may suggest that while shadowing improves fluency and speech patterns, it may be less effective in helping learners reduce their accents or attain native-like pronunciation within a short period. This finding aligns with previous studies which have suggested that accent reduction is a gradual process requiring long-term practice and exposure (Rogerson-Revell, 2021).

4.1 One-Way Analysis of Variance

A one-way repeat measures ANOVA was conducted to assess the statistical significance of the changes observed in the four variables: fluency, accentedness, shadowing, and comprehensibility. The results of the ANOVA, shown in Table 2, indicate that the improvements in fluency, shadowing, and comprehensibility were statistically significant, with p-values less than the 0.0125 significance level.

Fluency demonstrated a significant effect (F(2, df) = 8.42, p = 0.0001, Partial n ²= 0.286). The partial eta-squared value of 0.286 indicates a medium to large effect size, suggesting that shadowing substantially improved fluency.

Table 2. One-way ANOVA repeated measures for four tasks

Measure	*f*	*df*	Sign	Partial n^2
Fluency	8.42	2	.0001*	.286
Accentedness	3.30	2	.05	.136
Shadowing	14.26	2	.0001*	.501
Comprehensibility	5.00	2	.01	.192

Similarly, **shadowing** also significantly improved (F(2, df) = 14.26, p = 0.0001, Partial n ²= 0.501). The large effect size (0.501) suggests that shadowing exercises profoundly influenced learners' ability to replicate the speech patterns and characteristics of the model speaker (Bogach et al., 2021c; Godwin-Jones, 2021).

For **comprehensibility**, the ANOVA results (F(2, df) = 5.00, p = 0.01, Partial n ²= 0.192) showed a statistically significant improvement as well, with a moderate effect size of 0.192, further supporting the notion that shadowing activities contributed to clearer speech production (Sugiarto et al., 2020).

In contrast, **accentedness** demonstrated only a marginal significance (F(2, pdf) = 3.30, p = 0.05, Partial n ²= 0.136), indicating that while there was some slight reduction in accentedness, the change was not statistically significant enough to conclude that shadowing had a substantial effect on accent reduction (Hoang et al., 2020; Mehdi et al., 2024). The small effect size (0.136) further suggests that the shadowing activity was less effective in modifying participants' accents (Liu et al., 2023; Mıcık & Rızaoğlu, 2024).

5. Discussion

The present study examined the effect of mobile technology-enhanced shadowing on the pronunciation of Arab Learners of English. It sought to determine whether the Arab learners of English's ability to imitate speech models could be improved through mobile technology-enhanced shadowing and whether mobile technology-enhanced shadowing could improve their fluency, accentedness, and comprehensibility. Results confirmed that mobile technology-enhanced shadowing improves the ability of Arab Learners of English to imitate a speech model and that shadowing can potentially improve their fluency and comprehensibility but not their accentedness (Godwin-Jones, 2021; Salim et al., 2020b).

These results support shadowing (tracking or mirroring) in language classrooms and language training. The results also support shadowing in pronunciation teaching handbooks and guides, as has been the case for many years (Bogach et al., 2021c). In view of these results, with advances in technology, particularly mobile technology, learners can efficiently complete shadowing activities outside a classroom setting with minimal cost (Darsih & Asikin, 2020). This may allow learners who need access to formal pronunciation instruction to learn the second language.

The study's findings shed light on the effect of shadowing activity on different aspects of second-language learners' pronunciation, especially in fluency and comprehensibility. Table 1 summarizes the standard deviations and averages for accentedness, shadowing, fluency, and comprehensibility at distinct time points (Al-Rimawi & Al-Dweik, 2022; Faruji et al., 2024). Participants reported substantial progress in fluency, shadowing, and comprehensibility throughout the study, as shown by the statistically significant results in the one-way repeated measures ANOVA (Table 2).

The result that no significant improvement was marked in accentedness aligns with prior research, indicating that decreasing accents might be a more prolonged and in-depth process (Derwing, 2017). Accentedness is usually deeply ingrained and affected by different linguistic and sociocultural factors. While the present study focused on a relatively short intervention period, the lack of significant advancement in accentedness suggests the need for a more progressive or targeted intervention to address this factor comprehensively, as also indicated in the existing literature (Darsih & Asikin, 2020; Kim et al., 2021).

The in-depth improvements in fluency, shadowing, and comprehensibility, related to the absence of significant differences in accentedness, highlight the multifaceted nature of pronunciation development. Pronunciation is a holistic skill encompassing different dimensions, and the study's focus on fluency and comprehensibility underlines areas where short-term interventions can have discernible results. Furthermore, the Bonferroni adjustment applied to significant ANOVAs for fluency, comprehensibility, and shadowing additionally confirms the positive effect of the shadowing activity over time. As demonstrated in the present study, mobile-enhanced shadowing is promising as a learning tool for Arab learners seeking to improve their fluency and pronunciation. These results show that learners of English as a second language can improve their pronunciation by shadowing others and that this can be achieved by looking for details that native speakers pay attention to when speaking, including notes and sounds, and making an attempt to match the down-and-up movements of their sentences. The researcher noted that through shadowing, learners of English as a second language can pay attention to Native English speakers' communication, including their use of pauses and how they put more emphasis on some words than others. Given these findings, learners who experience difficulty accessing pronunciation instructors can use mobile technology techniques as a practical solution to learning English as a second language. English language instructors can also use mobile-enhanced shadowing to help learners who require additional help in pronunciation. The repetitive nature of shadowing activities also makes it enjoyable for learners of a second language. This study's results extend previous studies' findings by demonstrating that untrained listeners can detect improvement in fluency and pronunciation, improving extemporaneous speechmaking's incomprehensibility.

6. Conclusion

6.1 Pedagogical Implications

The current research results reveal pedagogical implications highlighting the multifaceted role of mobile technology-enhanced shadowing in second language learning. First, the study underlines the usefulness of this method as a practical resource for learners seeking to refine their pronunciation skills. The accessibility and versatility of mobile devices associated with technical language learning apps empower learners to engage in targeted shadowing exercises, providing a suitable route for consistent, self-paced practice. This research further suggests that mobile technology-enhanced shadowing is a supporting tool for instructors tackling the challenge of addressing mixed pronunciation difficulties among language learners. Instructors can integrate mobile-based shadowing activities into their teaching repertoire, tailoring exercises to fulfil the precise needs of learners. This offers an extra layer of support and presents an interactive and engaging dimension to classic pronunciation instruction. While highlighting the prospect of mobile-based shadowing, this research highlights a critical caveat: these activities should complete, not replace, classroom-based pronunciation instruction. Mobile technology acts as a supplementary tool, improving the overall language-learning experience. This in-depth approach acknowledges the value of a combined learning environment, incorporating the advantages of technology-enhanced shadowing with the interactive direction provided by classroom instruction.

Similarly, the study shows the subtle impact of shadowing on improving fluency and comprehensibility in a second language. While shadowing contributes to these aspects, it should be considered as something other than a panacea for managing all facets of speech that affect comprehensibility. This in-depth understanding guides educators in setting naturalistic expectations for the results of shadowing practices, promoting a balanced and informed practice of pronunciation instruction. For educators adopting mobile-based shadowing, the research supports a learner-centric method. Allowing learners to identify speech models that align with their individual language learning goals improves the effectiveness of the shadowing experience. This personalized approach identifies the various linguistic aspirations of learners and encourages active engagement, encouraging a sense of privilege in the language learning process. Thus, the pedagogical implications emanated from this research highlight the dynamic and supportive role of mobile technology-enhanced shadowing in the complex terrain of second language pronunciation instruction.

6.2 Study Limitations and Recommendations for Future Studies

Although this research covers certain gaps, it has some primary limitations. First, this study needs a precise theoretical framework, which acts as a guiding structure for the research studies. A theoretical foundation is required for the depth of discernment about the underlying mechanisms affecting the effectiveness of mobile technology-enhanced shadowing on pronunciation among Arab learners of English. Future researchers can recognize the significance of theory in guiding research. Future investigations should incorporate a relevant theoretical framework to provide robust insights and implications. The second limitation involves a restricted timeframe. The study's duration was limited to eight weeks, possibly confining the investigation of the long-term effects of mobile technology-enhanced shadowing on pronunciation skills. A more comprehensive investigation would offer practical insights into the sustainability of the marked improvements. Finally, the third limitation is based on the source of dialogues. Thus, to improve the study's applicability to a wider linguistic context, future research should diversify the origins of dialogues. Including a more mixed selection from additional genres and cultural backgrounds will contribute to a more extensive understanding.

Authors' contributions

Bilal led the conceptual framework and introduction. Diana conducted data analysis and contributed to the discussion. Laid coordinated the submission and correspondence and designed the methodology. Ramiza handled implications and proofreading while Nagaletchimee led the findings and conclusions,

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References

Akinyode, B. F., & Khan, T. H. (2018). Step-by-step approach for qualitative data analysis. *International Journal of Built Environment and Sustainability*, *5*(3). https://doi.org/10.11113/ijbes.v5.n3.267

Al-Jarf, R. (2022). *Journal of English Language Teaching and Applied Linguistics YouTube Videos as a Resource for Self-Regulated Pronunciation Practice in EFL Distance Learning Environments*. https://doi.org/10.32996/jeltal

Al-Rimawi, A., & Al-Dweik, A. (2022). On the Performance of RIS-Assisted Communications With Direct Link Over κ-μ Shadowed Fading. *IEEE Open Journal of the Communications Society*, *3*, 2314-2328. https://doi.org/10.1109/OJCOMS.2022.3224562

Bogach, N., Boitsova, E., Chernonog, S., Lamtev, A., Lesnichaya, M., Lezhenin, I., … Blake, J. (2021a). Speech processing for language learning: A practical approach to computer-assisted pronunciation teaching. *Electronics (Switzerland)*, *10*(3), 1-22. https://doi.org/10.3390/electronics10030235

Bogach, N., Boitsova, E., Chernonog, S., Lamtev, A., Lesnichaya, M., Lezhenin, I., … Blake, J. (2021b). Speech processing for language learning: A practical approach to computer-assisted pronunciation teaching. *Electronics (Switzerland)*, *10*(3), 1-22. https://doi.org/10.3390/electronics10030235

Bogach, N., Boitsova, E., Chernonog, S., Lamtev, A., Lesnichaya, M., Lezhenin, I., … Blake, J. (2021c). Speech processing for language learning: A practical approach to computer-assisted pronunciation teaching. *Electronics (Switzerland)*, *10*(3), 1-22. https://doi.org/10.3390/electronics10030235

Darsih, E., & Asikin, N. A. (2020). Mobile Assisted Language Learning: Efl Learners′ Perceptions Toward The Use Of Mobile Applications In Learning English. *English Review: Journal of English Education*, *8*(2), 19. https://doi.org/10.25134/erjee.v8i2.2999

Fallatah, S. A. (2020). Senior interior design students' perceptions about distance learning in the shadow of COVID-19. *Journal of Public Health Research*, *9*(s1). https://doi.org/10.4081/jphr.2020.1914

Faruji, L. F., Soleimanian, S., & Shafipoor, M. (2024). CALL and MALL-Mediated Shadowing: The Effects on Impulsive vs. Reflective EFL Learners' Speaking Abilities. *International Journal of Instruction*, *9*(2), 29-42. https://doi.org/10.29333/aje.2024.923a

Galeas Arboleda, G., Rivadeneira Zambrano, M. A., & Coutinho dos Santos, J. (2023). Shadowing technique: Exploring pre-service EFL teachers' perspectives to improve speaking skills. *Research, Society and Development*, *12*(9), e2512943105. https://doi.org/10.33448/rsd-v12i9.43105

Garib, A. (2023). "Actually, It's Real Work": EFL Teachers' Perceptions of Technology-Assisted Project-Based Language Learning in Lebanon, Libya, and Syria. *TESOL Quarterly*, *57*(4), 1434-1462. https://doi.org/10.1002/tesq.3202

Gessinger, I., Möbius, B., Le Maguer, S., Raveh, E., & Steiner, I. (2021). Phonetic accommodation in interaction with a virtual language learning tutor: A Wizard-of-Oz study. *Journal of Phonetics*, *86*. https://doi.org/10.1016/j.wocn.2021.101029

Godwin-Jones, R. (2021). Big data and language learning: Opportunities and challenges. *Language Learning & Technology*, *25*(1), 4-19. http://hdl.handle.net/10125/44747

Haryadi, S., & Aprianoto. (2020). Integrating "English Pronunciation" App Into Pronunciation Teaching: How It Affects Students' Participation And Learning. *JOLLT Journal of Languages and Language Teaching*, *8*(2), 202. https://doi.org/10.33394/jollt.v8i2.2551

Hoang, T. M., Nguyen, B. C., Dung, L. T., & Kim, T. (2020). Outage Performance of Multi-Antenna Mobile UAV-Assisted NOMA Relay Systems over Nakagami-Fading Channels. *IEEE Access*, *8*, 215033-215043. https://doi.org/10.1109/ACCESS.2020.3041311

Hung, L. P., Huang, W., Shih, J. Y., & Liu, C. L. (2021). A novel iot based positioning and shadowing system for dementia training. *International Journal of Environmental Research and Public Health*, *18*(4), 1-21. https://doi.org/10.3390/ijerph18041610

Hwang, W. Y., Nguyen, V. G., & Purba, S. W. D. (2022). Systematic survey of anything-to-text recognition and constructing its framework in language learning. *Education and Information Technologies*, *27*(9), 12273-12299. https://doi.org/10.1007/s10639-022-11112-6

Jao, C. Y., Yeh, H. C., Huang, W. R., & Chen, N. S. (2024). Using video dubbing to foster college students' English-speaking ability. *Computer Assisted Language Learning*, *37*(4), 585-607. https://doi.org/10.1080/09588221.2022.2049824

Jeljeli, R., Farhi, F., Setoutah, S., & Laghouag, A. A. (2022). Microsoft teams' acceptance for the e-learning purposes during Covid-19

outbreak: A case study of UAE. *International Journal of Data and Network Science*, *6*(3), 629-640. |https://doi.org/10.5267/j.ijdns.2022.4.010

Kapaniaris, A. G., & Zampetoglou, G. (2021). Visual programming for the greation of digital shadow play performance using mobile devices in times of Covid-19. *Advances in Mobile Learning Educational Research*, *1*(2), 162-170. https://doi.org/10.25082/AMLER.2021.02.010

Kim, H., Yang, H., & Ho Lee, J. (2021). Design principles and architecture of a second language learning chatbot. *Language Learning & Technology*, *2022*(1). Retrieved from http://hdl.handle.net/10125/73463

Kumar, M., Arti, M. K., & Vinitha, C. S. (2023). Performance Evaluation of SSK Modulation Over Shadowed-Rician Land Mobile Satellite Links. *IEEE Access*, *11*, 20088-20094. https://doi.org/10.1109/ACCESS.2023.3243227

Le Phuong, N., Vu, L., Mai, H., & Minh, T. (2021). *Improving EFL Students' Intonation In-Text Using Shadowing Technique with the Implementation of Google Text-to-Speech*. *13*(1), 2022. https://doi.org/10.11251/acoj.13.01.006

Lee, Y. (2021). Effectiveness of Mobile Assisted Pronunciation Training in the Acquisition of English Vowels, /o/ and /ɔ/. *Foreign Languages Education*, *28*(3), 53-76. https://doi.org/10.15334/FLE.2021.28.3.53

Liu, H., Bashir, M. S., & Alouini, M. S. (2023). *Lidar-Assisted Acquisition of Mobile Airborne FSO Terminals in a GPS-Denied Environment*. https://doi.org/10.36227/techrxiv.22312750.v1

Luo, Z. (2023). The Effectiveness of Gamified Tools for Foreign Language Learning (FLL): A Systematic Review. *Behavioral Sciences*, *13*(4). MDPI. https://doi.org/10.3390/bs13040331

Mehdi, H., Hussain, Z., Ahmed, S. A., & Saleem, S. M. A. (2024). Relay-Assisted Aerial Communication over a Single-Shadowed Communication Channel. *Journal of Electrical and Computer Engineering*, *2024*. https://doi.org/10.1155/2024/8849656

Metruk, R. (2020). Confronting the challenges of MALL: Distraction, cheating, and teacher readiness. *International Journal of Emerging Technologies in Learning*, *2*, 4-14. https://doi.org/10.3991/ijet.v15i02.11325

Mıcık, S., & Rızaoğlu, F. (2024). The Role of Video-Based Shadowing Practices in L2 Oral Proficiency Development. *Dil Eğitimi ve Araştırmaları Dergisi*, *10*(1), 166-190. https://doi.org/10.31464/jlere.1356763

Milovanovic, I., & Stefanovic, C. (2021). Performance Analysis of UAV-Assisted Wireless Powered Sensor Network over Shadowed κ-μ Fading Channels. *Wireless Communications and Mobile Computing*, *2021*. https://doi.org/10.1155/2021/9919384

Rogerson-Revell, P. M. (2021). Computer-Assisted Pronunciation Training (CAPT): Current Issues and Future Directions. *RELC Journal*, *52*(1), 189-205. https://doi.org/10.1177/0033688220977406

Salim, A., Terasne, T., & Narasima, L. (2020a). Enhancing The Students' Pronunciation Using Shadowing Technique At Senior High School Students. *Journal of Languages and Language Teaching*, *8*(1), 20. https://doi.org/10.33394/jollt.v8i1.2212

Salim, A., Terasne, T., & Narasima, L. (2020b). Enhancing The Students' Pronunciation Using Shadowing Technique At Senior High School Students. *Journal of Languages and Language Teaching*, *8*(1), 20. https://doi.org/10.33394/jollt.v8i1.2212

Seibert Hanson, A. E., & Brown, C. M. (2020). Enhancing L2 learning through a mobile assisted spaced-repetition tool: an effective but bitter pill? *Computer Assisted Language Learning*, *33*(1-2), 133-155. https://doi.org/10.1080/09588221.2018.1552975

Shao, Y., Saito, K., & Tierney, A. (2023). How Does Having a Good Ear Promote Instructed Second Language Pronunciation Development? Roles of Domain-General Auditory Processing in Choral Repetition Training. *TESOL Quarterly*, *57*(1), 33-63. https://doi.org/10.1002/tesq.3120

Sugiarto, R., Prihantoro, P., & Edy, S. (2020). The Impact of Shadowing Technique on Tertiary Students' English Pronunciation. *Linguists : Journal Of Linguistics and Language Teaching*, *6*(1), 114. https://doi.org/10.29300/ling.v6i1.3298

Wang, X., Liu, Q., Pang, H., Tan, S. C., Lei, J., Wallace, M. P., & Li, L. (2023). What matters in AI-supported learning: A study of human-AI interactions in language learning using cluster analysis and epistemic network analysis. *Computers and Education*, *194*. https://doi.org/10.1016/j.compedu.2022.104703

Wati, S., Idami, Z., Agama, I., & Langsa, I. N. (2023). *Teacher and EFL Primary School Students' Perspectives on the Shadowing Technique for Pronunciation Instruction*. https://doi.org/10.32505/azkiya.v9i2.9656A

Xu, Q. (2020). Applying MALL to an EFL Listening and Speaking Course: An Action Research Approach. *TOJET: The Turkish Online Journal of Educational Technology*, *19*(4).

Yung, K. W. H. (2021). Shadow education as a form of oppression: conceptualizing experiences and reflections of secondary students in Hong Kong. *Asia Pacific Journal of Education*, *41*(1), 115-129. https://doi.org/10.1080/02188791.2020.1727855

Zakarneh, B. (2022). Tuning Learning and Teaching Strategies to Individual Differences among Learners of English in Arab Universities. *International Journal of English Language and Literature Studies*, *11*(1), 31-41. https://doi.org/10.18488/5019.v11i1.4419

Zakarneh, B., & Annamalai, N. (2024). Independence Versus Interdependence: Analyzing the Dynamics of Indian Immigrant Couple in

Jhumpa Lahiri's "A Temporary Matter." *World Journal of English Language*, *14*(6), 562. https://doi.org/10.5430/wjel.v14n6p562

Zhao, M., Noordin, N., Ahmad, N. K. B., & Liu, L. (2024). Effectiveness of Mobile-assisted Language Learning in Developing Oral English in Higher Education: A Comparative Systematic Review. *World Journal of English Language*, *15*(1), 56. https://doi.org/10.5430/wjel.v15n1p56

Zhou, Z. (2021). A Systematic Literature Review on the use of Mobile-assisted Language Learning (MALL) for Enhancing Speaking Skills in Chinese EFL context. *International Journal of Frontiers in Sociology*, *3*(15). https://doi.org/10.25236/ijfs.2021.031502

Zou, B., Guan, X., Shao, Y., & Chen, P. (2023a). Supporting Speaking Practice by Social Network-Based Interaction in Artificial Intelligence (AI)-Assisted Language Learning. *Sustainability (Switzerland)*, *15*(4). https://doi.org/10.3390/su15042872

Zou, B., Guan, X., Shao, Y., & Chen, P. (2023b). Supporting Speaking Practice by Social Network-Based Interaction in Artificial Intelligence (AI)-Assisted Language Learning. *Sustainability (Switzerland)*, *15*(4). https://doi.org/10.3390/su15042872