From Tradition to Innovation: The Role of the ELSA Speak Application in Facilitating Autonomous Pronunciation Learning among Libyan EFL Freshmen

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ABSTRACT

This study investigated whether the free version of the ELSA Speak app facilitates autonomous learning and enhances pronunciation features among Libyan freshman English majors. A quantitative quasi-experimental research design, with a non-equivalent pre-test/post-test control group model was employed over a 12-week intervention. The participants were 30 freshmen who were divided equally into an experimental group and a control group based on a proficiency test. The findings revealed that the app successfully facilitated perceived autonomy (p = .002). However, no statistically significant improvement was found in pronunciation skills (p = .727). The study recommends integrating a blended approach of AI technology and teacher guidance to overcome persistent pronunciation errors.

Keywords ELSA Speak, autonomous pronunciation learning, Self-Determination Theory (SDT), Skill Acquisition Theory (SAT), Libyan EFL learners.

الملخص

هدفت هذه الدراسة إلى استكشاف ما إذا كانت النسخة المجانية من تطبيق ELSA Speak تسهم في تعزيز التعلم الذاتي وتحسين خصائص النطق لدى طلاب السنة الأولى تخصص اللغة الإنجليزية في ليبيا. تم اعتماد تصميم شبه تجريبي كمي باستخدام نموذج المجموعتين (تجريبية وضابطة) مع اختبار قبلي وبعدي غير متكافئ، وذلك على مدى فترة تدخل استمرت 12 أسبوعًا. وتكوّنت عينة الدراسة من 30 طالبًا من طلاب السنة الأولى، تم توزيعهم بالتساوي على مجموعة تجريبية وأخرى ضابطة بناءً على اختبار مستوى. أظهرت النتائج أن التطبيق نجح في تعزيز الاستقلالية المُدركة لدى

المتعلمين (p = .002). ومع ذلك، لم تُسجَّل فروق ذات دلالة إحصائية في تحسين مهارات النطق (p = .727). توصي الدراسة بدمج نهج تعلّمي هجين يجمع بين تقنيات الذكاء الاصطناعي وإشراف المعلم للتغلب على أخطاء النطق المستمرة.
الكلمات المفتاحية: **ELSA** Speak، التعلم الذاتي للنطق، نظرية التحديد الذاتي ((SDT، نظرية اكتساب المهارة ((SAT، متعلمو اللغة الإنجليزية كلغة أجنبية في ليبيا

Introduction

As a global lingua franca of the modern world, English is essential for international communication, enabling individuals from diverse linguistic backgrounds to interact effectively (Salheen et al., 2019; Santhosh, 2025). English as a foreign language (FL) was introduced in the early 1940s; however, the formal instruction has been inconsistent due to policy shifts and resource limitations (Hashim, 1997; Khalid, 2017; Elabbar, 2011, as cited in Owen et al., 2019). Although English education has been more systematically implemented across primary to higher education levels since the early 2000s (Macfarlane & Harrison, 2008, as cited in Owen et al., 2019), the classroom practices remain largely dominated by grammar-oriented and teacher-centered methodologies, emphasizing other language skills such as reading, writing, and translation while neglecting speaking and listening, which limits students' development of communicative competence (Ben Hamid, 2010; Orafi & Borg, 2009, as cited in Owen et al., 2019).

Pronunciation plays a crucial role in oral communication because it influences both intelligibility (the listener's ability to understand speech) and comprehensibility (the perceived effort to interpret speech) (Celce-Murcia et al., 2012; Levis, 2018; Salheen et al., 2019). However, Libyan EFL learners continue to struggle with pronunciation in both segmental and suprasegmental features due to first language (L1) interference, limited access to authentic English input, and persistent reliance on conventional instructional approaches (Abdelaty, 2023; Ahmed, 2017; Alahrish, 2022; Aoghala & Ali, 2024; Elkateb, 2023; Khalifa, 2020; Mohammed & Idris, 2020).

Despite its importance for effective communication, pronunciation has been neglected in language instruction compared to other skills, leading to its description as the "Cinderella Syndrome—kept behind doors and out of sight" (Celce-Murcia et al., 1996, p. 323). Traditional approaches to pronunciation tend to present it as a subject taught in learners' mother tongue, focusing on rote memorization and repetitive drill-based activities while offering minimal individualized feedback and limited integration of technology to support skill development (Abdelhalim & Alsehibany, 2025; Fernandez Sesma et al., 2022; Khalifa, 2020; Pourhosein Gilakjani & Sabouri, 2016; Yassin et al., 2024). Such approaches hinder learners' ability to develop effective pronunciation skills and promote ineffective learning strategies that negatively affect autonomous learning (Abdelaty, 2023; Khalifa, 2020; Yassin et al., 2024).

From Holec's (1981) perspective, learner autonomy refers to learners' capacity to take control of their learning process by setting their personal goals, planning content, selecting methods, monitoring progress, and evaluating outcomes. However, learners are often hindered in their attempts to study or practice pronunciation on their own because they lack the necessary skills required to assess and adjust their speech (McCrocklin, 2016).

The lockdown during the COVID-19 pandemic prevented face-to-face instruction, leading to a shift toward online teaching and making Mobile-Assisted Language Learning (MALL) a necessary tool for language learning (Darsih et al., 2021; Yosintha & Rekha, 2022). Recent technological developments in Artificial Intelligence (AI) and Automatic Speech Recognition (ASR) have further reshaped English language learning, creating new opportunities to facilitate autonomous learning (Azhar & Abdullah, 2024; Paethrangsi et al., 2024).

ELSA Speak (English Language Speech Assistant), introduced by Vu Van in 2015, is an AI-powered mobile application designed to help learners improve English pronunciation through instant, individualized feedback on both segmental and suprasegmental features. Its flexibility allows learners to practice independently at their own convenience, thus

supporting motivation and autonomy in pronunciation learning (Al-Shallakh, 2024; Anggraini, 2022; Tran & Vu, 2024).

Nonetheless, empirical evidence regarding the role of AI-powered tools in supporting learner autonomy and enhancing pronunciation skills, particularly in under-resourced EFL settings, remains scarce. To address this gap, the current study investigated whether the free version of the ELSA Speak application facilitates autonomous pronunciation learning and enhances segmental and suprasegmental pronunciation skills among Libyan EFL freshmen.

Research Objectives

This study aims to:

1. Examine the extent to which the free version of the ELSA Speak application facilitates autonomous pronunciation learning among Libyan EFL freshmen.
2. Evaluate its effectiveness in enhancing Libyan EFL freshmen's segmental and suprasegmental pronunciation skills.

Research Questions

Accordingly, the study addressed the following research questions:

RQ1. To what extent does the free version of the ELSA Speak application facilitate autonomous pronunciation learning among Libyan EFL freshmen?

RQ2. To what extent does the free version of the ELSA Speak application enhance Libyan EFL freshmen's segmental and suprasegmental pronunciation skills?

Literature review

Learner Autonomy

According to Holec (1981), autonomy is "the ability to take charge of one's own learning" (p. 3). This ability is not innate but rather is acquired in a systematic and structured manner, usually within a formal instruction setting. He further emphasized the two conditions required for learning to be truly autonomous. First, the learner must possess the necessary skills

needed to manage and monitor their own learning; second, the learning environment must provide opportunities to allow learners to exercise this ability. Little (1991) added that although autonomy grants learners a considerable degree of freedom, it is not absolute but rather constrained and conditional by specific circumstances.

Holec (1981) explained that there is a gap between self-directed learning and autonomous learning. When learners take responsibility for their learning, they participate in self-directed learning, which is learning undertaken on an autonomous basis. This could happen regardless of whether a teacher is involved or learning materials are provided. He further noted that an autonomous learner may not necessarily imply a self-directed learner. In other words, a learner might not use the capacity of being in charge of their learning to its full extent, despite actually possessing it, as the degree of self-direction depends on two conditions: the degree of autonomy that a learner possesses and the extent to which they exercise it.

Pronunciation Learning in EFL Contexts

Pronunciation has been referred to as the production of sounds used to convey meaning, including consonants and vowels, which are known as segmental features, and features such as stress, intonation, and rhythm referred to as suprasegmental features (Pourhosein Gilakjani, 2012; Yates & Zielinski, 2009, as cited in Pourhosein Gilakjani & Sabouri, 2016). Both of these features are central to effective communication, and neglecting either may have a negative impact on oral communication (Celce-Murcia et al., 2012; Levis, 2018).

In the Libyan EFL context, learners face common pronunciation difficulties in segmental and suprasegmental features. They often confuse sounds that do not exist in Arabic, such as pronouncing /p/ as /b/ and /v/ as /f/, inserting vowels in consonant clusters, and substituting similar consonant contrasts. These difficulties also extend to vowel sounds, as learners may struggle to distinguish between short and long vowels as well as diphthongs (Abdelaty, 2023; Aoghala & Ali, 2024; Alahrish, 2022; Elkateb, 2023). Moreover, Libyan learners experience problems with

stress placement, rhythm patterns, and intonation use (Abdelaty, 2023; Alahrish, 2022; Aoghala & Ali, 2024).

Artificial Intelligence in Language Education

Artificial intelligence (AI) has transformed language education, reshaping the traditional perspective of teaching beyond confined classrooms into distance and blended learning environments. However, its implementation requires careful consideration to ensure its effectiveness in second language acquisition teaching and learning methodologies (Idrissi et al., 2024; Konyrova, 2024; Son et al., 2025).

AI systems simulate human cognitive functions such as comprehension, problem-solving, decision-making, and creativity, enabling learning environments that can accommodate learners' diverse needs including proficiency levels, job-related demands, and personal interests (Anggraini & Faisal, 2024).

These tools support autonomous learning by helping students set their learning goals, track their progress, and adjust their learning strategies (Qiao & Zhao, 2023). They also enhance engagement and support skill development through real-time feedback, while reducing anxiety and fostering intrinsic motivation (Wei, 2023).

The ELSA Speak Application

The ELSA Speak app is an AI-driven mobile application that utilizes ASR technology to provide instant, personalized feedback, assisting non-native English speakers in improving their pronunciation (Adawiah & Muliati, 2024; Kholis, 2021). The app can be downloaded for free from the App Store or Google Play. It analyzes the accuracy of users' input and provides immediate corrective feedback on their pronunciation attempts (Becker & Edalatishams, 2019). It has also been reported that the app detects pronunciation errors with high accuracy, exceeding 95% (Adawiah & Muliati, 2024; ELSA Speak, n.d.; Fitrah & Rahmani, 2024).

The free version offers limited access to features, including a basic personalized learning plan based on the learners' goals, interests, and proficiency level, restricted AI-driven role-play activities, pronunciation

exercises, and a dictionary tool (ELSA Speak, n.d.). Learners are also limited to two lessons per day. Despite these limitations, the free version has been considered sufficient for beginner-level practice (Senowarsito & Ardini, 2023).

Theoretical Framework

This study is grounded in two theories: Self-Determination Theory (SDT) and Skill Acquisition Theory (SAT).

Self-Determination Theory (SDT)

According to Ryan and Deci (2020), SDT is "a broad framework for understanding factors that facilitate or undermine intrinsic motivation, autonomous extrinsic motivation, and psychological wellness, all issues of direct relevance to educational settings" (p. 1). This theory assumes that individuals are inherently inclined toward psychological growth and integration, and thus toward learning and social connections. These innate human tendencies are not automatically satisfied but rather they require supportive environments to be sustained.

SDT further suggests that individuals vary in their level of motivation and in the orientation of that particular motivation, which can range from autonomous to controlled (Ryan & Deci, 2000a, 2022).

SDT posits three basic psychological needs crucial for consistent growth, integration, and well-being (Ryan & Deci, 2020, 2022). The first is autonomy, which refers to a sense of ownership over one's actions, and is reinforced by experiences of interest and worth but weakened by external control. The second is competence, which indicates the feeling of mastery and the ability to improve, and it is best fulfilled in well-organized settings that provide appropriate challenges, positive feedback, and opportunities for improvement. The third is relatedness, which refers to the sense of belonging and being connected to others and is facilitated through care and respect. The frustration of any of these needs is harmful to motivation and well-being (Ryan & Deci, 2020). However, although SDT includes relatedness as a core psychological need, the current study focuses on

autonomy and competence, as they align with the nature of independent learning through the ELSA Speak application.

In this context, two kinds of motivation drive people to engage in activities. Intrinsic motivation occurs when individuals are motivated because they value an activity or out of interest, whereas extrinsic motivation occurs when people act because there are external forces such as out of fear of surveillance, or for the sake of receiving a reward (Ryan & Deci, 2000a, 2000b). Deci and Ryan (2000) highlighted that for intrinsic motivation to be maintained, autonomy and competence must be satisfied.

Skill Acquisition Theory (SAT)

SAT is grounded in Anderson's (1982) Adaptive Control of Thought (ACT) model and applied to second language acquisition by DeKeyser (1997) to explain how learners develop cognitive skills through practice.

DeKeyser (2020) explained that learners progress from initial learning to advanced levels of proficiency in a gradual manner. In other words, a skill is acquired by following a developmental sequence that starts with initial knowledge representation followed by initial behavioral changes, and eventually leading to fluent, spontaneous, and largely effortless and skilled performance.

DeKeyser (2020) elaborated that a person acquires knowledge about a skill through perceptive observation, which is usually transmitted verbally, often accompanied by a demonstration of that behavior, from someone who has that knowledge to someone who lacks it. This process involves proceduralization, through which declarative knowledge (knowing that) transforms behavior into procedural knowledge (knowing how).

However, DeKeyser (2020) further argued that skills require extensive practice to be performed fluently, with few to no errors, gradually leading to automatization of knowledge. Automatization is gradual rather than an all-or-nothing matter, and even highly practiced skills are prone to failures or slips.

In the context of the current study, these two theories complement each other, as SDT explains how psychological conditions encourage learners

to engage autonomously with the app, and SAT explains the cognitive process through which extensive practice transforms the declarative pronunciation knowledge into the proceduralized and eventually automatized knowledge.

Methodology

Research Design

The study employed a quantitative quasi-experimental research design, with a non-equivalent pre-test/post-test control group model. To strengthen the quasi-experimental design and control confounding factors, Heinsman and Shadish (1996, as cited in Dörnyei, 2007) highlighted the need to prevent students from volunteering for either group and to reduce group differences by matching participants. Therefore, participants were assigned using a matched-pairs technique based on a proficiency test, ensuring group comparability. Furthermore, to account for initial group discrepancies commonly associated with quasi-experimental designs, an analysis of covariance (ANCOVA) was employed during the analysis stage to statistically control for pre-existing differences (Dörnyei, 2007).

Participants

The participants were recruited from the Faculty of Arts, Bani-Waleed University, involving 30 freshman EFL majors selected through purposive sampling based on specific characteristics, including their current enrollment as first-year English majors, having similar years of English instruction, and comparable proficiency levels as measured by the placement test. They were equally divided into an experimental group and a control group. Participants were paired based on their proficiency test scores. Each matched pair was randomly assigned, with one member being placed in the experimental group and the other in the control group.

Data Collection Instruments

Data were collected using the following instruments: a placement proficiency test that was used as a screening instrument for group assignment, a quantitative questionnaire to capture participants'

perceptions, and a pronunciation assessment test evaluated through an analytic rubric.

Placement Proficiency Test

The placement test was administered at the outset of the study to assess participants' initial English proficiency levels, with a focus on their general English grammatical knowledge. It was adopted from the *Language Hub Placement Test* (Macmillan Education, 2019). Scores ranged from 0 to 30 and were categorized into three levels: low (0–10), medium (11–20), and high (21–30).

Learner Autonomy Questionnaire

A six-item questionnaire adapted from Nikou and Economides (2017) was employed, using a 5-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. They developed the questionnaire within a framework integrating SDT and the Technology Acceptance Model (TAM). Accordingly, to suit the context of autonomous pronunciation learning using the ELSA Speak app, the questionnaire items were modified and reviewed for clarity. The constructs of *autonomy* and *competence* were specifically retained to align with the objectives of the study.

Pronunciation Assessment Test

Based on prior research conducted within the Libyan EFL context, a test was designed to assess both segmental and suprasegmental pronunciation features (Abdelaty, 2023; Alahrish, 2022; Aoghala & Ali, 2024; Elkateb, 2023). The test included two sections. The first section focused on assessing segmental accuracy through minimal pairs, as they are commonly used to raise learners' awareness of sound contrasts and serve as a tool for training EFL learners in the discrimination of sounds (Avery & Ehrlich, 1992; Celce-Murcia et al., 2012).

Evaluating segmental accuracy beyond the isolated word level, as well as suprasegmental features including *connected speech***,** *intonation***,** *word stress*, and *sentence stress*, is crucial for achieving intelligibility and comprehensibility (Avery & Ehrlich, 1992; Celce-Murcia et al., 2012).

Therefore, the second section assessed both segmental and suprasegmental features through a sentence reading task. The assessment test is provided in Appendix A.

Pronunciation Assessment and Scoring Rubric

To enhance scoring consistency, participants' performance was evaluated using a dual-assessment approach. The minimal pairs task was scored using a *dichotomous scoring system* (correct = 1, or incorrect = 0), while the sentence reading task was assessed using a four-point analytic scoring rubric (0–3), adapted to suit the study context while drawing on pronunciation descriptors from the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2020). These scoring approaches were employed systematically to support consistency and validity in measuring participants' pronunciation development throughout the study.

Validity and Reliability of the Instruments

The pronunciation assessment test was validated by three PhD experts in the field of English Applied Linguistics. Their feedback informed the test's suitability and alignment with the learners' educational background. The test was also piloted to confirm its clarity and the practicality of administration procedures. Furthermore, the recordings were rated three times on three separate occasions for both the pilot and the main study participants in order to maintain consistency in scoring, establishing intra-rater reliability.

Pilot Study

The pilot study was conducted prior to the main implementation with three students who did not participate in the actual study. They represented the three categories of low, medium, and high proficiency levels based on their placement test scores. This stage helped evaluate the clarity and suitability of the instruments and the scoring rubric, as well as identify any potential technical issues that might be encountered during the intervention stage. It also informed refinements to the final design of the main study, including

minimizing scheduling conflicts and enhancing follow-up checks without overwhelming the participants.

Data Collection Procedure

After piloting the research instruments, the study was conducted over a 12-week intervention period. The data collection procedure was organized into three stages.

The Pre-intervention Stage. Permission was obtained to conduct the study, and the study protocol was explained to the participants. Next, a placement test was administered in order to assign participants using a matched-pairs procedure based on their test scores. Moreover, to establish a baseline for measuring improvement in pronunciation skills, a pronunciation pre-test was administered to both groups.

The Intervention Stage. The free version of the ELSA Speak app (version 7.7.2) was introduced as an out-of-class activity for the experimental group to complement regular classroom instruction, while the control group received traditional instruction only. Participants were instructed to practice with the app for at least three sessions per week, with each session consisting of two lessons. Each lesson took approximately one to five minutes, depending on the task type, such as short word pronunciation or role-play activities. It should be noted that the free version was employed due to its accessibility for Libyan EFL learners, who may face financial constraints that prevent them from subscribing to the paid version. In addition, during the implementation, the app was updated with an additional section, the "Pronunciation Skills" section, which allowed users to practice without daily limits; however, the overall number of free lessons was limited to approximately 41. Weekly reminder notifications were sent via WhatsApp every Tuesday, and a short poll was distributed every Friday to monitor participants' engagement, collect lesson completion data, and track their adherence levels throughout the intervention period. Furthermore, some participants voluntarily provided open-ended qualitative feedback regarding their experiences with the app.

The Post-intervention Stage. The experimental group completed the questionnaire to capture their perceptions of the app, and the pronunciation post-test was administered to both groups to evaluate any changes in pronunciation skills.

Ethical Considerations

This study adhered to ethical guidelines to protect participants' rights. Permission was secured through an official request issued by the Faculty of Arts, Misurata University, and addressed to the Faculty of Arts, Bani-Waleed University, granting permission to conduct the study at the institution. In addition, participants were informed of their right to withdraw at any time as well as the steps taken to preserve confidentiality.

Data Analysis Procedures

The data were analyzed using descriptive and inferential statistics with IBM SPSS Statistics (version 27). The process took the following order:

An independent samples *t*-test was conducted to ensure initial homogeneity between groups on placement test scores. Descriptive statistics were then calculated to summarize participants' lesson completion data and adherence levels.

Next, the internal consistency of the questionnaire constructs was evaluated using Cronbach's alpha, and descriptive statistics were calculated to summarize participants' responses. In addition, a one-sample *t*-test was conducted to determine whether participants' perceived autonomy was significantly higher than the neutral midpoint.

To evaluate pronunciation performance, descriptive statistics were first calculated for the overall pronunciation scores and pronunciation features. Then, an ANCOVA analysis was conducted, with pre-test scores entered as the covariate to control for initial group differences that may influence the post-test results. Assumptions for ANCOVA were checked prior to analysis. Because the homogeneity of variances assumption was violated for the overall pronunciation score, a bootstrapped ANCOVA was performed to ensure robust results. Additional ANCOVA analyses were

also conducted for the test sections. Finally, voluntary open-ended qualitative feedback was analyzed thematically.

Results

Participant Demographics and Group Homogeneity

Thirty freshman English majors (5 males, 25 females) from the Faculty of Arts, Bani-Waleed University, participated in the study and were equally divided into an experimental group (n = 15) and a control group (n = 15). The experimental group included five participants and the control group had four participants from the high proficiency category. Each group included two participants with low proficiency, whereas most participants fell into the medium category.

Next, to ensure initial group homogeneity prior to the intervention, an independent samples *t*-test was conducted on participants' placement test scores. Table 1 presents the descriptive statistics and *t*-test results.

Table 1

Descriptive Statistics and Independent Samples t-Test for Placement Test Score

Group	***N***	***M***	***SD***
Experimental	15	17.67	5.51
Control	15	17.07	5.19
t	***df***	***p***	**Cohen's *d***
.307	28	.761	.11

As shown in Table 1, the two groups were homogeneous at baseline, with no statistically significant difference in placement test scores, $t(28) = 0.307$, $p = .761$, indicating comparable proficiency levels prior to the intervention.

Participants' Adherence Levels to the ELSA Speak App

As the experimental group was instructed to follow the study protocol over the 12-week period, they were expected to practice at least 72 lessons each. However, adherence to the intervention varied significantly among participants. The adherence in this study was measured based on lesson completion rather than the estimated minutes of practice as the ELSA Speak app does not provide records of the time spent on each lesson. Table 2 presents the descriptive statistics for app usage.

Table 2

Descriptive Statistics for App Usage

Measure	**Min**	**Max**	***M***	***SD***
Total lessons completed	2	124	46.40	42.79

As shown in Table 2, the total number of lessons completed ranged from 2 to 124, with $M = 46.40$ ($SD = 42.79$), indicating substantial variability in participants' engagement with the app.

Therefore, participants' adherence levels were categorized into three levels based on lesson completion: high adherence (72 lessons or more), medium adherence (36–71 lessons), and low adherence (fewer than 36 lessons). Table 3 presents participants' adherence levels.

Table 3

Total Lessons and Adherence Levels of Participants

Participant Code	**Total Lessons**	**Adherence Level**
M.G. 06	**124**	**High**
AM.AL. 05	**105**	**High**
T.M. 05	**103**	**High**
Y.A. 05	**88**	**High**
HA.A. 05	**77**	**High**
T.A. 04	66	Medium
J.A. 04	30	Low
M.A.Z. 07	26	Low
F.A.A. 06	22	Low

M.B. 05	20	Low
A.L. 05	15	Low
N.A. 05	14	Low
F.A.E. 06	2	Low
M.A. 04	2	Low
H.A. 05	2	Low

As shown in Table 3, only five participants achieved high adherence, while one participant demonstrated medium adherence. The majority of participants fell into the low adherence category. These results suggest varying levels of autonomous engagement and motivation in managing pronunciation practice outside direct teacher supervision.

Questionnaire Findings

The questionnaire assessed participants' perceptions of the ELSA Speak app across two constructs aligned with SDT: autonomy and competence. Each construct consisted of three items measured on a 5-point Likert scale. Mean scores were interpreted using the uniform interval ranges proposed by Pimentel (2010): 1.00–1.79 = Strongly Disagree, 1.80–2.59 = Disagree, 2.60–3.39 = Neutral, 3.40–4.19 = Agree, and 4.20–5.00 = Strongly Agree. Both constructs demonstrated high internal consistency, with Cronbach's alpha values of .893 for perceived autonomy and .840 for perceived competence. Table 4 presents the descriptive statistics for the perceived autonomy construct.

Table 4

Descriptive Statistics for Perceived Autonomy

Item	Statement	*M*	*SD*
1	I feel a sense of choice and freedom while using the ELSA Speak app	3.53	1.13
2	The ELSA Speak app provides me with interesting options and choices	4.07	0.80
3	I can make some decisions about how I practice pronunciation	3.80	0.86

Overall	**3.80**	**0.93**

As shown in Table 4, participants reported positive perceptions of autonomy (*M* = 3.80, *SD* = 0.93), with all items falling within the "Agree" category. This indicates that learners experienced a sense of choice and control over their pronunciation learning while using the app.

Next, the perceived competence construct assessed participants' confidence in their ability to improve pronunciation using the ELSA Speak app. Table 5 presents the descriptive statistics for this construct.

Table 5

Descriptive Statistics for Perceived Competence

Item	Statement	*M*	*SD*
1	I feel confident in my ability to improve pronunciation using ELSA Speak	3.80	0.86
2	I believe I have become more skilled in English pronunciation through the ELSA Speak app.	3.40	0.83
3	I feel capable of successfully completing the pronunciation exercises in the ELSA Speak app.	3.67	0.98
	Overall	**3.62**	**0.89**

As shown in Table 5, participants reported positive perceptions of competence (*M* = 3.62, *SD* = 0.89), with all items falling within the "Agree" category. This suggests that learners felt capable of improving their pronunciation and successfully engaging with the app's exercises.

Perceived Autonomy Analysis

A one-sample *t*-test was conducted to compare the perceived autonomy mean score to the neutral midpoint of 3. Table 6 presents the results.

Table 6

One-Sample t-Test Results

Measure	*M*	*SD*	*t*(df)	*p*	Mean Difference	95% CI	Cohen's d

Perceived Autonomy	3.80	0.85	3.63 (14)	.002	0.80	[0.33, 1.27]	0.94

As shown in Table 6, the results showed that the mean score was significantly greater than neutral, $t(14) = 3.63$, $p = .002$, with a large effect size (Cohen's $d = 0.94$). These results indicate that the free version of the ELSA Speak app significantly facilitated learners' perceived autonomy in pronunciation learning.

Pronunciation Outcomes

Descriptive statistics for overall pronunciation performance are presented in Table 7.

Table 7

Descriptive Statistics for Overall Pronunciation Performance

Group	Pre-test *M* (*SD*)	Post-test *M* (*SD*)	Score Change *M* (*SD*)
Experimental	48.93 (9.14)	50.60 (10.20)	1.67 (4.73)
Control	50.07 (9.21)	51.13 (9.68)	1.07 (2.76)

As shown in Table 7, both groups demonstrated a slight increase in mean scores from pre-test to post-test, with the experimental group showing a marginally higher gain than the control group. Next, Table 8 presents descriptive statistics for each section of pronunciation features.

Table 8

Descriptive Statistics for Pronunciation Features

Feature	Group	Pre-test *M* (*SD*)	Post-test *M* (*SD*)	Score Change *M* (*SD*)
Segmental Features (Minimal Pairs)	Experimental	22.27 (3.96)	23.67 (4.84)	1.40 (3.22)

	Control	23.00 (5.03)	23.67 (4.97)	0.67 (1.35)
Segmental Features (Sentence Reading)	Experimental	17.33 (3.87)	17.73 (4.23)	0.40 (1.55)
	Control	17.80 (2.81)	17.93 (3.24)	0.13 (1.51)
Suprasegmental Features	Experimental	9.33 (2.82)	9.20 (3.12)	-0.13 (2.10)
	Control	9.27 (2.92)	9.53 (2.92)	0.27 (2.19)

As shown in Table 8, the experimental group demonstrated slight improvement compared to the control group in terms of segmental features in minimal pairs and sentence reading tasks, whereas suprasegmental features showed a slight decrease for the experimental group.

ANCOVA Analysis

To examine whether the observed differences between groups were statistically significant, an ANCOVA was conducted with pre-test scores entered as a covariate. Prior to the analysis, key assumptions were assessed. The assumption of homogeneity of regression slopes was met, and residuals were normally distributed. Nonetheless, the homogeneity of variances assumption was violated for the overall score (p = .039); therefore, a bootstrapped ANCOVA was performed to ensure robust results. Table 9 presents the results of the bootstrapped ANCOVA analysis.

Table 9

The Bootstrapped ANCOVA Results for Overall Pronunciation Score

Source	***F***	***df***	***p***	***Partial η²***
Group	0.172	1, 27	.727	.006

Note. Results are based on 1,000 bootstrap sample.

As shown in Table 9, the results indicated that there was no statistically significant difference between the experimental and control groups in post-test pronunciation scores after controlling for pre-test performance (p = .727).

To further examine pronunciation performance across the three sections of the test, ANCOVA analyses were also conducted for segmental features in the minimal pairs task, segmental features in the sentence reading task, and suprasegmental features. The assumptions were also tested prior to the analysis and they were found to be satisfied, supporting the use of the traditional ANCOVA, as presented in Table 10.

Table 10

Results of ANCOVA for the Test Sections

Feature	F	p	Partial η^2
Segmental Features (Minimal Pairs)	0.564	.459	.020
Segmental Features (Sentence Reading)	0.235	.631	.009
Suprasegmental Features	0.256	.617	.009

As shown in Table 10, no statistically significant differences were found between the two groups across pronunciation features after controlling for pre-test differences ($p > .05$), suggesting that the intervention did not lead to measurable improvement in learners' pronunciation performance.

Voluntary Open-Ended Qualitative Feedback on the ELSA Speak App

During the intervention stage, some participants voluntarily provided open-ended qualitative feedback. The feedback reflected several observations regarding participants' autonomous experiences with the app. Some participants highlighted the app's flexibility and its role in facilitating independent pronunciation practice. Participant M.B. 05 noted that the app helped by "giving me the comfort of choosing the time and days that suit me." Similarly, participant Y.A. 05 commented that although "the teacher still has a big role," the app "reduced my dependence on the teacher."

Nonetheless, some participants reported technical and access issues that may have influenced the effectiveness of the intervention. Participant Y.A. 05 explained that "the app would write a different word, so I had to repeat it." Likewise, participant T.M. 05 reported that "no matter how many times I asked or changed the question, it would not accept my answer as correct." In addition, while some participants expressed positive views about the app, others reported frustration with the restricted lesson access in the free version and the payment requirement for additional exercises, limiting their opportunities for continuous practice.

Discussion

The first research question investigated the extent to which the free ELSA Speak app facilitated autonomous pronunciation learning, particularly in terms of learners' perceived autonomy and perceived competence. The questionnaire findings revealed positive views for both Perceived Autonomy (M = 3.80, SD = 0.93) and Perceived Competence (M = 3.62, SD = 0.89), suggesting that the free version of the ELSA Speak app was successful in supporting participants' psychological needs for autonomy and competence, aligning with the principles of SDT (Ryan & Deci, 2022). This result is consistent with Elsani et al. (2023), who highlighted the role of automatic speech recognition in facilitating autonomous learning through instant feedback. A similar pattern was observed by Tran and Vu (2024), who reported that the app's interactive features create a flexible environment that allows users to choose freely and control their own learning content.

In addition, voluntary open-ended qualitative feedback reinforced these findings, as participant M.B. 05 appreciated the app's flexibility and "the comfort of choosing the time and days that suit me." This also illustrates Holec's (1981) principles of learner autonomy.

Nonetheless, participants did not engage with the app to the same extent, as reflected in their varied lesson completion patterns and adherence levels (see Table 1). Although many participants reported positive perceptions of the app, not all of them maintained consistent autonomous practice throughout the intervention period. This finding supports Holec's (1981)

view that learners may possess the capacity for autonomy without necessarily applying it consistently in practice.

Similar patterns were also observed by Gusrianto and Iswahyuni (2025), who found that student engagement gradually declined over time due to individual differences in learning pace, approaches, and other external responsibilities, such as daily schedules. In addition, the limitations of the free version, particularly the limited number of lessons and payment barriers, may have reduced the opportunities for sustained practice, thus hindering the development of autonomy.

From the perspective of Ryan and Deci's (2000a) SDT, although the app supported participants' psychological needs, this support may not have been sufficient to maintain consistent engagement over time. Learners' motivation, willingness to practice, and the continuous fostering of these factors, as well as individual differences, likely influenced learner autonomy and the extent to which learners engaged in autonomous pronunciation practice (Al Ghazali, 2020; Shaban, 2025).

Regarding the second research question, despite the app's features enabling an autonomous experience, it did not lead to statistically significant improvements in pronunciation skills, as indicated by the ANCOVA analysis (p = .727). This finding is inconsistent with previous studies that reported the app's effectiveness in enhancing pronunciation skills (Adawiah & Muliati, 2024; Almutairi & Alghammas, 2025). This outcome suggests that perceived autonomy does not necessarily translate into measurable improvement in performance, aligning with St. Germain et al.'s (2023) findings, and contradicts Şakrak-Ekin and Balçikanli's (2019) finding, who reported that higher levels of autonomy are associated with increased academic performance.

In addition, some external and individual factors may have influenced the effectiveness of autonomous pronunciation learning, including distractions associated with mobile learning environments, difficulties in evaluating progress, limited knowledge in navigating learning materials, and the lack of face-to-face instructor guidance (Qi, 2025).

The pronunciation errors observed among participants are also consistent with previous studies on Arabic and Libyan EFL learners that reported

similar segmental and suprasegmental difficulties (Abdelaty, 2023; Ahmed, 2017; Alahrish, 2022; Awaj & Mohamed, 2017; Elkateb, 2023; Khalifa, 2020). These persistent phonological errors could be caused by fossilization, in which learners tend to transfer linguistic habits from their native language to the target language, causing certain errors to become resistant to change despite learners' age or the instruction received (Selinker, 1972). Notably, the data showed a slight decline in suprasegmental features for the experimental group, suggesting that ASR technology may be limited in its ability to improve and model suprasegmental features (Farrús, 2023; Ngo et al., 2024).

In addition, the amount of practice may not have been sufficient to overcome fossilized errors. From the perspective of SAT (DeKeyser, 2020), limited and inconsistent practice may have restricted the transformation of declarative knowledge into fluent and proceduralized performance, thereby hindering skill automatization.

Overall, the findings suggest that although the free version of the ELSA Speak app facilitated perceived autonomy in pronunciation learning, participants did not maintain the same level of autonomous engagement, and autonomy alone did not necessarily guarantee measurable improvement in pronunciation performance.

Conclusion and Recommendations

In conclusion, the free version of the ELSA Speak app utilizes features that facilitate perceived autonomy among learners. However, this facilitation did not lead to measurable improvement in pronunciation performance. This suggests that learners require special attention in developing their pronunciation skills and that AI alone cannot fully address such needs. As a result, learners should strengthen their awareness and complement their autonomous learning with teacher supervision to effectively enhance their pronunciation skills.

The study has several limitations, including the small sample size (n = 30) from a single institutional context involving only freshman EFL students, which restricts the generalizability of the findings to other EFL educational contexts. In addition, the study only used the free version of the app, which

provides a limited number of lessons and features, and the intervention period was relatively short.

Based on these findings, the study recommends adopting a hybrid approach in which instructors integrate AI tools as a supplement rather than a replacement for teacher guidance to help overcome fossilized pronunciation errors. Future research should investigate long-term interventions and compare the free and paid versions of the app with a larger and more diverse sample.

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