

# Evaluating the effectiveness of a mobile app in second language improvement among middle school students: a case study of the Stimuler App

## *Evaluación de la eficacia de una aplicación móvil en la mejora del aprendizaje de una segunda lengua en estudiantes de educación secundaria: caso de estudio en la aplicación Stimuler App*

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### Abstract

**Objective:** This study evaluated the impact of the mobile application Stimuler on learning English as a second language among secondary education students, to determine if the use of digital tools contributes to the development of language skills in young people of different age groups. **Methodology:** Using a quasi-experimental quantitative design, 120 high school students from Santo Domingo de los Tsáchilas, Ecuador, participated, divided into two age groups (10-12 and 16-18 years old). For three months, the participants used the application as a complementary tool and were evaluated through pre- and post-tests that measured their grammatical, listening comprehension, reading, and speaking skills. The usability of the application was evaluated using the System Usability Scale (SUS). **Results:** A significant

improvement was observed in the overall scores (pretest mean = 53.12, posttest mean = 76.21;  $p < 0.001$ ) and in the four evaluated skills, with no statistically significant differences between age groups ( $t = 1.13$ ,  $p > 0.001$ ). The usability evaluation indicated high acceptance and ease of use. The Pearson correlation analysis showed a positive but not significant relationship between the application usage time and the improvement obtained ( $r = 0.11$ ,  $p > 0.001$ ). **Conclusions:** The findings confirmed that well-designed applications can enhance language development, motivate students, and promote self-directed and integrative learning across different age groups. The findings presented add value to the existing literature on mobile-assisted language learning (MALL) and emphasize the importance of focusing on the quality of cognitive engagement rather than the duration of use, with implications for instructional design and the incorporation of mobile technologies in formal educational settings.

**Keywords:** Language barrier; second language; applications; digital technologies.

## Resumen

**Objetivo:** Este estudio evaluó el impacto de la aplicación móvil Stimuler en el aprendizaje del inglés como segunda lengua entre estudiantes de educación secundaria, con el fin de determinar si el uso de herramientas digitales contribuye al desarrollo de competencias lingüísticas en jóvenes de diferentes grupos de edad. **Metodología:** Utilizando un diseño cuasi-experimental cuantitativo, participaron 120 estudiantes de secundaria de Santo Domingo de los Tsáchilas, Ecuador, divididos en dos grupos de edad (10-12 y 16-18 años). Durante tres meses, los participantes utilizaron la aplicación como herramienta complementaria y fueron evaluados mediante pruebas previas y posteriores que midieron sus habilidades gramaticales, de comprensión auditiva, de lectura y de expresión oral. La usabilidad de la aplicación se evaluó utilizando la Escala de Usabilidad del Sistema (SUS). **Resultados:** Se observó una mejora significativa en las puntuaciones generales (media pretest = 53,12, media posttest = 76,21;  $p < 0,001$ ) y en las cuatro habilidades evaluadas, sin diferencias estadísticamente significativas entre los grupos de edad ( $t = 1,13$ ,  $p > 0,001$ ). La evaluación de usabilidad indicó una alta aceptación y facilidad de uso. El análisis de correlación de Pearson mostró una relación positiva pero no significativa entre el tiempo de uso de la aplicación y la mejora obtenida ( $r = 0.11$ ,  $p > 0.001$ ). **Conclusiones:** Los hallazgos confirmaron que las aplicaciones bien diseñadas pueden mejorar el desarrollo del lenguaje,

motivar a los estudiantes y promover el aprendizaje autodirigido e integrador en diferentes grupos de edad. Los hallazgos presentados añaden valor a la literatura existente sobre el aprendizaje de idiomas asistido por dispositivos móviles (MALL) y enfatizan la importancia de centrarse en la calidad del compromiso cognitivo en lugar de en la duración del uso, con implicaciones para el diseño instruccional y la incorporación de tecnologías móviles en entornos educativos formales.

**Palabras clave:** Barrera del idioma; segundo idioma; aplicaciones; tecnologías digitales.

## Introduction

Nowadays, self-learning is no longer a challenge. Thanks to globalization, artificial intelligence tools and digital channels around the world have helped people improve their language skills not only at the personal level but also on an interpersonal level (Li et al., 2022). As a result, the way people communicate with one another has overcome numerous language barriers, creating a multilingual environment. Among the most widely spoken languages in the world, English ranks first (Canestrino et al., 2022). Therefore, the importance of learning it as a second language has become key to opening not only social doors but also academic and career opportunities (Hossain, 2024). Thus, English is used as a versatile and effective communication tool in almost every field.

Due to the importance of English communication, people feel obligated to learn this language to be successful in any field, since many resources and pieces of relevant information are more detailed in English than in their native language (Chan et al., 2022). According to (Kennedy, 2006) research, the best time to start learning a new language is during childhood or adolescence, when the brain can retain more information and adopt new knowledge more easily than in adulthood. Moreover, the advantages of knowing a second language not only help youth expand their social networks, but also their academic and professional opportunities for a better future.

In recent years, digital technologies have been increasingly integrated into educational environments, developing tools that help people of all ages learn or improve a new language. These technological gadgets rely on smart devices, such as smartphones, computers, and tablets, which are used continuously throughout the day and make them a new way to

encourage people to learn something new instead of getting stuck in traditional methodologies (Haddock et al., 2022). These interactive environments motivate young students to incorporate tech resources into their daily routines to learn anything, making knowledge more accessible, enjoyable, and dynamic (Haleem et al., 2022).

Through the most interactive technological gadgets, mobile apps have become the best alternative for motivating people to develop language skills (Sung et al., 2015). All of them offer dynamic activities to capture users' attention and help them learn new language skills. Also, apps do not force people to study rigorously, which means people can schedule their learning at any time of day, a true advantage that allows high school students to organize their time without missing any opportunities to improve, something that regular classes cannot do (Fu et al., 2025)

Due to the increasing use of mobile apps, it is important to track their impact on students of different ages, since real data can measure the advantages of implementing apps in a language-learning environment and improve them based on user satisfaction (Partsei et al., 2025). But also, it can provide understanding about how these applications influence English learning to help institutions make informed decisions about their implementation. As these digital tools become more common in educational settings, it is important to analyze whether they contribute to improving student performance in the language.

Therefore, the objective of this study is to evaluate the impact of using a mobile app for English language learning among two groups of middle school students of different ages. Thus, student performance will be analyzed before and after using the app for a specific period to test its effectiveness. The study will determine if using digital tools contributes to developing English language skills improving the understanding of the role that mobile apps can play in language teaching and language learning among teenagers of these ages.

## Literature review

**English as a global perspective.** In recent decades, English has established its position as a global lingua, playing an essential role in fields such as education, science, technology, and international trade (El Garras, 2025). Thus, proficiency in English not only facilitates cross-cultural communication but also significantly expands career and academic opportunities.

According to Tran et al. (2025), the dominant position of this language is the result of political, economic, and historical factors.

In the field of education, learning English has become an integral part of the curriculum. Richards (2015) explain that English as a foreign (EFL) language (EFL) have shifted toward approaches that enhance the development of practical skills. However, traditional methods limit this kind of learning, especially in settings with limited resources or large class sizes.

Therefore, digital technologies have emerged as an innovative way to supplement English learning. As Godwin-Jones (2021) have noted, the use of technological tools enables the creation of participatory, interactive, and self-centered learning environments. This is particularly relevant for young people who are familiar with using digital devices.

Moreover, English also has a cultural value as Hossain (2024) explain that learning a new language involves developing intercultural skills that help students understand and engage with diverse global contexts. Then, mastering English is essential for the well-rounded development of the individual.

Thus, given its relevance nowadays it is necessary to adopt innovative methods that facilitate learning, especially among young people, who can easily gather experience by using technological resources like mobile apps as a promising strategy (Haddock et al., 2022)

**Mobile apps as a tool for learning languages.** During the last decade Mobile-Assisted Language Learning (MALL) has seen significant growth, since this approach uses portable technologies, such as tablets and smartphones, to enable learning anywhere and at any time (Alisoy & Sadiqzade, 2024). According to Kukulska-Hulme & Shield (2008) MALL is an evolution of computer-assisted language learning (CALL), offering greater flexibility and ease of access.

One of the major advantages of MALL is promoting self-directed learning, which allows students to set their own learning pace personalizing their educational process. Furthermore, mobile apps often include interactive elements, such as games, immediate feedback, and reward systems, to help keep users motivated (Al Shihri et al., 2025)

Therefore, adapting these apps to the educational setting may be key for learning. Traxler (2018) mention that the success of learning via mobile devices depends on content relevance,

ease of use, and instructional design with the capacity of accomplishing and aligning with the specific needs of students.

However, in general it has been demonstrated that mobile applications are particularly beneficial for young people due to their high level of technological literacy, since new generations are known as "digital natives," meaning their education can be enhanced by technological tools.

**The Usability of Educational Apps in language learning.** Usability is a key factor in the success of educational apps. According to the ISO 9241-11 standard, usability is defined as the extent to which a product can be used by specific users to effectively, satisfactorily, and efficiently achieve specific goals (Bevan et al., 2016). Thus, mobile learning, high usability improves the learning experience and facilitates interaction with the app.

The adoption of technology depends on two main factors: ease of use and perceived usefulness, since it has been demonstrated that academic performance is significantly affected by these two factors it is important to evaluate mobile apps based on the user experience (Schorr, 2023). In this context, the Brooke scale, known as the System Usability Scale (SUS), is commonly used to analyze the usability of digital systems due to its reliability and usefulness in various situations, including educational ones (Grier et al., 2013)

In the field of language learning, usability is particularly important to maintain user interest, applications must be adaptive, engaging, and intuitive especially if it is targeting young people.

A satisfying user experience can increase the frequency of service use and consequently improve learning outcomes. However, usability affects not only technology adoption but also the quality of learning, since complex or unintuitive interfaces tend to produce frustration and reduce the effectiveness of the teaching process (Deng et al., 2010). Therefore, the design of educational apps must be user centered.

**The impact of mobile apps on language learning among young people.** Language learning is particularly effective for young people when mobile apps are used. This is partly due to its familiarity with technology and ability to adapt to digital environments. Yurdagül & Öz (2018) argue that young learners have a positive attitude toward mobile learning,

which increases their motivation and engagement integrating these resources into daily life, and thus increasing exposure to the language.

Moreover, learning through apps promotes the development of specific skills. For example, Yu (2023) found that mobile apps greatly enhance vocabulary and listening skills. Meanwhile, Hwang et al. (2014) found that the effect on listening comprehension is positive if the mobile app interface allows for interactive speaking.

Furthermore, digital technology enables innovative teaching methods, such as game-based learning or gamification, which increases student motivation and engagement leading to improved educational outcomes (Yu, 2023).

## Methodology

**Study design.** The study used a quasi-experimental, quantitative approach to assess the effectiveness of the ‘Stimuler App’ before and after its implementation. Students used the app as a supplementary learning tool for a period of three months.

**Sample.** A total of 120 students from several high schools in Santo Domingo de los Tsáchilas, Ecuador, where English was taught as a second language were evaluated. The analysis was conducted with two groups of students of different ages. The first group consisted of 60 students aged 10-12, and the second group consisted of 60 students aged 16-18. Both groups took two English tests to evaluate their grammar, listening, reading, and speaking skills. The first test was taken before using the app, and the second test was taken after using it. The time considered was three months.

**Assessment of English language skills.** First, data were collected to record the participants' demographic information and add it to an online Microsoft Teams group for follow-up. Since several students came from different educational institutions, all the assessments were conducted online to facilitate communication and interventions between students and researchers throughout the research period. Thus, the online format allowed participants to complete the tests flexibly and accessibly while enabling researchers to efficiently collect and organize the data.

The structure of the English language assessment used in this study was designed following the multi-skill evaluation approach commonly applied in standardized English proficiency examinations such as the TOEFL iBT, IELTS, and Cambridge English assessments.

The pre- and post-tests included four skills: grammar, listening, reading, and speaking. Each component was scored on a scale from 0 to 25 points, for a maximum total score of 100 points. Improvements in language proficiency were determined by the difference between pre-test and post-test scores.

**Usability assessment.** To gather information about the relationship between app effectiveness and English improvement, a usability assessment was conducted. It was designed using the System Usability Scale (SUS). The standardized questionnaire consisting of ten statements is shown in Table 1. The statements were rated on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." This was carried out online after the research period ended.

**Table 1**

*System Usability Scale (SUS) items used to evaluate the usability of the Stimuler application*

Item	Statement
Q1	I think that I would like to use this app frequently.
Q2	I found the app unnecessarily complex.
Q3	I thought the app was easy to use.
Q4	I think that I need technical support to use this app.
Q5	I found the various functions in this app well integrated.
Q6	I thought there was too much inconsistency in this app.
Q7	I would imagine that most people would learn to use this app very quickly.
Q8	I found the app very cumbersome to use.
Q9	I felt very confident using the app.
Q10	I needed to learn a lot of things before I could get going with this app.

**Statistical analysis.** All data were processed using RStudio (version 5.2.1). The descriptive analysis compiled information such as means and standard deviations. The normalization was also tested in each group before conducting paired t-tests to compare the pre- and post-test scores of each group of students, and then overall and by each tested skill. Moreover, a Pearson correlation was carried out to demonstrate the relationship between app usage and English improvement of all participants. Statistical significance was considered at a p-value of less than 0.001. Plots were created using R packages from the tidyverse, such as *ggplot2*, *dplyr*, and *patchwork*.

**Ethical considerations.** Participation in the study was voluntary, and all students agreed to take part in the research activities. Any personal information collected for communication purposes was used solely to maintain contact with participants and facilitate assessment administration. This information was handled confidentially and used exclusively for research purposes. Participants' identities were kept anonymous during data analysis and reporting.

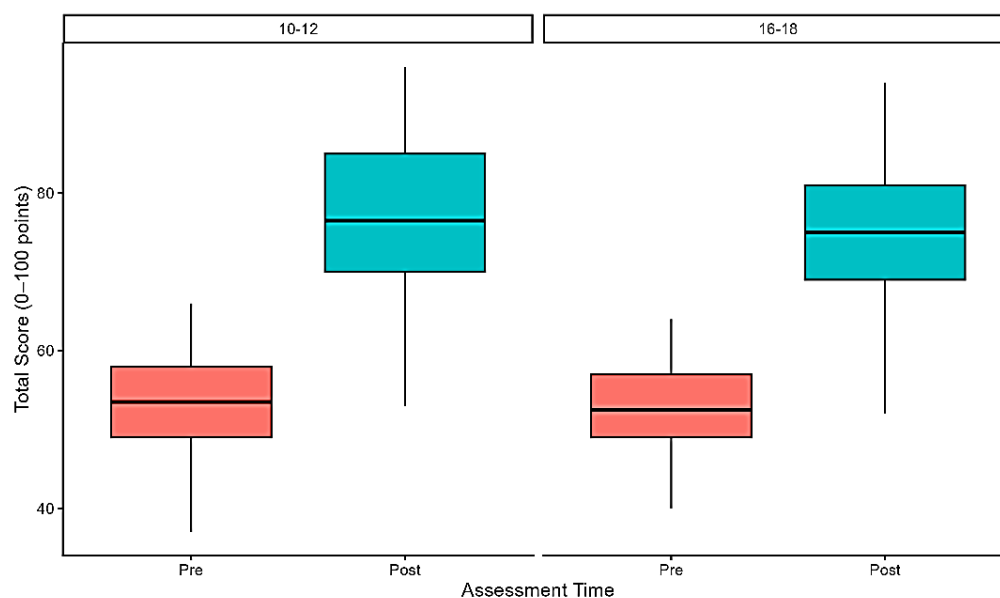
## Results

The first characterization of the sample was conducted to obtain demographic information. Thus, both groups consisted of 60 students. Of the 120 participants, 66 were male (55%) and 54 were female (45%). On average, students used the app for 47.45 days (SD = 7.89) and 20.57 minutes per day (SD = 5.65) during the evaluation period.

Figure 1 shows the pre- and post-test responses in both groups. A clear improvement was found in both groups between the before and after times, meaning the use of the app favored English learning and enhanced the students' knowledge overall. A Welch's t-test was performed to investigate any differences in improvement between the two groups and to determine whether youth respond better to app use. However, no statistical difference was found ( $t = 1.13, p > 0.001$ ).

**Figure 1**

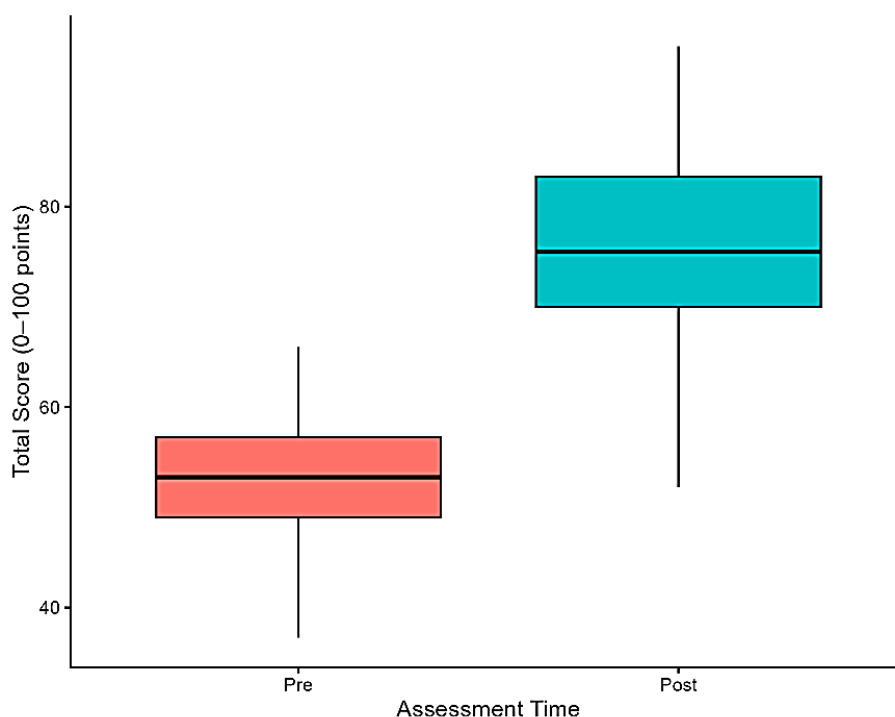
*Assessment english skills in two age groups pre-posttest*



Due to the notable improvements observed in both groups, a statistical analysis was carried out to describe the overall improvement and improvement by skill. Figure 2 shows the overall improvement of the 120 students, indicating an increase in total scores.

**Figure 2**

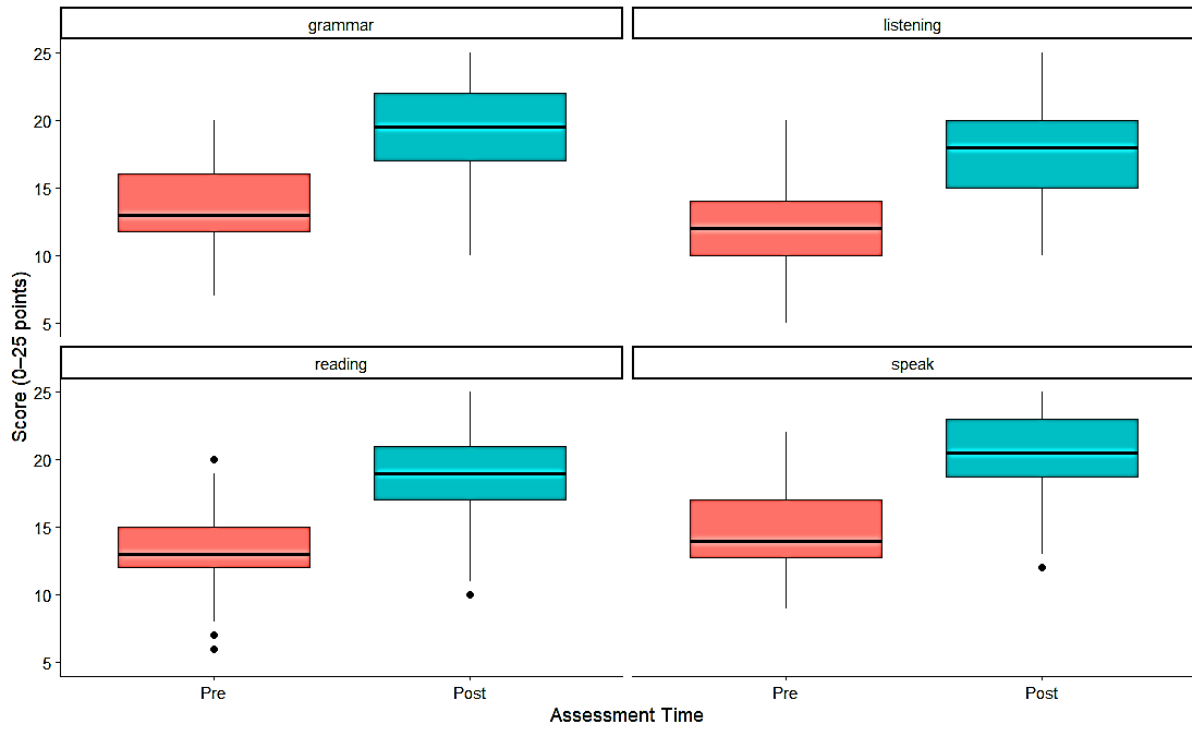
*Overall english proficiency pre-posttest*



During the pretest, the average score was 53.12 (SD = 7.1), whereas after the evaluation period, the average score was 76.21 (SD = 8.2), with a statistically significant difference found ( $p < 0.001$ ). Figure 3 shows the improvements by skill. Scores increased for all skills in both groups, indicating that the pre- and post-test results were statistically different ( $p < 0.001$ ). Therefore, these results clearly demonstrate an improvement in language skills thanks to app usage.

**Figure 3**

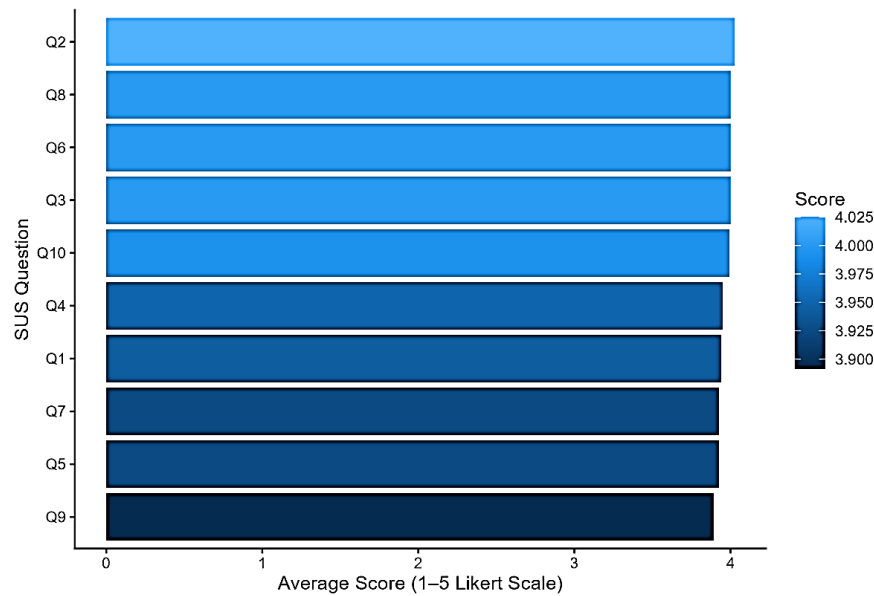
*Overall improvement in english skills pre-posttest*



The usability of the app was measured through SUS and showed a positive overall score, as the average score was 49.29 (SD = 7.08). Most of the individual scores were ranked between 3.89 and 4.03 on the five-point Likert scale, indicating positive responses from participants who found the app useful. Figure 4 shows all the scores. No statistical differences were found among the items ( $p > 0.001$ ).

**Figure 4**

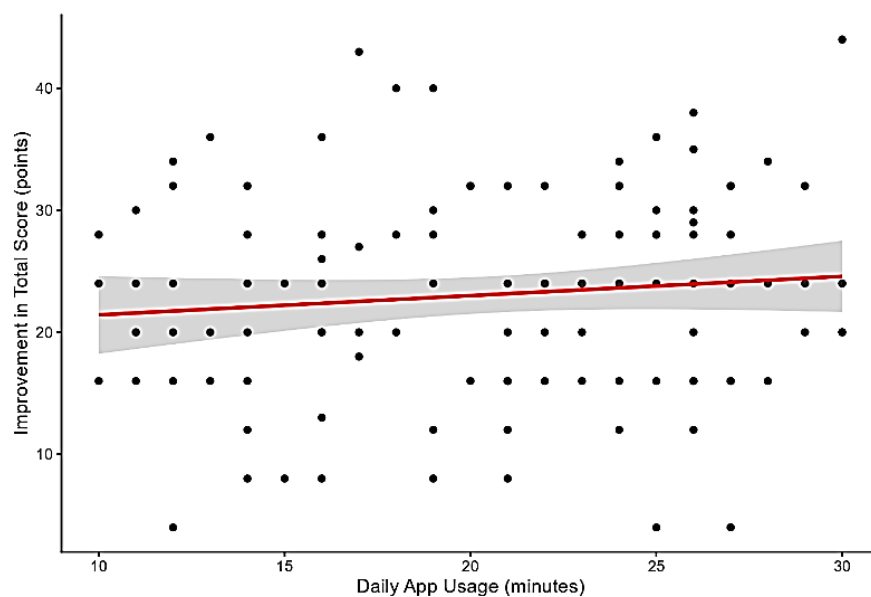
*Average score of System Usability Scale (SUS) items*



Finally, the correlation of Pearson demonstrated a positive, but not statistically significant, relationship between the period that the app was used and the improvement in students ( $r = 0.11$ ,  $p > 0.001$ ). Figure 5 shows a slightly positive relationship; however, daily usage of the app did not lead to greater improvement. Therefore, students do not need to use the app daily to achieve significant improvement.

**Figure 5**

*Relationship between app usage and english improvement*



## Discussion

This study evaluated the impact of using a mobile app for English language learning among middle school students of different ages to gather information about the effectiveness of this technology during self-learning. Overall, the results indicate remarkable improvement in both groups, with all four evaluated skills showing significant improvement after students started using the app. Therefore, the app can be considered an effective strategy for enhancing language learning in contemporary educational contexts.

Since one of the most important findings of this study is the increase in posttest scores in all categories, it aligns with the extensive research on this topic conducted by Qiao & Zhao, (2023), who noted that technology has a positive impact on developing any skill, a process called Computer-Assisted Language Learning (CALL). Additionally, (Shanmugasundaram & Tamilarasu, 2023) found that mobile apps encourage constant, autonomous practice through highly interactive interfaces, making these tools useful and enjoyable.

Also, a meta-analysis of research conducted in Mobile-Assisted Language Learning (MALL) highlights that mobile apps can improve linguistic development when users can use them on a flexible schedule, allowing them to collect new information and repeat as necessary at any time (Mihaylova et al., 2022). Thus, our positive results reinforce this statement with evidence that students who used the app received positive feedback on all evaluated skills because they had free access to practice at any time. This continuous exposure is key to learning a second language.

The robustness of the improvement obtained in this study is comparable to those other studies, which also found high performance in students who used mobile apps as a second tool to improve their second language. Though we can demonstrate that mobile apps can help with acquiring a new language, they can also be used as complementary tools when traditional learning is not enough to motivate students.

It is important to highlight that the overall improvement describes positive development in all evaluated skills (grammar, listening, speaking, and writing), meaning that the mobile app enticed students in all categories, taking an integrative approach to learning. For example, Gligorea et al. (2023) have mentioned that only smart and well-developed apps can motivate

multiple abilities in users, making learning easier and more holistic. In the case of the Stimuler app, its friendly layout enables it to improve speaking skills in all students, making it a very versatile tool, since most apps focus on developing other skills, which are usually considered easier.

The fact that there was no significant difference between the two groups of students, which makes the app suitable for a wide range of ages and allows youth of all ages to develop cognitive abilities while learning a new language. A similar case study led by Gerlich (2025) and Poláková & Klímová (2019) pointed out that one of the most important advantages of apps is that they can effectively capture the attention of any age group if they have a good structure and design that is easy to use.

Regarding app usability, the positive results obtained from the SUS questionnaire indicate that all students consider Stimuler an easy-to-use, useful, and accessible app with an interactive interface. According to Lee et al. (2025), and its technology acceptance model (TAM) when rating any technological resource, usability and ease of use are the two most important factors to consider for a good tool. Therefore, this app meets these criteria, making it useful not only for students with a certain level of knowledge of the language, but also for those who are starting out or need help improving their language skills.

Although the correlation between the time invested in learning and improvement showed a positive trend, it did not mean that a better improvement would be achieved by any student who invested more time using the app. This result can be explained by the theory that quality of cognitive commitment is more important than quantity of time invested. For example, Godwin et al. (2021) describes how time is one of the least important factors affecting progress in learning. This can also happen in most educational settings where students spend years trying to learn a new language, but often only master the basics. In this case, the Stimuler app demonstrates its ability to effectively enhance cognitive skills instead of creating larger, worthless courses.

Also, Kukulska-Hulme & Shield (2008) mobile learning has great potential to be effective, even in short sessions, if they are frequent and well-organized. Overall, the results are comparable with previous studies like one by Amez & Baert (2020) who found that the

relationship between time spent using mobile apps and academic performance is not always linear. Excessive use can lead to demotivation or fatigue in certain situations.

Furthermore, research by Pedraja-Rejas et al. (2024) and Strojny y Dużmańska-Misiarczyk (2023) suggests that the effectiveness of mobile learning depends more on the instructional design of the app than on the amount of time spent using it.

However, despite its favorable results, this study has some limitations. First, the use of other learning tools, motivation, and socioeconomic status were not monitored. Second, usage time was measured in general terms like minutes per day without considering the quality of activities performed. Additionally, while the sample size was appropriate, future studies could improve internal validity by incorporating an experimental design with a control group in order as well.

## Conclusions

In conclusion, the results of this research prove that the Stimuler mobile app is a useful digital language-learning tool, especially because of its interactive, user-friendly interface. These characteristics make the app attractive to students of all ages, demonstrating its versatility in engaging youths. Additionally, this app shows that time does not always indicate progress since there was no significant difference in correlation between time and improvement. Time spent using the app should not be considered the only indicator of commitment or learning; rather, the quality of interaction must be evaluated. Finally, as previous studies have explained, this research supports the idea that the design of the application is key, especially in terms of usability and adaptability.

Moreover, the findings highlight the importance of learner engagement and motivation as central factors in language acquisition through digital platforms, as the interactive features encourage active participation, which is more effective than passive exposure to content.

Another key finding is that Stimuler can be used as a complementary method enhancing the autonomy of students and reinforcing classroom instruction. In addition, this study contributes to the growing body of research on mobile-assisted language learning (MALL), emphasizing that well-designed applications can support personalized learning experiences adapted to individual needs and learning paces.

However, some limitations should be acknowledged, such as factors such as prior knowledge of students, learning strategies, and external motivation that were not deeply analyzed and may have influenced the results. Therefore, future research should explore these variables, as well as investigate long-term learning outcomes and compare different types of applications to identify which design elements have the greatest impact on language acquisition.

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