Development of a Mobile Application for English Language Learning, Designed for Students Aged 12 to 15, "Level A1, A2."

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Abstract: This research aims to develop a mobile application for English language learning for students aged between 12 and 15 years with A1 and A2 proficiency levels to solve the language learning deficit in Ecuador. The methodology applied includes design and agile development based on Mobile-D, using tools like Dart, Flutter and Firebase to ensure functionality, security and scalability. Based on usability and functionality tests in an Android environment with the results of the student sample, which demonstrate an improvement in student participation, and who found the helpful application to reinforce vocabulary and grammar. In addition, areas for improvement were identified, including more challenging activities. This research seeks to promote technological integration in education, offering an innovative and replicable model to overcome linguistic and technological barriers in education in Ecuador.

1. Introduction

Currently, the implementation of mobile applications has experienced exponential growth, effectively revolutionising the technological market. These sites have provided informative, social, cultural, political, religious, and economic content through software development technologies (1) (2).

Thus, learning English as a foreign language requires extrinsic support and motivation, as well as intrinsic motivation: desire to learn another language, enthusiasm for better opportunities, and success in personal and professional life (3) (4). If you decide to learn, it does not matter who you know; nowadays, it is easy to understand. To want is power, especially in difficult times that require resilience to overcome obstacles and circumstances that can block a life project (5).

According to the English Proficiency Index in the year 2023, Ecuador ranks 18th out of 20 countries evaluated for their level of English, and its score in the knowledge of the language is "very low". Thus, Ecuador remains one of the two Latin American countries with the poorest English language proficiency level, only ahead of Mexico (6). This data shows a problem that negatively impacts the educational competence of students, where language proficiency is a fundamental element, highlighting the importance of implementing tools that promote its development (7).

Nowadays, these tools provide students with study alternatives and the opportunity to self-learn. Therefore, mobile learning has become an innovative educational strategy for implementing good teaching practices and promoting the relationship between socialisation and education (8).
Practices in the teaching process and to promote the relationship between socialisation and learning (8).
As explained above, teaching English as a second language is a priority for students and teachers in an increasingly globalised context (9). However, the availability of resources to complement traditional learning is often limited, especially for young people in the initial levels of the language (10).

This article presents the development of a mobile application developed using Dart programming language, aimed solely at students between 12 and 15 years of age in English levels A1 and A2, to facilitate learning through an accessible, practical and motivating tool. This application, which focuses on acquiring vocabulary and basic grammatical structures, seeks to promote autonomous learning and reinforce the knowledge acquired in the formal educational environment.

2. Method

2.1. Type of Research

The following study is presented in a scientific research article. It aimed to develop a mobile application for English language learning for children aged 12 to 15 with knowledge levels A1 and A2.
The population with which the study was developed was 700 people (students from the canton of La Maná, province of Cotopaxi-Ecuador), and they were selected through the formulas for calculating the initial sample size and readjustment.
The research used a mixed approach, combining qualitative and quantitative methods. Bibliographic research techniques supported the application's design and content, while field research allowed data to be collected directly from the students who used it. The study also supported theoretical and practical aspects.

The research employed inductive and deductive methods. Based on the data obtained in the field research, the inductive method answered the scientific questions on how the mobile application could improve English language learning (11). The deductive method reflects the move from a broad theoretical framework on agile methodologies to a concrete approach in Mobile-D that can be applied in each mobile application development phase (12).

The survey stands out among the techniques used. It provided information on user satisfaction with the application's use and was tabulated using the Likert scale (13).

2.2. Materials

Mobile devices with an Android operating system were used to install and use the application, ensuring that students had continuous access to the learning material in English.
Developed specifically for this project, the application offers A1 and A2 level English content, organised in grammar and vocabulary modules with interactive activities. The platform allows users to register, authenticate, and recover their passwords. This platform was used as a real-time database to manage student information, ensuring secure storage and quick access to data.

3. Results

3.1. Study participants
To define the object of study and the field of action, it is necessary to establish the population and the sample to determine the different statistical techniques for calculating a sample in a population with English language learning problems (14).
Thus, this sample calculation formula is used to determine the appropriate sample size for surveys or studies, ensuring that the results are representative of the population with a specific confidence level and margin of error, where:
N = Population size N= 700.
Z = Confidence level Z= 95% = 1.96
E = Maximum permissible error E= 5% = 0.05
P = Probability in favor P= 90% =0.9
Q = Probability against Q= 10% = 0.1

3.2. Calculation of the initial sample size (no.)

The initial sample size was calculated using a 95% confidence level and a 5% margin of error. In this case, it was estimated that 90% of the participants would have characteristics relevant to the study, while 10% would not. By applying these parameters, the required sample would be approximately 138 individuals. This means that all 138 participants would need to be included in a student population of this size to ensure reliable results within the defined margin of error.

3.3. Readjustment of the sample size (n1) for a finite population

Given that the population is finite (700), a readjustment is applied to ensure the sample size is representative.
After applying the rescaling formula to a population size of 700, 115 students aged 12 to 15 from an educational institution in the canton of La Maná in Cotopaxi, Ecuador, were surveyed. Participants were randomly selected, focusing on those at basic English levels and willing to try out a digital educational tool. The group of students was monitored for three months, with evaluations before and after the implementation of the application to measure their progress in English language comprehension and use.

3.4. Design of the educational experience
The educational experience was created for the students, based on their academic workload and availability, so that they could use the application inside and outside the classroom. Each student used their mobile device for the application. Free access to the content was allowed at any time, which encouraged autonomous learning. Initial training sessions were held to familiarise students with the application's functionalities, and their progress was monitored through periodic surveys and tests.

3.5. Methodologies for application development.
"The Mobile-D agile methodology, specifically adapted for mobile application development" (15), allows development to be organised in iterative phases, with user feedback optimising each phase. The Mobile-D phases include requirements definition and design, implementation, and testing, which facilitates the adjustment of the application's interface and functionalities in response to user needs. During the application's programming, the Scrum methodology supports task and time management and assigns roles within the development team.

3.6. Application development
The analysis stage defined the learning objectives, applicable learning styles and models, and structured English vocabulary and grammar content for A1 and A2 levels. It also established the interface design elements and navigation features necessary for an intuitive learner experience. Similarly, a prototype of the application was created that included the interface design, authentication, registration, password recovery functionalities, and the vocabulary and grammar sections organised by levels.
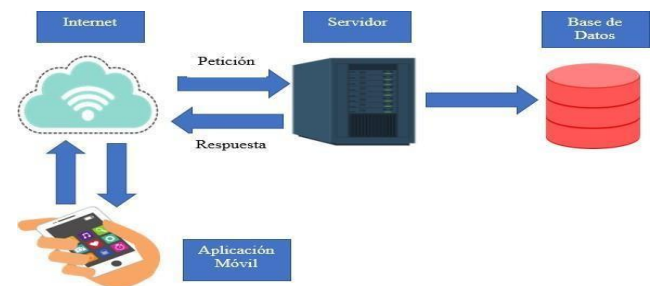

Fig SEQ Fig ARABIC 1. Basic architecture of a mobile application connected to a database through a server, using the internet as a connection medium.

The application was developed in the Dart programming language using the Flutter framework. This approach allowed us to create a high-quality native application for Android devices. Firebase was integrated as a database that managed student information and progress.
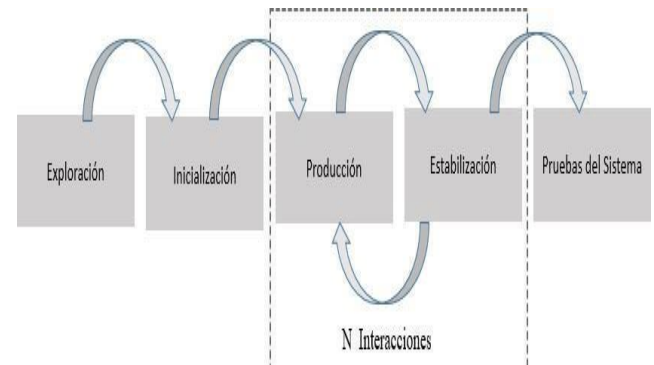
After several tests were performed to correct errors, the application was released to students. It was installed directly on Android devices, and training was provided on the application and its functionalities. Once in use, the respective satisfaction survey was applied, and periodic evaluations of the English were carried out to measure the application's impact. This evaluation focused on the perception of usability, interface design, and improved vocabulary skills and grammar.

Fig SEQ Fig ARABIC 3. Application interface

Regarding social impact, the application contributes to inclusion and equity in education. Providing an accessible tool for learning English reduces educational gaps and facilitates access to learning resources for all students, regardless of socioeconomic status. From an economic point of view, the application optimises educational resources. Reducing the costs associated with traditional teaching materials, such as books and notebooks, promotes greater resource management efficiency.

Regarding user approval and satisfaction, the results of the following research are presented:

Table 1: How would you rate the application's ease of use to improve your English skills?

ALTERNATIVE	NUMBER OF SURVEYS	PERCENTAGE
Very easy to use	4	3.48%
Easy to use	100	86.96%
Somewhat difficult to use	10	8.70%
Very difficult to use	1	0.86%
TOTAL	**115**	**100%**

As seen in Figure 4, 86.96% of the students consider the application easy to use, reflecting the system's high acceptance and usability.

Table 2. Has the application improved your understanding of English vocabulary and grammar?

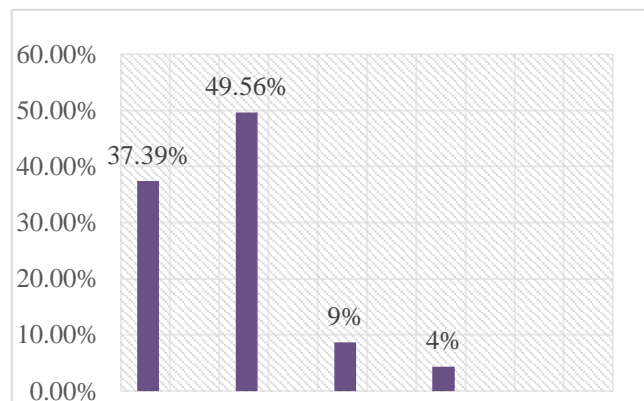| ALTERNATIVE	NUMBER OF SURVEYS	PERCENTAGE
Much improved	43	37.39%
Moderate improvement	57	49.56%
Some improvement	10	8.70%
No improvement at all	5	4.35%
TOTAL	**115**	**100%**

Fig SEQ Fig ARABIC 5. Improving English language comprehension

According to Figure 5, 49.56% of respondents said the app has moderately improved their understanding of English vocabulary and grammar.

Table 3. How motivated do you feel to learn English using the app compared to traditional teaching methods?

ALTERNATIVE	NUMBER OF SURVEYS	PERCENTAGE
Much more motivated	50	43.48%
Somewhat more motivated	33	28.69%
Equally motivated	30	26.09%
Less motivated	2	1.74%
TOTAL	**115**	**100%**

Concerning Figure 6, the majority of respondents, 72.17%, feel more motivated to learn English using the application.

Table 4. How functional and helpful are interactive activities and games within the app for learning English?

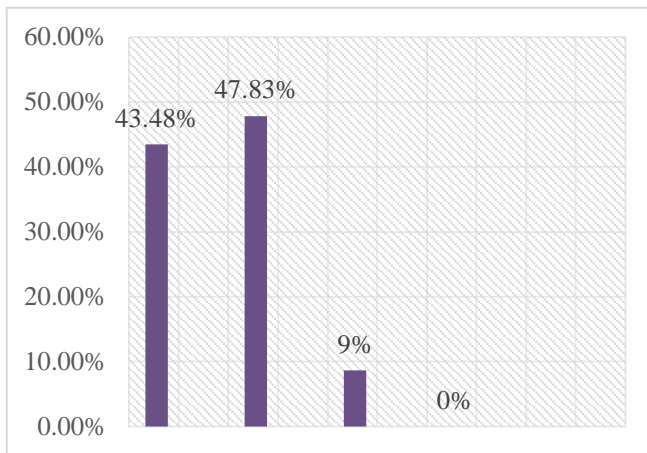| ALTERNATIVE	NUMBER OF SURVEYS	PERCENTAGE
Very useful	50	43.48%
Supplies	55	47.83%
Not very useful	10	8.69%
Not useful	0	0%
TOTAL	**115**	**100%**

Fig SEQ Fig ARABIC 7. Utility of the application

Figure 7 shows that 91.31% of the respondents consider interactive activities and games as helpful applications or handy for improving their English learning, which indicates that these elements effectively fulfil their educational and motivational purposes.

Table 5. Would you recommend this application to other students as a good tool to improve their English level?

ALTERNATIVE	NUMBER OF SURVEYS	PERCENTAGE
Definitely yes	69	60%
Probably yes	46	40%
Probably not	0	0%
Definitely no	0	0%
TOTAL	**115**	**100%**

According to the research, 100% of the respondents would recommend the application as a good tool to improve their English.

Tabla 6. *Escala de Likert*

Questions were asked regarding the satisfaction survey of the mobile application.	Scale +				
	1	2	3	4	5
Q1. How would you rate the application's ease of use in improving your English skills?		2			
Q2. Has using the app improved your understanding of English vocabulary and grammar?		2			
Q3. How motivated do you feel to learn English using the app, compared to traditional teaching methods?	1				
Q4. How useful are the interactive activities and games within the app for learning English?		2			
Q5. Would you recommend this application to other students as a good tool to improve their English level?	1				
Total	8				

In response to the Likert scale represented by the satisfaction survey statistics, a favourable result for users regarding the quality of this research project in scientific article modality is observed.

4. Discussion

Studies have shown that mobile applications promote more interactive and motivating learning. These tools allow students to access educational resources supporting active learning (16).

Mobile learning also contributes to the reduction of psychological and linguistic barriers faced by some students, and by using the application, they can practice oral skills in a comfortable environment, building confidence when speaking (17).

Developing a mobile application for English language learning aimed at students aged 12 to 15 at A1 and A2 levels evidences a significant contribution to the educational and technological field. It has theoretical and practical implications that deserve to be discussed.

The research is supported by previous theories and studies that have emphasised the critical role of machine learning as an innovative pedagogical strategy. According to Gomez-Miranda (2024), mobile applications stimulate self-education and socialisation within the didactic process, an aspect that is supported in the present research, as 91.31% of the students found that the use of interactive activities helped them learn more in this research. This is because, as Almeida (2020) also points out, English language learning in low-proficiency countries responds to the need for easily accessible and stimulating resources, coinciding with this project. In contrast, the Mobile-D methodology, applied during application development, shares similarities with the iterative approach proposed by Amaya (2023) in agile methods that enhance application design by focusing on the end-user's final needs. However, this research differs by integrating it into a specific educational context, which reinforces the novelty and practical applicability of the project.

The results show that the application can be helpful as an educational tool. For example, 72.17% of the students surveyed expressed a higher motivation to learn English through the app than traditional methods. This fact, therefore, reveals an opportunity for interactive technologies to transform the learning experience since, as this finding postulates, personal motivation can be enhanced through technological approaches, as Jara-Cobos (2021) argues.

Because of this, the application's use of interactive activities and games proved possible for autonomous learning. The pedagogical elements combined with this user-friendly technology allow for a generalisation to other educational contexts with similar challenges regarding implementing similar tools.

The main novelty of this project is its ability to integrate agile methodologies and specific educational content into a technological solution for students with low levels of English. At the same time, this innovative approach poses challenges, such as ensuring the application's sustainability in rural contexts with limited connectivity. This point is a limitation and an opportunity to explore more robust offline developments. The project's social and economic impact is notable, reducing educational gaps and optimising resources by replacing traditional teaching materials.

This project could be expanded to include more advanced levels of English and adapted to other languages or areas of knowledge in the future. This article validates the effectiveness of mobile applications in language learning and opens up new possibilities for their implementation in diverse educational contexts.

In this way (18), it describes a project with the same objective, uses tools such as Android Studio, the JDK and the Android SDK in a test environment based on accessible devices (BLU Dash JR with Android KitKat), and underlines a pragmatic approach towards technological implementation.

However, in this article, the choice of Dart and Flutter as the primary tools for mobile application development in the companion project demonstrates a search for efficiency and flexibility, optimising the end-user experience.

5. Conclusions

An analysis was conducted, the first being an in-depth study of the current situation regarding the student's level of English proficiency to identify where the deficit in their learning exists to implement an appropriate solution through the design of an interactive application.

Subsequently, a database was created that optimally stores information about the students appropriately manages the data, and personalises the educational content. The mobile application ensures maximum utilisation and an easy transition to this new learning modality.

The Mobile-D methodology allowed the development of agile and personalised actions for the target students and, at the same time, facilitated the technological integration of a curriculum in a school environment. By enhancing the learning of English and digital skills, this initiative ensures language acquisition among students. It reflects a more inclusive, sustainable, and innovative teaching approach, positioning technological tools for education as a benchmark in pedagogical innovation.

6. Bibliografía

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