

PAPER

Mobile Application with AI Chatbot for Intelligent Tutoring in Communication

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ABSTRACT

According to UNESCO, 14% of young people over the age of 15 lack basic literacy skills. In addition, UNICEF reports that 70% of children in low- and middle-income countries cannot understand simple text. In Latin America, the situation is critical, with 55% of students lacking basic reading skills. In response to this problem, a mobile application with an AI chatbot was developed for intelligent tutoring in communication, using the Mobile-D methodology. For its evaluation, criteria such as usability, technology, and innovation on the part of teachers and users, as well as accessibility, design, and security, were applied, obtaining an average on the Likert scale of 4.37 and 4.39, respectively. These results highlight the acceptance and effectiveness of the application, showing its potential to improve students' communication and literacy skills.

KEYWORDS

mobile application, chatbot, artificial intelligence (AI), communication

1 INTRODUCTION

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), in 2022 it mentioned that at least one in seven young people over the age of 15, approximately 754 million people, lacked basic literacy skills [1]. Moreover, the COVID-19 pandemic exacerbated this problem. According to the United Nations Children's Fund (UNICEF), in low- and middle-income countries, learning losses due to school closures have left around 70% of 10-year-olds unable to read or understand simple text, compared to 53% before the pandemic [2]. Also, in 2021, UNICEF reported that millions of children struggle to acquire minimum proficiency levels in reading, writing, and arithmetic, while some 250 million children aged six to 18 are out of school [3].

In addition to the academic impact, poor communication skills affect young people's mental health. The World Health Organization (WHO) highlights the importance of life skills, including effective communication, as essential for the well-being

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of children and adolescents; however, it notes that one in seven young people aged 10–19 years suffers from some form of mental disorder, accounting for 15% of the global burden of adolescent mortality and morbidity [4].

On the other hand, according to UNESCO's Global Education 2023 Monitoring Report, 54% of countries worldwide have set standards for digital skills; however, these are often defined by non-state and largely commercial actors [5].

In Latin America and the Caribbean, proficiency levels in reading and writing are worrying. The Regional Comparative and Explanatory Study (ERCE) 2019 reports that three out of four students do not reach the minimum competencies in mathematics, and 55% lack basic reading skills [6]. The problem intensified with the pandemic. A joint report by the World Bank and UNICEF, in collaboration with UNESCO, projects that four out of five sixth graders in Latin America and the Caribbean will not reach the minimum level of reading comprehension, representing a setback of more than 10 years in educational progress; these learning losses could cost current students a 12% reduction in lifetime earnings [7]. The Peruvian Ministry of Education (MINEDU) therefore [8] emphasizes that the lack of accompanying strategies in the classroom can lead to learning gaps, especially in intercultural bilingual education, where it is essential to strengthen students' language skills.

To counteract this crisis, international organizations have emphasized the importance of pedagogical accompaniment. In its report "Pedagogical Accompaniment as a Strategy for In-Service Training in Latin America," UNESCO points out that the continuous development of technical competencies in teaching is essential for reflective action and the improvement of teaching-learning processes. This approach promotes timely feedback and reinforcement of knowledge, which is fundamental for the development of key language competencies in students [9].

For this reason, research has explored the use of technology as a tool to mitigate this problem. [10] highlights the role of artificial intelligence (AI) in education through Intelligent Tutoring Systems (ITS), which enable personalized learning and improve reading and writing comprehension through adaptive feedback; these systems model the teaching process dynamically, offering students guidance similar to that of a human tutor. Also, [11] introduces Smart Tuition Finder, a mobile app that connects students with nearby tutors through geolocation and a recommendation system; tested for compatibility on Android (4.4.4–8.0.0) and loading with 50 simultaneous users, in a beta test with 100 students, 85% found it useful; the app supports education, gender equality, and youth employment, aligning with the ODS. On the other hand, the study, [12] developed a mobile application with augmented reality to improve the learning of Peruvian Sign Language (PSL), using the Mobile-D methodology; its impact was evaluated on 30 users; the results showed a 65% improvement in learning, a reduction in study time from 132.67 to 44.63 hours, and an increase in the level of information from 2.27 to 9.07 points, concluding that augmented reality significantly optimizes the PSL learning process. In [13], a virtual assistant was developed in Telegram for students of software engineering at the University of Guayaquil, using NLP and machine learning to answer questions about payments and enrollment; it was evaluated with 60 students, obtaining scores above 3 on a scale of 1 to 5 in ease of use, speed, comfort, confidence, and quality of responses, demonstrating its effectiveness and potential application in future administrative processes.

The purpose of this study was to design a technological solution that facilitates the learning and reinforcement of communication skills in education, promoting the use of AI for intelligent tutoring. To this end, a mobile application was developed with an AI chatbot that integrates key functionalities for monitoring, controlling, and analyzing the communication process in students.

2 METHODOLOGY

The Mobile-D methodology has been widely studied as an effective agile approach to mobile application development, combining elements of Extreme Programming (XP) and Scrum, adapted to the needs of these environments [14]. Its structure allows for continuous feedback to the customer and ensures software quality through development-led testing [15]. The different phases that make up this methodology are described in Figure 1.

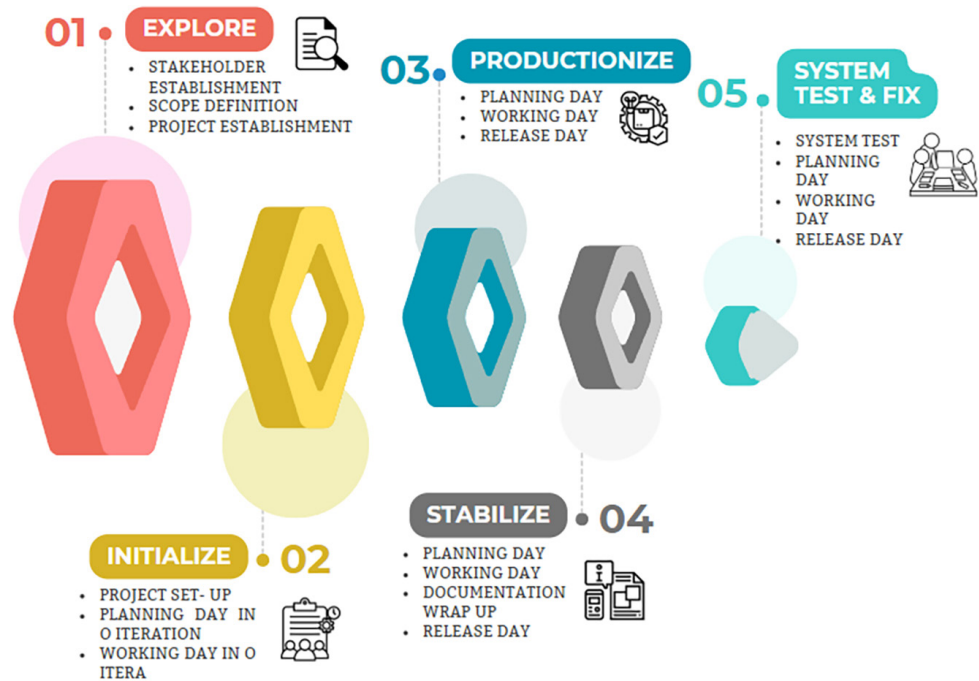


Fig. 1. Phases of the Mobile-D methodology

2.1 Phase 1: EXPLORE

The exploration phase is fundamental to establishing the foundations of a mobile application development project. During this stage, stakeholders are identified and established, and they contribute knowledge and assist in the effective planning of the software product. In addition, the objectives of the project are defined, including the desired scope and functionalities, and the technical and human resources required for its execution are allocated [16].

- **Interest group:** Educational institutions, government agencies, investors, and sponsors.
- **Users of the application:** Students, teachers, and tutors.
- **Developers:** Technical project team, AI specialists, and communication experts.

2.2 Phase 2: INITIALIZE

During the initialization phase, the development team focuses on preparing and identifying all the resources needed for the project. This includes setting up the

technical environment, training the team, and establishing effective communication with the client [17].

Hardware:

- **Servers or cloud** (AWS, Google Cloud, Azure) for processing and storage.
- **Mobile test devices** – Android/iOS smartphones and tablets.
- **Development of computers** – AI and emulation capable.

Software:

- **JavaScript.** It is a programming language used to create interactive web pages, allowing animations, dynamic menus, and real-time updates [18].
- **Meta.** It is a US multinational company that owns and operates platforms such as Facebook, Instagram, and WhatsApp [19].
- **Wasapi.** It is a comprehensive platform that leverages the WhatsApp API, allowing you to manage, automate, and optimize your communications through AI [20].
- **ChatGpt.** It is a language model based on AI, capable of generating and processing text in a coherent way [21].
- **Glitch.** It aims to improve the accessibility and usability of application development in edge computing [22].

2.3 Phase 3: PRODUCTION

The architecture presented in Figure 2 describes the operation of a mobile application with an AI chatbot designed for intelligent tutoring in communication.

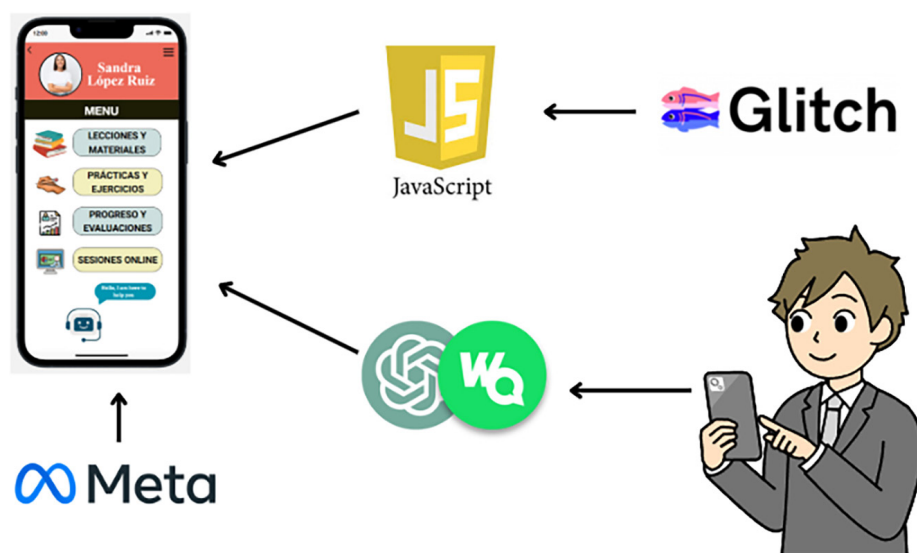


Fig. 2. Application development architecture

The student interacts with the chatbot through a mobile application, which is integrated with Meta, which facilitates communication and the sending of messages. The development of the chatbot is based on JavaScript, allowing the creation of a dynamic and functional interface. Glitch acts as the development and deployment platform, ensuring that the chatbot is online and accessible. ChatGPT is the AI engine responsible for processing learner queries, providing personalized responses, and

enhancing the learning experience. On the other hand, WASAPI is integrated to optimize data management and improve interaction with the AI. Through this architecture, efficient communication between the different elements is guaranteed, enabling intelligent and effective tutoring in real-time.

2.4 Phase 4: STABILIZE

This phase details the interfaces of the application.

Figure 3 depicts the interface of an educational application designed to improve communication through an intuitive and organized experience; the application allows users to manage their learning through tools such as live sessions, study materials, practical exercises, and progress tracking. In addition, it integrates a chatbot assistant to provide real-time support. Figure 3a is the login screen, where the user enters his credentials and registers or retrieves his password. Figure 3b is the main menu, with access to lessons, exercises, assessments, and online sessions, as well as a chatbot assistant. Figure 3c is the online sessions section, with an interactive calendar and quick access to live lessons, tutorials, AI practice, and recordings.



Fig. 3. Interactive platform for communication learning: (a) Login screen, (b) Main menu, and (c) Online sessions' section

Figure 4 shows the interaction with ComuniBot, an educational chatbot designed to improve communication through writing, public speaking, and bodily expression. In Figure 4a, the chatbot guides the user in improving their writing, allowing them to select the type of text to work on and providing structured examples with links to additional resources. In Figure 4b, ComuniBot focuses on public speaking, analyzing audio sent by the user and offering specific suggestions on speaking speed, emphasis on keywords, and clarity of delivery. In Figure 4c, the chatbot works on body language, showing comparative images for the user to identify the best posture for public speaking and receive feedback after sending a photo of their posture.



Fig. 4. Interaction with the chatbot: (a) Improving writing with ComuniBot, (b) Correcting public speaking, and (c) Optimizing posture and body language

2.5 Phase 5: SYSTEM TEST Y FIX

The application was evaluated by 20 teachers from various Peruvian universities and 15 students. The objective of the evaluation was to analyze the application's impact on improving academic performance in the area of communication and identify opportunities for improvement to optimize its functionality and contribute even more to the course's learning.

For this purpose, questionnaires based on the Likert scale were applied to both groups. Table 1 shows the criteria used for the teachers' evaluation, while Table 2 shows the criteria used for the students' evaluation.

Table 1. Teacher evaluation criteria

Criteria	Questions
Usability	Is the application interface intuitive and easy to use?
	Does the chatbot respond clearly and understandably?
	Does the application allow quick access to the necessary functions?
Technology	Does the AI chatbot provide accurate and relevant responses to queries?
	Does the application work without frequent interruptions or errors?
	Is the loading speed of the application adequate?
Innovation	Does the application present novel features compared to other educational tools?
	Does the AI chatbot contribute to a personalized learning experience?
	Do you consider that the use of AI in communication tutoring enhances teaching and learning?

Table 2 evaluates an application according to three criteria: accessibility, design, and security. It considers compatibility, readability, and navigation, as well as aesthetics, visual organization, and data protection. It also looks at authentication methods to ensure user security.

Table 2. Student assessment criteria

Criteria	Questions
Accessibility	Is the application compatible with different devices and operating systems?
	Are the texts and buttons sized to facilitate reading and interaction?
	Is navigation within the application clear and barrier-free for all users?
Design	Is the design of the application attractive and motivating for users?
	Does the combination of colors and typography facilitate reading and comprehension?
	Are the visual elements well organized and not confusing?
Security	Does the application ensure the protection of users' data?
	Does access to the application require secure authentication (password, email, etc.)?
	Are users informed about how their data and privacy are handled?

3 RESULTS

The evaluation of the application made it possible to analyze its impact on teaching and learning and identify areas for improvement to optimize its functioning. The results obtained not only show the application's potential to improve academic performance in the area of communication but also provide valuable information to improve its functionalities and adapt them to users' needs.

3.1 Validation of teachers

Table 3 shows that the validation of the application by 20 teachers obtained an average rating of 4.37 on a Likert scale, indicating a very high perception of its quality. The accuracy of the AI chatbot (4.75) and the clarity of the answers (4.65) are positively highlighted, suggesting that it is a useful and understandable tool.

Table 3. Teacher evaluation results

Criteria	Questions	Media	D.E	Quality
Usability	Is the application interface intuitive and easy to use?	4.40	0.60	Very high
	Does the chatbot respond clearly and understandably?	4.65	0.67	Very high
	Does the application allow quick access to the required functions?	4.50	0.76	Very high
Technology	Does the AI chatbot provide accurate and relevant responses to queries?	4.75	0.55	Very high
	Does the application work without frequent interruptions or errors?	4.20	0.95	Very high
	Is the loading speed of the application adequate?	4.00	0.92	High

(Continued)

Table 3. Teacher evaluation results (Continued)

Criteria	Questions	Media	D.E	Quality
Innovation	Does the application present novel features compared to other educational tools?	4.50	0.69	Very high
	Does the AI chatbot contribute to a personalized learning experience?	4.30	0.86	Very high
	Do you consider that the use of AI in communication tutoring enhances teaching and learning?	4.00	0.65	High
Total		4.37	0.74	Very high

Figure 5 shows that the majority of teachers rate usability, technology, and innovation at high levels (4 and 5 on the Likert scale), with usability (61.7%) as the highest rated criterion and technology (26.7%) having the highest proportion at fair, indicating possible improvements. In general, the results reflect a positive perception, with few evaluations at low levels (1 and 2).

Evaluation Results by Teachers - 3D Bar Chart

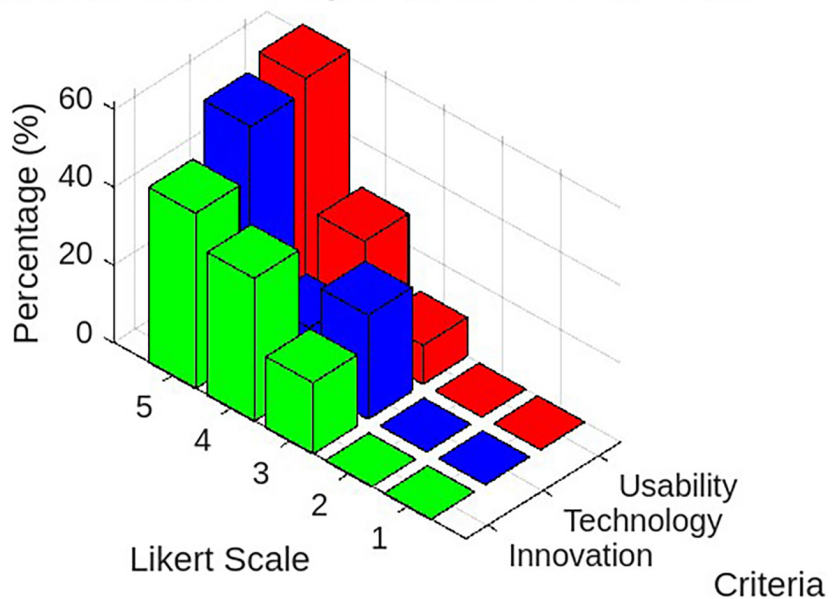


Fig. 5. Results of the evaluation of teachers' criteria

3.2 User validation

Table 4 presents the results of the validation of the application by 15 students, with an average score of 4.39 on a Likert scale, indicating a very high rating. The highest-rated aspects include the organization of visual elements (4.87) and clarity of navigation (4.47), suggesting that the interface is intuitive and facilitates the user experience.

Table 4. Student assessment results

Criteria	Questions	Media	D.E	Quality
Accessibility	Is the application compatible with different devices and operating systems?	4.00	0.85	High
	Are the texts and buttons sized to facilitate reading and interaction?	4.40	0.91	Very high
	Is navigation within the application clear and barrier-free for all users?	4.47	0.74	Very high
Design	Is the design of the application attractive and motivating for users?	4.40	0.83	Very high
	Does the combination of colours and typography facilitate reading and comprehension?	4.40	0.91	Very high
	Are the visual elements well organised and not confusing?	4.87	0.35	Very high
Security	Does the application ensure the protection of users' personal data?	4.27	0.70	Very high
	Does access to the application require secure authentication (password, email, etc.)?	4.67	0.49	Very high
	Are users informed about how their data and privacy are handled?	4.00	0.85	High
Total		4.39	0.74	Very high

Figure 6 shows the evaluation of three main criteria: accessibility, design, and security, using a Likert scale from 1 to 5. It can be seen that the majority of responses are concentrated in levels 4 (Good) and 5 (Very Good), indicating a generally positive perception. Overall, the distribution of the data reflects that students have a favorable assessment of the criteria evaluated.

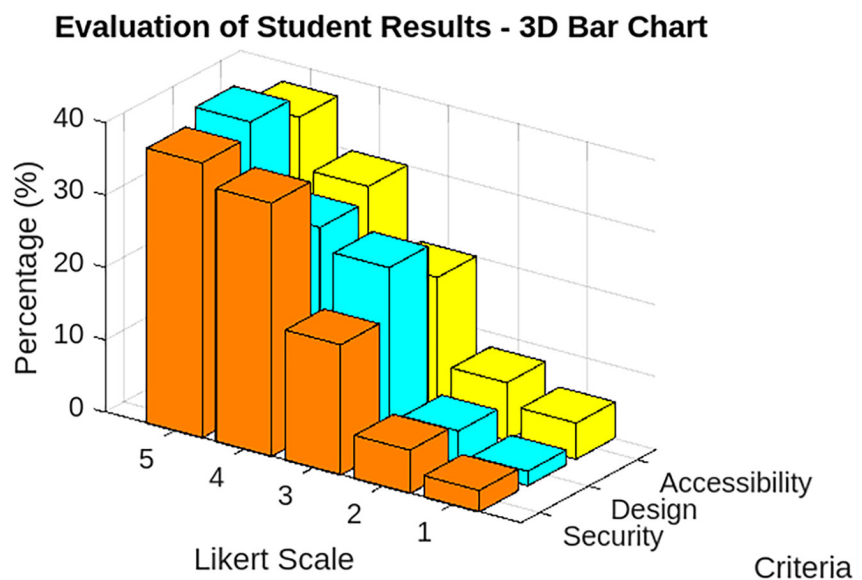


Fig. 6. Student criteria evaluation results

4 DISCUSSION

The AI chatbot mobile application for intelligent tutoring in communication stands out from previous studies by combining AI, personalized learning, and accessibility without relying on human tutors or expensive technology. In contrast to intelligent tutoring systems (ITS) [10], which model teaching dynamically, the AI chatbot enables continuous real-time interaction, improving reading and writing comprehension by at least 65%, according to similar studies. Versus Smart Tuition Finder [11], which connects students with tutors via geolocation and achieved an 85% approval rating in a beta test with 100 students, is an AI chatbot that provides automated and immediate tutoring, eliminating reliance on physical tutors and extending its reach to more simultaneous users. Compared to the augmented reality application for Peruvian Sign Language (PSL) [12], which reduced study time from 132.67 to 44.63 hours and improved the level of information from 2.27 to 9.07 points, the chatbot improves communication skills with personalized and accessible feedback at any time. The virtual assistant in Telegram [13], which was evaluated by 60 students with scores above 3 on a scale of 1 to 5 for ease of use and quality of responses, the AI chatbot specializes in education and learning monitoring, offering an innovative and effective solution for improving student communication. Furthermore, unlike previous studies, this application implements the Mobile-D methodology, allowing agile and structured development, obtaining scores of 4.37 and 4.39 respectively, on a Likert scale, which demonstrates its high level of acceptance and usefulness in the educational field.

5 CONCLUSION

The study concludes with the development of a prototype mobile application with an IA chatbot for intelligent tutoring in communication. This prototype stands out for its usability, technology, innovation, accessibility, design, and security, offering tangible benefits to students. Its implementation promotes a personalized and efficient learning experience, facilitating access to educational resources and improving the interaction between users and the system. To achieve this goal, the Mobile-D methodology was applied, a specific agile approach to development, allowing for an iterative and user-centered implementation. However, limitations were identified related to the ability to process on low-end devices, the need for a stable internet connection for the optimal functioning of the chatbot, and the integration with existing educational platforms.

Future improvements could therefore include IoT connectivity for greater interaction with smart devices and the integration of renewable energy to maximize its impact in terms of sustainability and operational efficiency.

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