

## PAPER

# Mobile eLearning Application with Chatbot and AI as Student Academic Mentor

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## ABSTRACT

The gap in education is centered on access to inter-active and accessible educational tools for all, however, it is changing thanks to globalization and technological advancement with new tools that promote continuous learning. A prototype of a mobile application with an artificial intelligence (AI) chatbot for academic mentoring has been developed. For this purpose, the ADDIE methodology was used, as it provides a structured and flexible framework that allows the development to be adjusted to the changing needs of the project. The prototype facilitates access to academic resources, resolves concerns immediately and offers personalized support to optimize the educational experience. The quality of the prototype was evaluated by experts and users, who appreciated its technology, relevance, integration, usefulness, satisfaction and mentoring, obtaining an average score of 4.47 and 4.48 respectively, which reflects a high level according to the criteria established to improve the educational experience.

## KEYWORDS

chatbot, artificial intelligence (AI), e-Learning, education, technology

## 1 INTRODUCTION

The integration of artificial intelligence (AI) in education globally is undergoing a remarkable transformation, driven by technological advancement and the growing impact of globalization [1]. According to the Organization for Economic Co-operation and Development (OECD), this change is creating new challenges for traditional education, especially in terms of adaptability for both students and teachers [2]. Furthermore, the integration of new learning tools and emerging technologies is reshaping educational methods and creating the need for constant adjustments to cope with these new realities [3]. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), 10% of educational institutions, such as schools and universities, apply formal guidelines on the use of popular AI tools, such as ChatGPT [4]. In response, UNESCO met with more than 40 education ministers to discuss both the benefits and risks of AI in education [5]. Since then, universities in different countries have adopted

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more flexible platforms, allowing students to better adapt to the academic, emotional and social challenges they face [6]. In which China stands out, which has integrated ChatGPT into its education system with the aim of improving interaction between teachers and students. This implementation seeks to personalize the educational experience and automate the teaching-learning process [7]. In this context, in order to facilitate communication, OpenAI developed in 2022 a language model based on the Transformer architecture, designed for natural language processing (NLP) called ChatGPT [8]. This language model allows interaction through questions and answers from various public sources [9]. It also has the ability to generate scientific summaries from invented content, with 68% of the texts being correctly identified as produced by AI [10]. For this reason, the need for the integration of e-learning with AI chatbots has been identified [11]. A chatbot is a computer program designed to simulate conversations with human users, especially in online environments. Thanks to AI and NLP, it has the ability to understand and answer questions efficiently to the user [12]. In this context, research indicates that the integration of emerging technologies in higher education brings about significant changes. A recent study [13] investigated the adoption of chatbots by post-graduate students in Lesotho. Using a quantitative approach based on questionnaires and structural equation modeling (SEM) analysis, the results highlight the importance of perceived advantages and compatibility. However, usefulness and ease of use did not show a significant direct relationship with chatbot adoption. The conclusion underlines the need to consider other factors in the adoption process. Furthermore, the study [14] investigated the use of AI chatbots in teaching English as a foreign language, analyzing the perceptions of 237 learners from Spain and the Czech Republic. Using a mixed approach, including the CHISM model and statistical analysis (SPSS and QDA Miner), the linguistic and technological characteristics of the chatbots were evaluated. The results showed moderate satisfaction, highlighting the need to improve personalization and voice technologies. On the other hand, the article [15] examined the development of a prototype of conversational agents (CA) with logic tailored to different personality styles. It used research meetings to extract data on these styles and applied a personalized approach to CA responses. The methodology included assessing personality descriptions and adapting the CA. The aim was to improve educational interaction through personalized communication, highlighting the innovation in personality-centered design and its potential to enrich the educational experience. However, the study [16] evaluated an AI chatbot platform in the "Line" application to support admissions decisions at the Railway Technical College in Bangkok. It was found that 86.15% of users make decisions based on the chatbot's suggestions, with high overall satisfaction. The platform proved to be effective and accurate in personalizing educational recommendations. On the other hand, the research [17] incorporated mobile technologies in higher education by developing the MoILCaps application, designed to improve the information literacy of Social Science students. A self-learning tool was created based on cognitive, constructivist, and connectivist theories, using ADDIE methodology for its development. The progressive web application includes two assessments with an overall rating score of 3.85 aligned with the ACRL framework and proved to be effective in teaching LFLE by offering an enhanced user experience. It was concluded that MoILCaps is a valuable and flexible tool, highlighting the importance of libraries and teachers in information literacy. The purpose of this study is to develop a prototype of a mobile application with a chatbot based on AI for academic mentoring. Being evaluated by both experts and users in order to improve the educational experience of students, facilitate access to academic resources, answer questions immediately, and offer personalized support during the educational process. In addition, it aims to assess the impact of this technology on motivation, academic performance, and user satisfaction, as well as its

ability to complement or replace traditional methods. The paper is organized as follows: Section 2 details the methodology employed for the development and evaluation of the prototype. Section 3 presents the results and discussions derived from the evaluation of the prototype. Section 4 presents the research discussions, Finally, Section 5 concludes with conclusions and recommendations for future research.

## 2 METHODOLOGY

The ADDIE methodology consists of five well-structured phases: analysis, design, development, implementation, and evaluation, which follow a logical and progressive process focused on user requirements and project objectives as specified in the study [18]. Its flexibility allows for modifications at any stage, while its interactive approach ensures constant improvements [19]. Figure 1 illustrates the above-mentioned phases.

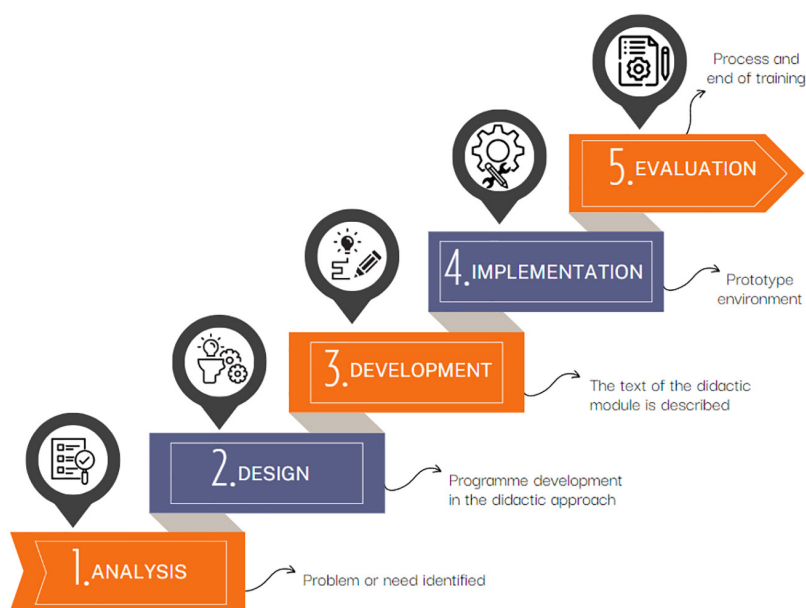


Fig. 1. Phases of the Addie methodology

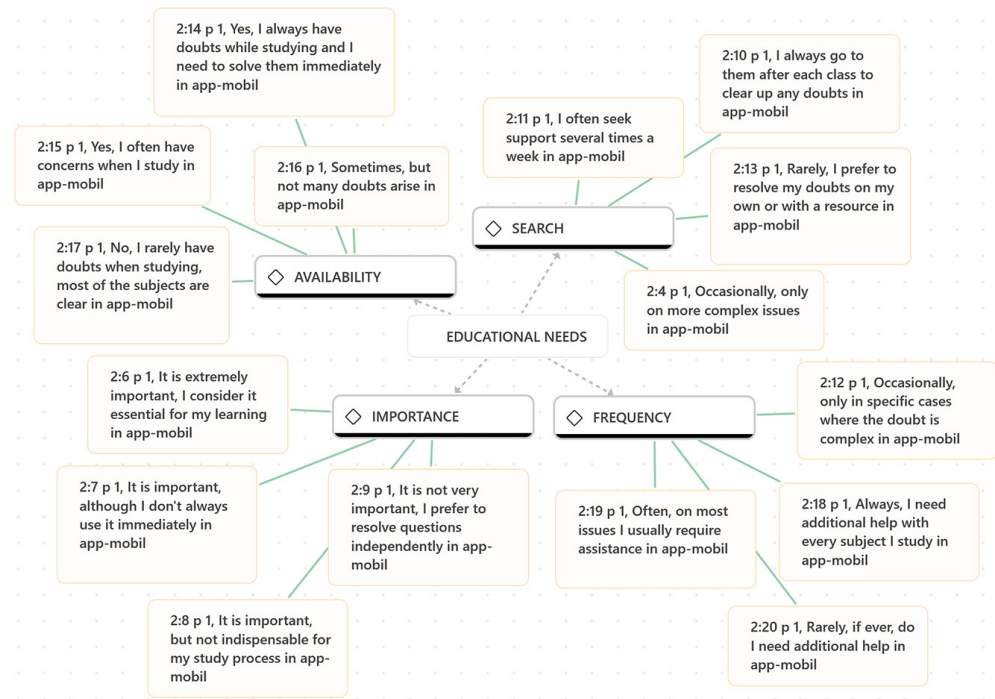
### 2.1 Analysis

In this initial phase of the methodology, the focus is on defining the main objective of the mobile application and identifying the specific needs of the education sector, especially those of the students. This stage is fundamental, as it establishes the necessary scopes to ensure the success of the following phases. It is also essential to clearly define the target audience of the prototype in order to start the design.

- **Aim:** To provide an academic mentor to support students in their educational progress by asking questions, providing resources, and mentoring tailored to their individual performance.
- **Needs:** Through the questionnaire presented in Table 1 and the responses organized in an Atlas Ti scheme data analysis tool [20] in Figure 2, it was identified that students need continuous accompaniment from a mentor who provides immediate feedback on academic content and is available 24 hours a day.
- **Target audience:** Higher education students who lack an academic mentor.

**Table 1.** Questionnaire

No	Questions
1	How often do you need additional help with academic content?
2	How important is it for you to have a mentor available to answer immediate questions?
3	How often do you seek help from a counselor or teachers to solve doubts after the end of the lessons?
4	Do you often have doubts and concerns about the content of your courses when studying?



**Fig. 2.** Organization of questionnaire responses in Atlas Ti

## 2.2 Design

In this second phase of the study, the functionalities and structure of the mobile application have been defined, ensuring the necessary technological resources to carry out the implementation and that it meets the user’s expectations.

Main functionalities:

- **Chatbot con IA:** Facilitates answers to course questions, offers tutorials, and evaluates academic performance to provide study suggestions.
- **Virtual mentor:** It plays the role of a traditional tutor, guiding the student through the course material and assisting with questions and explanations.
- **Personalized recommendations:** Oriented to the student’s progress, the system suggests study modules, exercises, and readings adapted to the student’s needs.
- **Analysis of academic performance:** It focuses on monitoring student progress through rapid assessments and feedback, adjusting the content to the needs of the teacher’s material.

Structure of the content:

- **User interface:** The application will display an initial menu with options leading to your full campus, digital ID card, library, and reservations.

- **Conversational flows:** Depending on the student's question, the chatbot will offer step-by-step explanations, linking resources, videos, or examples according to the teacher's material or information requested by the student.

Integration of E-learning, AI, and Chatbot: The application will be designed to provide the student with access to all the information needed to solve their doubts. In addition, it will offer quick access to the student's essential resources, keeping them up to date on all their educational activities, which will facilitate their professional success.

## 2.3 Development

In this third phase, the ideas and functions of the application are organized. Figure 3 shows the architecture of the proposed application.

Tools used:

- Meta: Focused on the creation of virtual and augmented reality.
- JavaScript: Programming language for the development of web and mobile applications. Allows interaction with APIs and interactive functions.
- Wasapi: Allows advanced processing and audio synthesis in web browsers.
- Glitch: Platform that allows the creation of prototypes.
- ChatGpt: Language based on OpenAI.

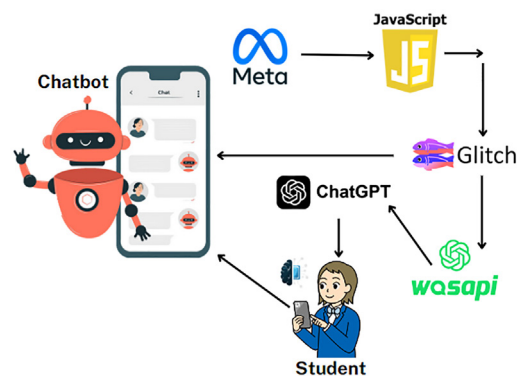


Fig. 3. Architecture of the proposed application

The project focuses on the development of a mobile application designed to optimize educational efficiency, facilitating access to academic resources and resolving students' doubts and concerns. An interactive and automated system has been implemented that allows the chatbot to evaluate student responses in real time. The interaction flow is oriented to cover programming and e-learning topics, using a dynamic database. The development environment of the application is based on Meta, using the WhatsApp API for interaction, and connecting to the Glitch web server, programmed in JavaScript. In addition, the Wasapi premium account is integrated, to which ChatGPT is added to provide AI-driven responses.

## 2.4 Implementation

During this phase, prototypes of the application were developed. Figure 4 illustrates the initial stage, showing both the login screen and the front page of the mobile application. Figure 4a shows the login screen, from which the user can access the

system. After logging in, the user is directed to the login screen, where he/she must enter his/her username and password to advance to the main home page. On this front page, visible in Figure 4b. Finally, Figure 4c shows the main screen, which offers access to the most important functions for the student, such as courses, timetables, exams, payments, virtual classes, and the chatbot, and a menu of further options.



Fig. 4. Login interfaces: (a) Home, (b) Login, (c) Home page

Figure 5 presents various interfaces of the e-learning platform, designed to provide the learner with access to key data, information, and resources. Figure 5a shows the course screen, where the student can access the resources provided by the lecturer in charge of the subject. Figure 5b presents a detailed list of payments, with the option to make payments immediately.



Fig. 5. Interfaces of the e-learning platform to access learner information, (a) Courses, (b) Payments

Figure 6 presents the Mentor Chatbot interfaces. Figure 6a shows the chatbot screen for consulting the timetable. Figure 6b shows how the chatbot provides useful resources for the student related to exams. Figure 6c shows the chatbot’s function for handling academic average queries.

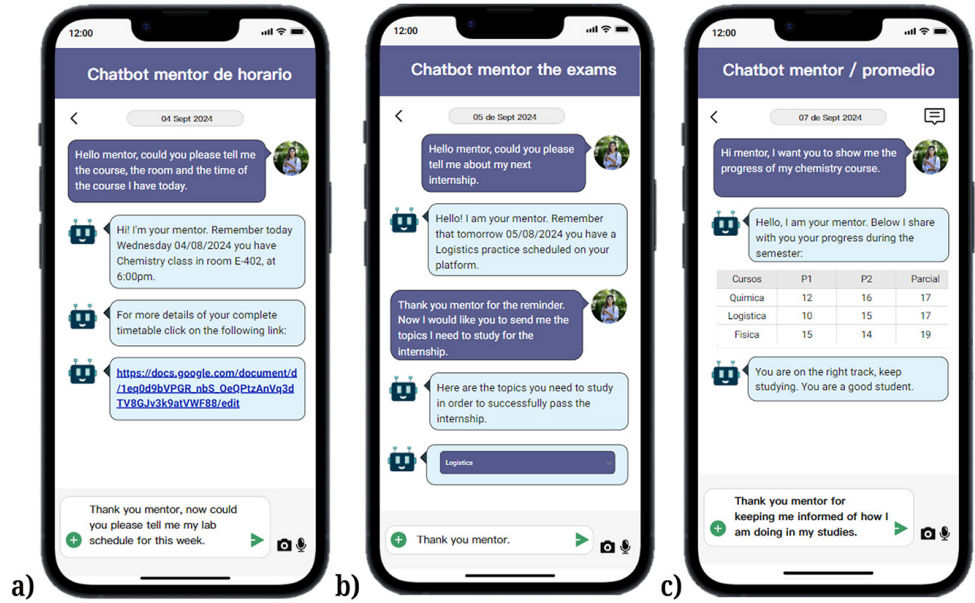


Fig. 6. Chatbot Mentor interfaces, (a) Chatbot Mentor Schedule, (b) Chat Mentor exams, (c) Chat Mentor averages

### 2.5 Evaluation

For the evaluation of the system, 12 specialists from different universities in Peru participated, along with 25 higher education students, all residents of Lima, Peru, aged between 20 and 25 years old. The evaluation was carried out by means of questionnaires based on the Likert scale. The evaluation parameters are presented in Tables 2 and 3.

Table 2. Expert assessment criteria

Criteria	Aspects
Technology	How would you rate the flexibility of the system to work with new user interfaces based on academic mentoring?
	How do you assess the ability to integrate with augmented reality?
	How would you rate the transparency and fluidity of the Chatbot’s communication with the student?
Relevance	How do you rate the ability to correctly identify and prioritize the most relevant information for each student?
	How well does the information provided by the Chatbot and AI align with the student’s academic priorities?
	How would you rate the effectiveness of the system in personalizing recommendations based on student data priorities?
Integration	How do you evaluate the integration of the Chatbot and AI with other learning management systems and student data?
	How adaptable do you think it is to adjust to changes in student priorities?
	How would you rate the chatbot and AI as an academic mentor?

**Table 3.** User evaluation criteria

Criteria	Aspects
Usability	How easy is it for you to access priority academic information?
	How would you rate the effectiveness of providing you with the most relevant information?
	To what extent do you think it makes it easier to manage your educational priorities?
Satisfaction	How satisfied are you with the personalization of information and recommendations provided by Chatbot mentor?
	How would you rate the relevance of the academic resources of the mobile application?
	How well do you feel the Chatbot mentor understands and responds to your needs?
Mentoring	How much does the Chatbot mentor influence your time optimization?
	How comfortable are you with the management and protection of mentor chatbot information?
	How would you rate the chatbot mentor for your academic training?

### 3 RESULTS

**Validation of the design with experts.** This section presents the results obtained during the validation of the design, which was carried out with the collaboration of 12 specialists from different universities in Peru. For this validation, several criteria were considered, such as technology, relevance, and integration. Based on these criteria, questions were formulated using a Likert scale to evaluate the level of acceptance by the experts. Table 4 details the criteria evaluated, the questions corresponding to each, and the results, expressed in terms of mean and standard deviation (S.D.). The overall mean was 4.47, indicating that the quality of the prototype is evaluated as very good. According to the previously established quality range: 1 = very low, 2 = low, 3 = fair, 4 = high, and 5 = very high.

**Table 4.** Validation by specialists

Criteria	Aspects	Media	D.E	Quality
Technology	How would you rate the flexibility of the system to work with new user interfaces based on academic mentoring?	4.25	0.45	High
	How do you assess the ability to integrate with augmented reality?	4.42	0.79	High
	How would you rate the transparency and fluidity of the Chatbot's communication with the student?	4.42	0.67	High
Relevance	How do you rate the ability to correctly identify and prioritize the most relevant information for each student?	4.50	0.67	Very High
	How well does the information provided by the Chatbot and AI align with the student's academic priorities?	4.50	0.51	Very High
	How would you rate the effectiveness of the system in personalizing recommendations based on student data priorities?	4.75	0.45	Very High
Integration	How do you evaluate the integration of the Chatbot and AI with other learning management systems and student data?	4.25	0.62	High
	How adaptable do you think it is to adjust to changes in student priorities?	4.67	0.49	Very High
	How would you rate the chatbot and AI as an academic mentor?	4.42	0.51	High
Total		4.47	0.51	High

The graph presented in Figure 7 reveals that the criterion most highly rated by experts is relevance, with 86.1% rating it as “Very High.” This is followed by technology with 72.2% and integration with 63.9%. These percentages clearly highlight the strengths of the prototype in the different criteria evaluated, with approval scores of more than 50%, and at the same time point to the areas with the greatest opportunity for optimization.

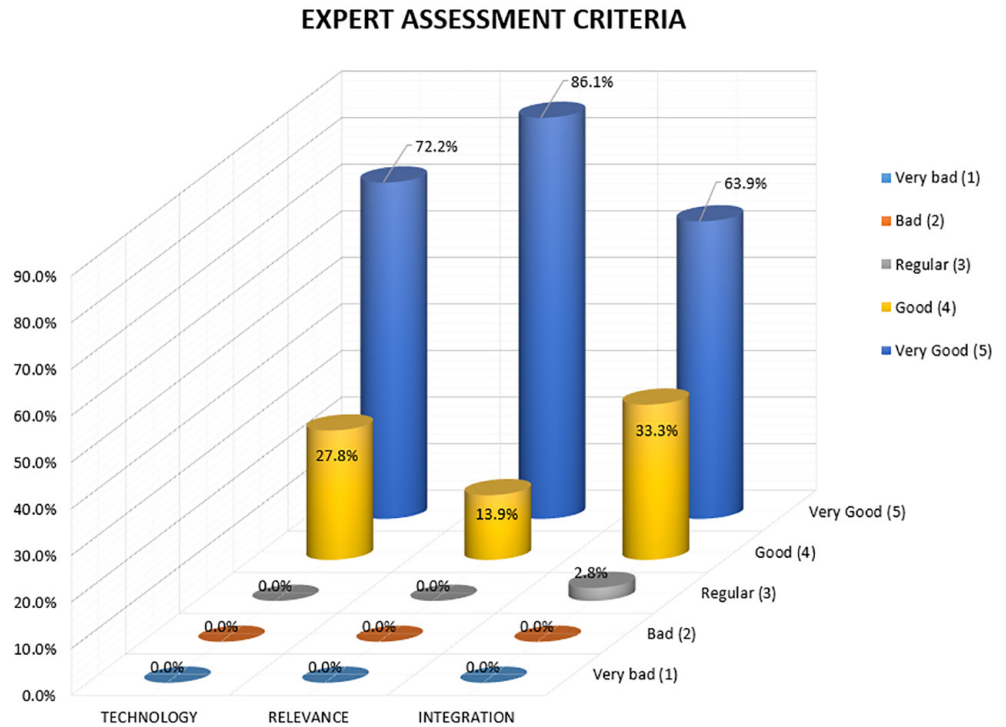


Fig. 7. Summary of criteria

**Validation of the design with users.** In addition to validation by subject matter experts, a usability analysis (SUS) was carried out. This study facilitated the identification and correction of possible failures in the functioning of the system, in addition to assessing the level of user satisfaction with the application. For this process, 25 university students participated. A Likert scale was used to evaluate the criteria, in which the response options were: 1 = very low, 2 = low, 3 = fair, 4 = high and 5 = very high.

Table 5. Validation by users

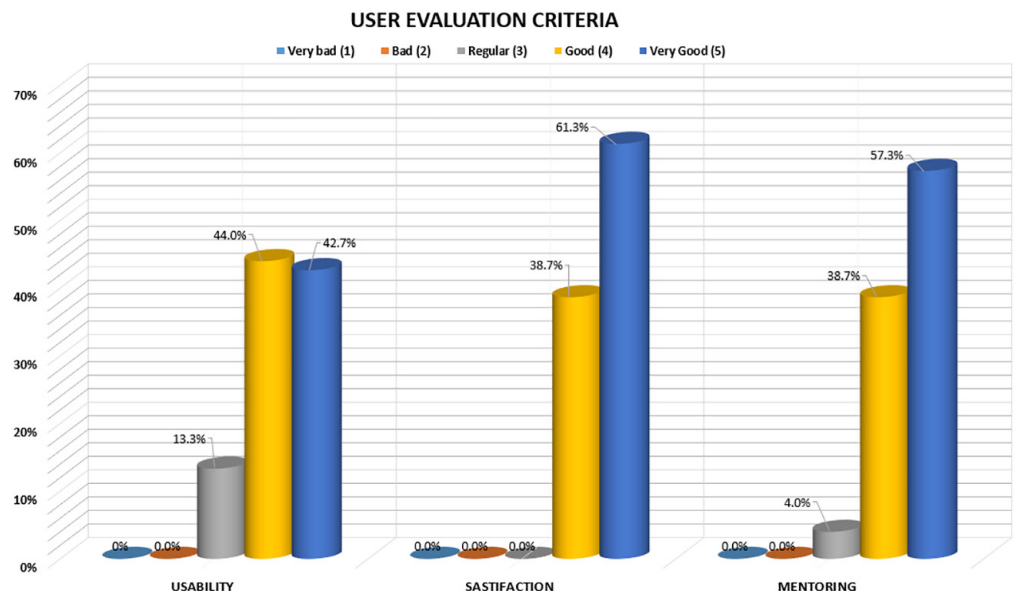
Criteria	Aspects	Media	D.E	Calidad
Usability	How easy is it for you to access priority academic information?	4.32	0.56	High
	How would you rate the effectiveness of providing you with the most relevant information?	4.40	0.71	High
	To what extent do you think it makes it easier to manage your educational priorities?	4.16	0.80	High
Satisfaction	How satisfied are you with the personalization of information and recommendations provided by Chatbot mentor?	4.60	0.50	Very High
	How would you rate the relevance of the academic resources of the mobile application?	4.56	0.51	Very High
	How well do you feel the Chatbot mentor understands and responds to your needs?	4.68	0.48	Very High

(Continued)

**Table 5.** Validation by users (*Continued*)

Criteria	Aspects	Media	D.E	Calidad
Mentoring	How much does the Chatbot mentor influence your time optimization?	4.44	0.65	High
	How comfortable are you with the management and protection of mentor chatbot information?	4.64	0.57	Very High
	How would you rate the chatbot mentor for your academic training?	4.52	0.51	Very High
Total		4.48	0.59	High

The evaluation of the quality of the prototype was carried out by calculating the average of the selected criteria for the users. As illustrated in Figure 8, the highest percentages obtained for each criterion are: usability (44.0%), satisfaction (61.3%), and mentoring (57.3%). These results reflect that the quality of the mobile application is favorable, with an overall average of 4.48. It is important to note that for the app to be considered viable, its average score must exceed a value of 4.

**Fig. 8.** Summary of criteria

## 4 DISCUSSION

After the implementation of the mobile application developed with a chatbot powered by AI for academic mentoring, focused on a friendly educational experience, a quantitative value-rated rubric (Likert scale) for experts and users was used to evaluate the level of technology, relevance, integration, usability, satisfaction, and mentoring, obtaining an average score of 4.47 and 4.48, respectively, which reflects a high level according to the established criteria. However, the literature indicates that satisfaction with chatbots can vary depending on a number of factors. A study in Lesotho [12] highlighted that, despite the positive perception of advantages and compatibility, usefulness and ease of use did not show a significant relationship with the adoption of chatbots. On the other hand, research in the field of teaching English

as a foreign language [13] showed moderate satisfaction with chatbots, highlighting the need for improved personalization and voice technologies. This conclusion aligns with the personalization approach observed in the study on conversational agents tailored to personality styles [14], which underlines the importance of adapting interactions to users' individual characteristics to improve the educational experience. The study on the AI chatbots platform in the "Line" application [15] showed high satisfaction and a positive impact on decision-making, with 86.15% of users basing their decisions on the chatbot's recommendations. Finally, the development of MoILCaps [16], with an overall evaluation score of 3.85, demonstrates that, although the application offers an improved user experience and is valuable for information literacy, there are still areas of opportunity to improve its effectiveness and adaptability.

## 5 CONCLUSION

This study culminates in the development of a prototype mobile application that incorporates an AI-powered chatbot for academic tutoring. The prototype stands out for its efficient use of AI, as well as its intuitive design, good usability, and functionality, providing students with continuous 24-hour assistance. Its implementation facilitates access to academic resources, offers quick answers to pre-questions, and provides personalized support during the educational process. In addition, it allows the evaluation of how this technology influences motivation, academic performance, and user satisfaction, as well as the optimization of time in the management and implementation of educational strategies. The ADDIE methodology was crucial in providing an effective structure and approach to the development of the project. Achieving approval by experts and users, in that sense, it is recommended to carry out future studies that develop technology integration interfaces that are favorable in education.

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