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ABED

ORIGINAL ARTICLE

# **Use of Artificial Intelligence through Chatbot:** Students' Perception in a Family Health Specialization Course

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## ABSTRACT

To assess the use of Artificial Intelligence through a Chatbot in interacting with students in a Family Health specialization course. Methods: Technological, descriptive, and exploratory study with a mixed-methods approach, conducted with a convenience sample of 53 students. The Chatbot was implemented to evaluate usability and communication effectiveness with participants, including a pilot test followed by full implementation. Analysis was based on a Likert scale questionnaire, presenting results as means and standard deviations. Results: The analysis revealed patterns in students' academic performance, with positive responses regarding the Chatbot's responsiveness, student motivation to seek information, and overall user experience. Conclusion: The Chatbot proved effective in promoting greater engagement between students and tutors, indicating that student-centered pedagogical approaches supported by Artificial Intelligence have the potential to enhance academic experiences and professional training in Family Health.

**Keywords:** Artificial Intelligence; Machine Learning; Human Resources Training in Health; Distance Education.

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# **Utilização de Inteligência Artificial por Chatbot:** a percepção dos estudantes em um Curso de Especialização em Saúde da Família

**RESUMO**

Avaliar o uso de Inteligência Artificial por meio de um Chatbot na interação com estudantes em um curso de especialização em Saúde da Família. Métodos: Estudo tecnológico, descritivo e exploratório, com abordagem quali-quantitativa, realizado com amostra por conveniência de 53 estudantes. O Chatbot foi implementado para avaliar a usabilidade e a eficácia da comunicação com os participantes, com um teste piloto seguido de implantação. A análise baseou-se em um questionário com escala Likert, apresentando resultados em médias e desvios padrão. Resultados: A análise revelou padrões no desempenho acadêmico dos estudantes, com respostas positivas em relação à prontidão do Chatbot, à motivação dos estudantes em buscar informações e à experiência de uso. Conclusão: O Chatbot demonstrou-se eficaz ao promover maior engajamento entre estudantes e tutores, evidenciando que abordagens pedagógicas centradas no estudante, apoiadas por Inteligência Artificial, têm potencial para enriquecer as experiências acadêmicas e a qualificação profissional em Saúde da Família.

**Palavras-chave:** Inteligência Artificial; Aprendizado de Máquina; Capacitação de Recursos Humanos em Saúde; Educação a Distância.

# **Uso de Inteligencia Artificial a través de Chatbot:** La Percepción de los Estudiantes en un Curso de Especialización en Salud Familiar

**RESUMEN**

Evaluar el uso de Inteligencia Artificial a través de un Chatbot en la interacción con estudiantes en un curso de especialización en Salud Familiar. Métodos: Estudio tecnológico, descriptivo y exploratorio con un enfoque de métodos mixtos, realizado con una muestra de conveniencia de 53 estudiantes. El Chatbot fue implementado para evaluar la usabilidad y la efectividad de la comunicación con los participantes, con una prueba piloto seguida de la implementación completa. El análisis se basó en un cuestionario de escala Likert, presentando resultados en medias y desviaciones estándar. Resultados: El análisis reveló patrones en el desempeño académico de los estudiantes, con respuestas positivas en cuanto a la prontitud del Chatbot, la motivación de los estudiantes para buscar información y la experiencia de uso en general. Conclusión: El Chatbot demostró ser eficaz al promover un mayor compromiso entre estudiantes y tutores, lo que indica que los enfoques pedagógicos centrados en

el estudiante y apoyados por Inteligencia Artificial tienen el potencial de enriquecer las experiencias académicas y la capacitación profesional en Salud Familiar.

**Palabras clave:** Inteligencia Artificial; Aprendizaje Automático; Capacitación de Recursos Humanos en Salud; Educación a Distancia.

## 1. Introduction

The university teaching-learning process, aimed at professional qualification, is closely linked to the quality of communication among participants, particularly in the context of Virtual Learning Environments (VLEs), where it is essential to promote more dynamic interaction among those involved (Yildirim, 2017). In this sense, ensuring greater student engagement in all educational activities represents an approach that overcomes limitations in engagement (Reilly et al., 2021).

According to Dede et al. (2019), the convergence of technology-rich activities represents a well-established trend in academic environments, allowing diversity to embrace the digital age of the current generation. Today's students show a preference for and proficiency in digital technologies, experiential learning, and immediacy in communication. In this context, the comprehensive use of Information and Communication Technologies (ICT) in university courses becomes crucial for fostering students' commitment to the learning environment.

Guiding future professionals toward competent practice requires the experience of effective real-time communication, currently mediated by technologies (Awidi et al., 2019). The scientific community has presented encouraging results regarding the use of ICT in online university environments, where immediate feedback among users stands out as an effective strategy for improving engagement, self-confidence, and reducing dropout rates (Reilly et al., 2021).

In this perspective, the complexity of Distance Education (DE) involves challenges in course management, the creation of instructional materials, pedagogical adaptation, the use of communication technologies, and student monitoring. These factors require interactive content, virtual environments that promote interaction, and technical support. Thus, DE creates opportunities for innovation and continuous improvement in teaching, in which technology can play a transformative role.

Artificial Intelligence (AI), for example, can support the responsibilities of tutors and instructors by grading assignments, analyzing profiles, supplementing discussions, and providing student support on a much larger scale. These functionalities make AI a versatile technology applicable to various aspects of distance education. The ability to recognize patterns of behavior, make predictive assessments, and provide continuous interaction are examples of AI's diverse potential. Additionally, AI uses advanced algorithms and large volumes of data to perform tasks that would traditionally require human intelligence, such as learning and decision-making.

According to International Business Machines (IBM, 2021), "AI leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind." Over time, this technology has evolved and adapted to different scenarios, such as Chatbot systems.

Chatbots are programs that use AI to communicate with users in natural language, simulating human interactions. These tools are particularly useful in education, supporting virtual learning environments where users can seek information and resolve queries in real time. The chatbot can be integrated with platforms such as Google's Dialogflow, IBM's Watson Conversation, and Amazon's Alexa, enhancing communication and facilitating access to knowledge (Tamayo et al., 2020).

Machine Learning, an essential aspect of AI, enables systems to learn and adapt based on the data provided, without explicit programming for each task. This process uses algorithms to identify patterns, making chatbots more accurate and, over time, providing a personalized experience. This capability allows for effective and contextually relevant responses, aligning with the learning and needs of students.

In the university context, the use of this technology still presents various reports in the literature (Wollny et al., 2021). In a study where students interacted daily with a chatbot system via the web, the authors indicated a neutral assessment of the experience but recognized the technology's potential for future improvements (Thomas, 2020). Another study showed a significant increase in task-related behaviors by students, highlighting the chatbot as a promising tool in supporting teaching and learning in Distance Education (Siddique, 2021).

A study conducted in Spain implemented the progressive digitalization of teaching materials and tools in Distance Education, using a virtual assistant in the form of a chatbot. Since 2017, the authors reported positive results, which led to the adoption of this technology following detailed analyses of its performance and utility, as well as consideration of the role of instructors in the implementation of this technological innovation (Tamayo et al., 2020).

In a literature review, the authors highlighted that the growth of the mobile device market has driven the use of chatbots to enhance user interaction. The research, which examined 47 educational chatbots, revealed that although this technology is still in its early stages, it has the potential to evolve into an AI-powered teaching assistant (Smutny; Schreiberova, 2020).

The current literature has fostered discussions and discoveries aimed at improving the integration of these resources into educational practices within virtual environments (Awidi; Paynter; Vujosevic, 2019; Siddique; Chow, 2021). In this context, the experience with educational technologies at the Federal University of São Paulo (Unifesp) has been essential for their application in various academic approaches and activities.

As a participant in the collaborative network Universidade Aberta para o Sistema Único de Saúde (UNA-SUS) since 2009, Unifesp has offered Specialization and Professional Development courses, with a particular emphasis on the lato sensu course in "Family Health." Based on the premises discussed, the present study aims to evaluate the implementation and use of AI through a

chatbot in the Family Health Specialization Course, offered in the Distance Education (EaD) modality by the institution, in partnership with the UNA-SUS network.

## 2. Methodology

This is a technological experience report of a descriptive and exploratory nature, with a quali-quantitative observational approach. It was conducted based on the experiences of students and tutors from the 17th edition of the Family Health Specialization Course (ESF17) UNA-SUS Unifesp, between August 2021 and December 2022. The study was approved by the Research Ethics Committee of Unifesp, under number 4.925.046, CAAE: 46778121.9.0000.5505.

It is important to note that the quali-quantitative approach integrates both qualitative and quantitative methods to enhance the understanding of a phenomenon. While the quantitative approach analyzes numerical data to identify patterns, the qualitative approach delves into experiences and contexts, providing a richer and more detailed perspective. This combination allows for more robust and triangulated analyses (Creswell, 2010).

The study population consisted of students enrolled and active in the aforementioned edition of the course. The sample, selected for convenience, included 53 students, and the Informed Consent Form was provided at the beginning of the study as an inclusion criterion.

The 17th edition of the course, which served as the setting for the study, has undergone continuous improvements over the years, aiming to promote a broader engagement of professionals, greater autonomy, and interaction among the coordination team, production, students, and tutors. The course features a complex organizational, pedagogical, and technological structure, developed within the Moodle® VLE (Modular Object-Oriented Dynamic Learning Environment). The methodology adopted in ESF17 and other offerings includes problem-based approaches that encourage reflection and practical qualification throughout the learning process. The learning situations were planned and developed for the EaD context, considering the principles of Primary Health Care (PHC). The collaborative method is one of the foundational principles in the production stages, fostering learning in a virtual environment, enabling the creation of pathways for knowledge exchange, and addressing the individual interests and needs of the students.

The ESF17 course totals 420 hours, divided into the following modules: Introduction to the Virtual Platform, Public Health Policies and Primary Health Care, Social Determinants of Health, Care Management and Family Approach, Health Services Planning and Management, Clinical Practice Management, Communication Skills, Person-Centered Clinical Method, Comprehensive Care, Intervention Project (Final Course Work), and Elective Modules.

The methodological phases included: 1.Development of the Chatbot system: Implementation in the course using the Dialogflow® tool, including configuration, usability, integration with the Moodle environment, and functionality testing. 2. Conversion of theoretical content into a question-

and-answer format: Adaptation for AI using natural language processing (NLP). This process was carried out with the help of a tutoring specialist to ensure the relevance and clarity of the responses. 3. Design and navigability: The chatbot, named "George," was integrated into all course pages. When hovering over the icon, students receive a brief description of how to use it. 4. Pilot testing: Implementation with the "Sandra and Sofia" Knowledge Module of the ESF17 course, chosen due to its high frequency of student queries. This process allowed testing of the chatbot's interaction and features before full deployment, reinforcing its effectiveness as a first level of support for students.

Stage 1: Various programs are available for chatbot development, and Google® offers a free partnership for this technology through its Standard Edition business model. The Dialogflow® tool was used in all the stages mentioned, including configuration, usability, content conversion standards, technical support, integration with the Moodle environment, and responsiveness on mobile devices.

Humanizing the dialogue between users and robots is a challenge. Many companies assign names to their chatbots, such as Apple's Siri® and Amazon's Alexa®. For this study, the chatbot was named "George" and made available to all users of the ESF17 course, including tutors, students, tutoring coordinators, course coordinators, and the administrative team.

Stage 2: Natural Language Processing (NLP) refers to the ability of machines to interpret text written by humans, understand its meaning, and determine the next action to respond in a comprehensible manner. In the process of analyzing and converting content into the chatbot's question-and-answer format, a subject matter expert with experience in tutoring participated. The adapted content was integrated into the Google Dialogflow® Chatbot system. The greater the number of questions associated with a single answer, the higher the likelihood of providing a correct response. Therefore, the decision was made to enhance the chatbot by expanding the responses and, when inconsistencies were identified, additional options were incorporated.

Stage 3: The "George" chatbot was represented by an icon, positioned and configured in the bottom-right corner of all pages in the ESF17 course to facilitate user access. The system was designed to be activated by the user at their desired moment, and when hovering over the icon, a note block with an informative message is displayed. The user can then initiate a query and receive the corresponding responses. The chatbot asks a final question to ensure user satisfaction with the provided answers, and the interaction is then concluded.

In cases where the response is satisfactory, the chatbot remains available for future queries. In unsatisfactory cases, the chatbot forwards the question to the responsible tutor. The entire process is monitored, and inadequate responses are analyzed, corrected, and incorporated into the chatbot's database.

Stage 4: The pilot test was conducted using the "Sandra and Sofia" Knowledge Module of the ESF17 course, which frequently generates a series of questions, justifying the choice of using a chatbot as a learning aid. It is important to note that this module consists of a case study that allows

students to discuss common situations in the daily routine of Family Health. In addition to aspects of the family approach, it addresses the care of mental health issues and child health within the context of Primary Health Care. Furthermore, this module clearly highlights the intrinsic relationship between the health conditions of family members within a family system.

After the interaction through the pilot test, users completed an evaluation instrument that allowed for the analysis of the chatbot's performance in fulfilling its role as the first level of support for course content-related queries, as well as assessing difficulties in accessing the bot, usability, and layout.

Data collection was conducted at the moment the user accessed the chatbot. A database stored all access logs, including the interactions (questions and answers) between users and the bot, along with the date and time, and the number of unsatisfactory queries. This approach made it possible to measure how often the bot was triggered, identifying periods when students had questions and the content they sought. During the period of chatbot use by participants, the Dialogflow® system provided a statistical analysis tool that allowed tracking the number of accesses to the tool and the questions that went unanswered.

The evaluation questionnaire consisted of 12 closed-ended questions with a Likert scale ranging from 1 to 5 for responses. The statistical analysis considered the average value of the participants' responses, and the standard deviation indicated the dispersion of the data in relation to the mean. A higher average indicated agreement, while a lower average pointed to disagreement or neutrality. A low standard deviation indicated greater variability and consistency in the responses, allowing for coherent and consistent results.

During the period of chatbot usage, the Google Dialogflow® system provided a statistical analysis tool that allowed for tracking the number of accesses to the chatbot (logs), the number of questions asked, the specific questions posed, and the unanswered questions. Unanswered questions were identified by the system and forwarded to the content specialist, who evaluated them and added them to the chatbot's database.

The research was submitted to and approved by the Research Ethics Committee of Unifesp, and was registered in the Plataforma Brasil due to its involvement with human participants. The data were handled in compliance with the General Data Protection Regulation (GDPR), in an anonymous manner, ensuring privacy, security, and ethical standards. Students were informed about the study 15 days prior to the "Sandra and Sofia" module. During this period, the chatbot was available for access, and information was collected anonymously. The deadline for completing the online evaluation questionnaire was up to 15 days after the module ended. The online Informed Consent Form was available to students throughout the research period. To minimize any uncertainties during the study, a contact email and access to the messaging tool via the Moodle environment were provided.

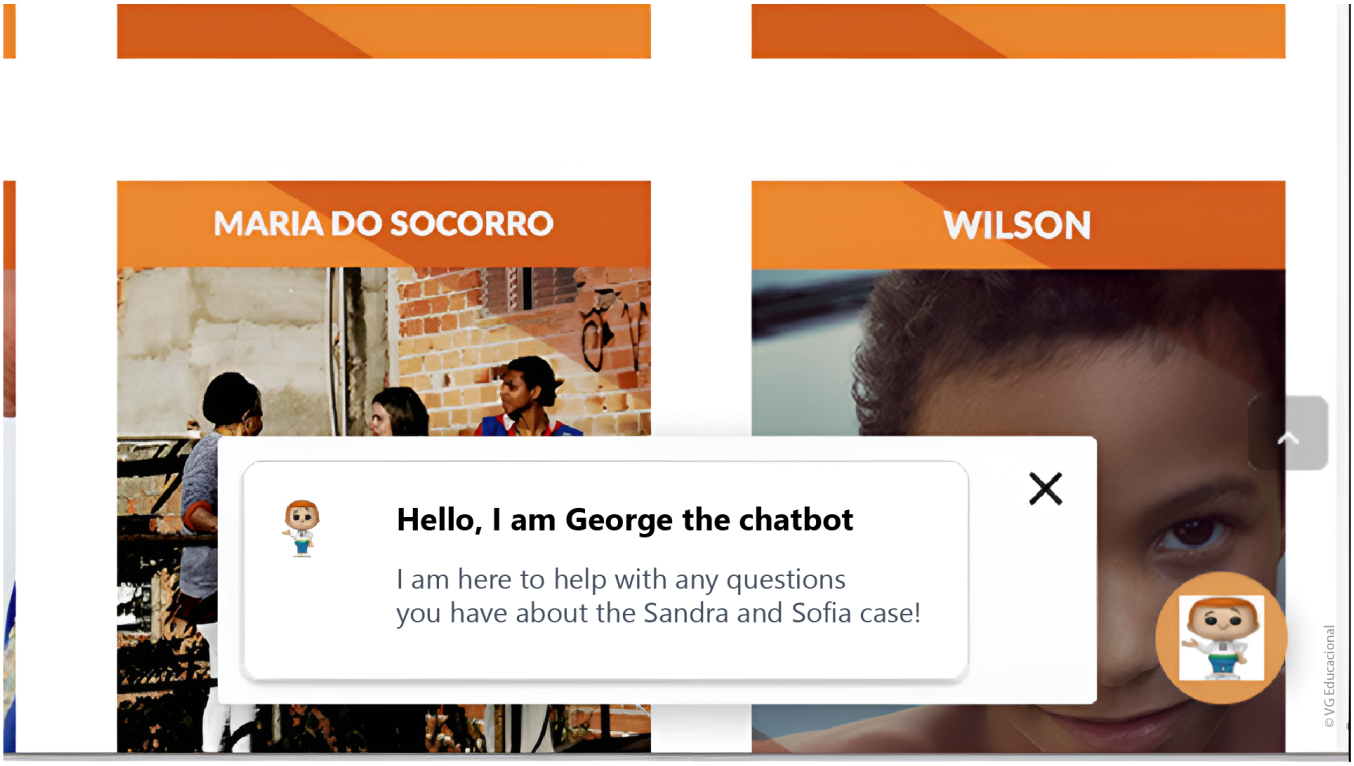
## 3. Results

The implementation of the chatbot generated both quantitative and qualitative data regarding student satisfaction and engagement. The results indicate that the majority of students found this tool useful and easy to access. Of the 51 students who participated, 78.4% reported that it was their first experience using a chatbot in distance learning courses. Furthermore, 76.5% stated that they found it easy to locate and access the chatbot within the course.

The majority of participants also considered the layout to be inviting (70.6%) and the responses to be quick (70.6%) as positive aspects of the chatbot. These results suggest that the experience was positive for most students, supporting the effectiveness of the chatbot as an educational tool.

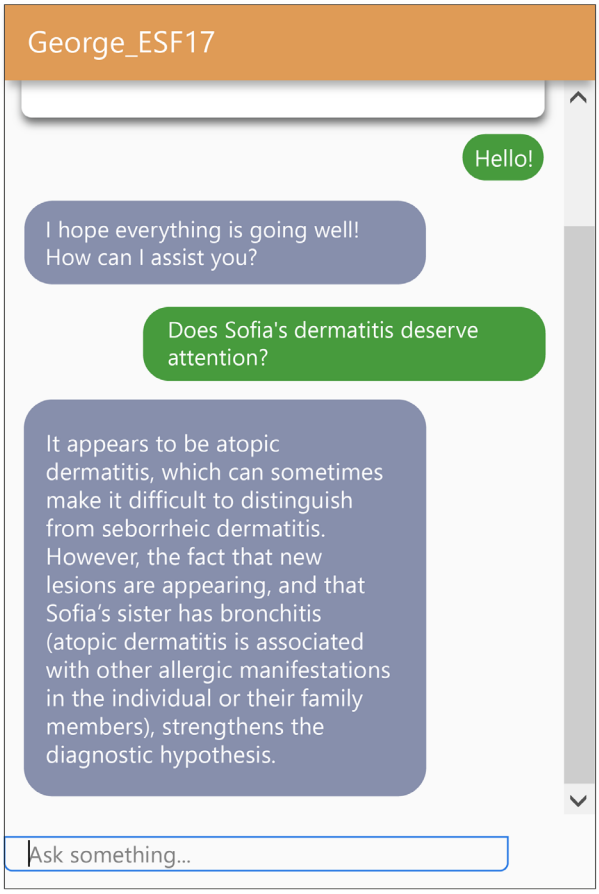
The chatbot design is shown in Figures 1 and 2, including data from the access and usage analysis of the AI system described throughout this chapter.

Figure 1 - Graphical representation of the ESF17 course screen with access to the chatbot.




Source: Author, 2023.

Figure 2. Graphical representation of the message screen of the George chatbot in the ESF17 course.

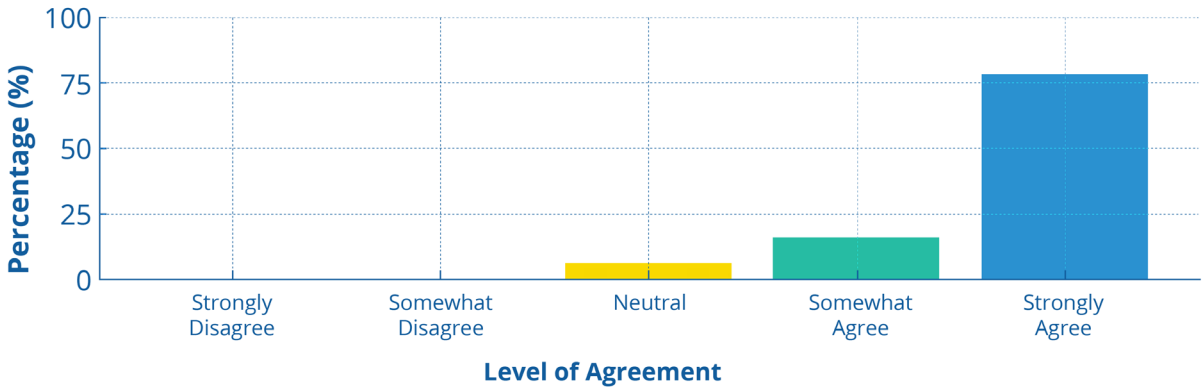



Source: Author, 2023.

The quantitative analysis of student satisfaction and engagement in using the chatbot for problem-solving was conducted based on data extracted from the responses provided by students through the "Evaluation Questionnaire: Use of the Chatbot by Students."

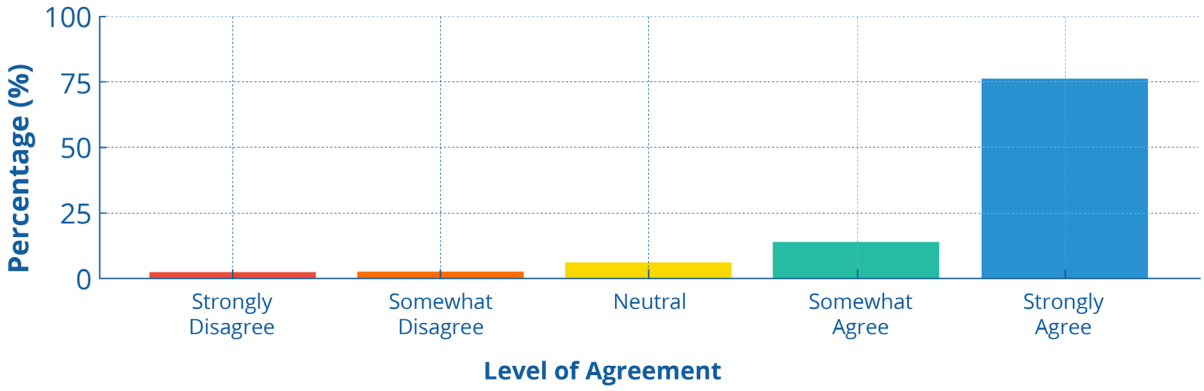
Of the 53 students enrolled in the course, who had access to the chatbot throughout the entire "Sandra and Sofia" module, only two chose not to participate in the research. Therefore, 51 students completed the questionnaire, which contained 12 questions. Additionally, data analysis was conducted using the logs recorded in Dialogflow®, which allowed for identifying the percentage of questions distributed by themes within the "Sandra and Sofia" module. The detailed results of the responses provided by the students are presented in percentages for each question (Figures 1 to 12).

Figure 1. Question 1 - This is my first experience using a chatbot in distance learning courses.



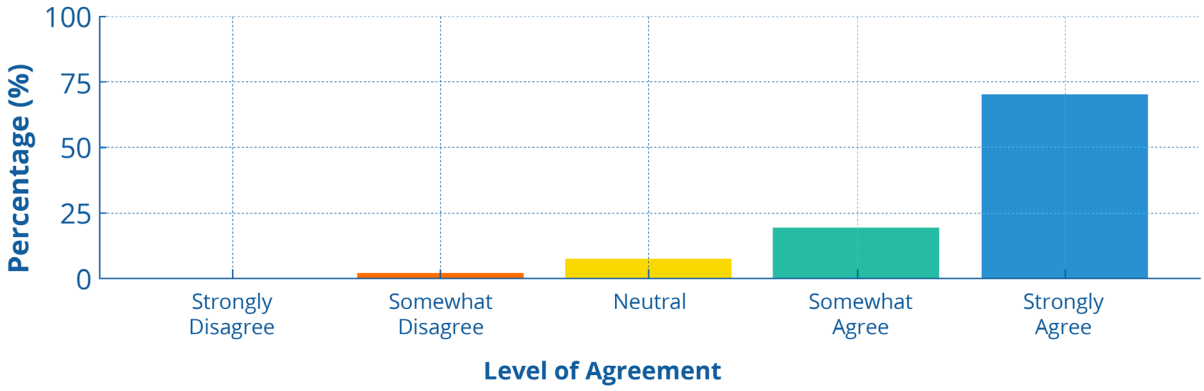

Source: Author, 2023.

Figure 2. Question 2 - The location and access to the chatbot in the course were easy to understand.



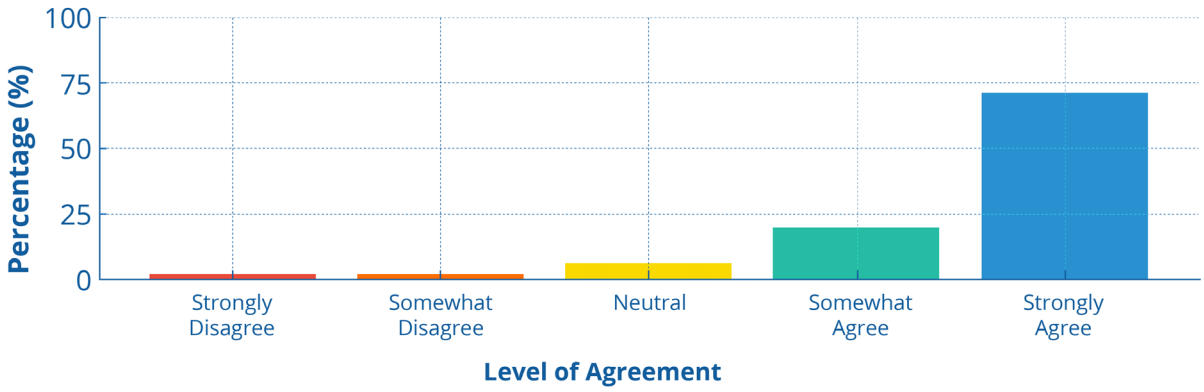

Source: Author, 2023.

Figure 3. Question 3 - The visual appearance (layout and design) of the chatbot was inviting.



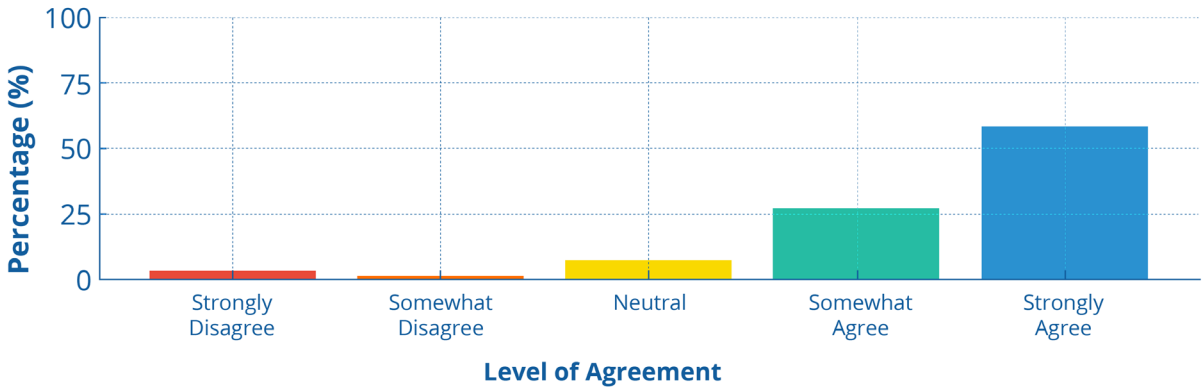

Source: Author, 2023.

Figure 4. Question 4 - The chatbot responded promptly to your questions.



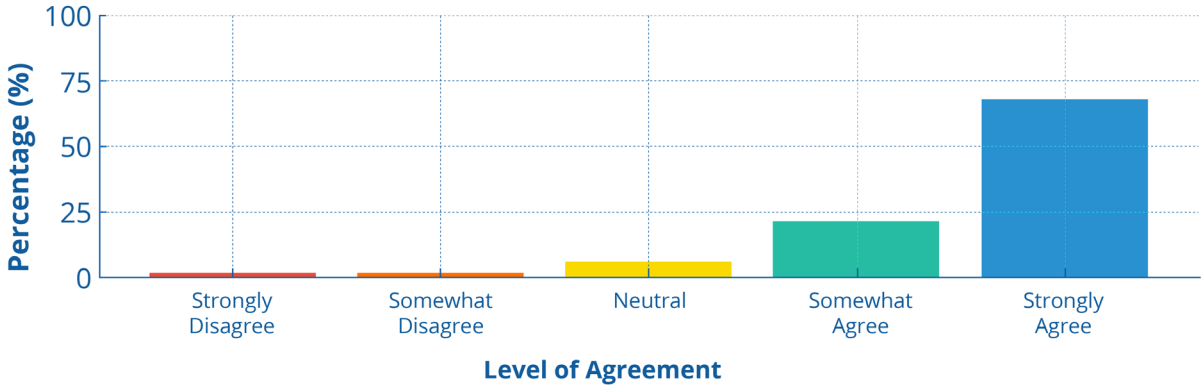

Source: Author, 2023.

Figure 5. Question 5 - Most of the questions asked to the chatbot were answered as expected.



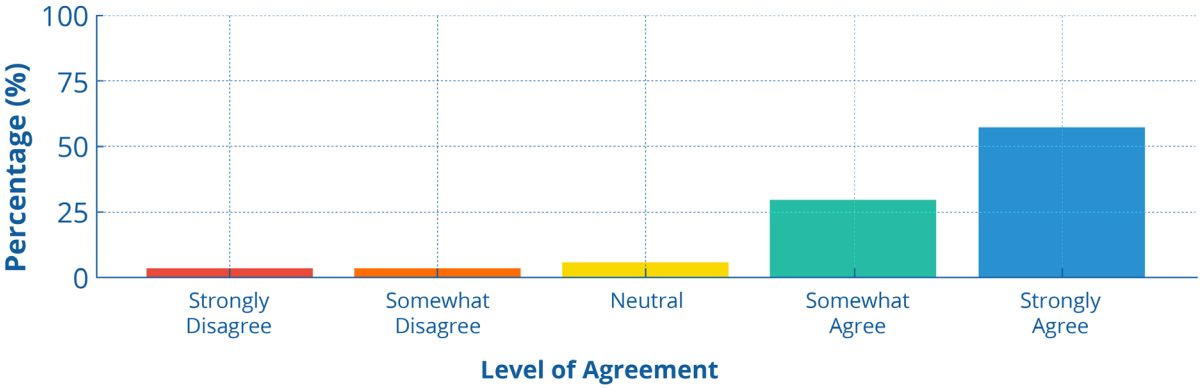

Source: Author, 2023.

Figure 6. Question 6 - You frequently used the chatbot to resolve doubts about the content of the "Sandra and Sofia" Knowledge Module.



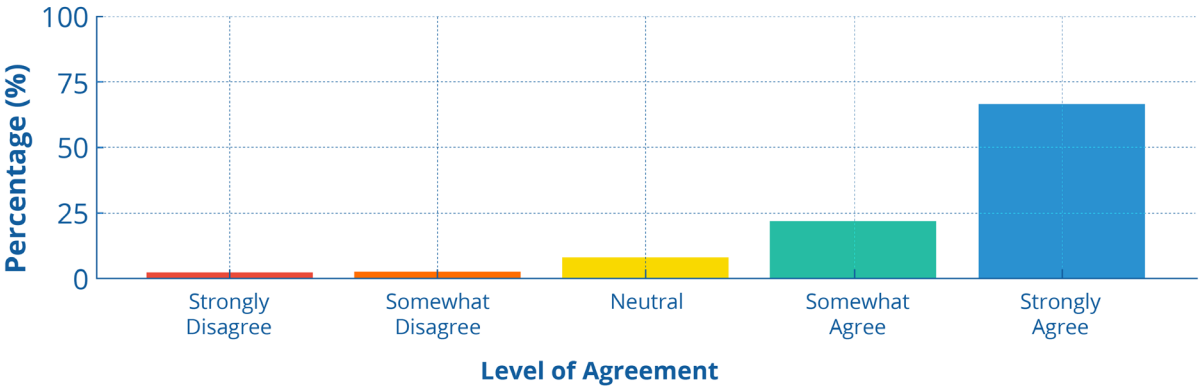

Source: Author, 2023.

Figure 7. Question 7 - The chatbot demonstrated a clear and objective understanding of the "Sandra and Sofia" content.



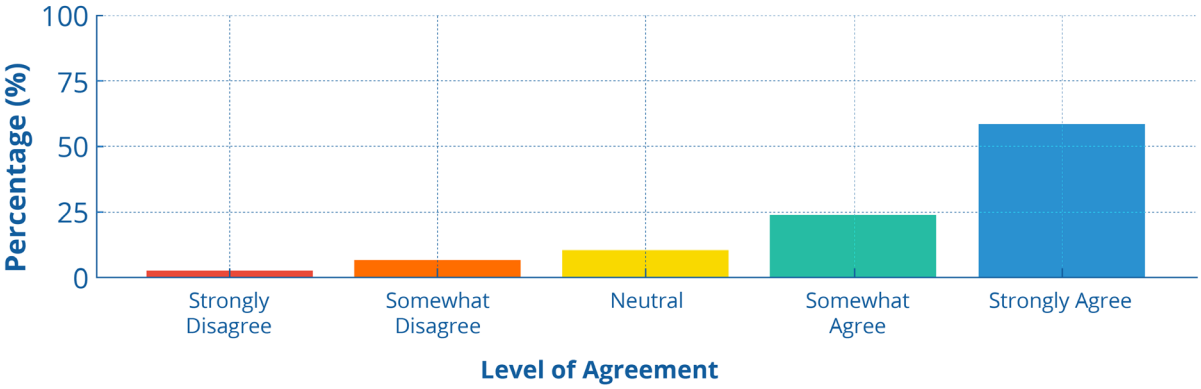

Source: Author, 2023.

Figure 8. Question 8 - The chatbot fulfilled its purpose of resolving doubts before contacting the tutor.



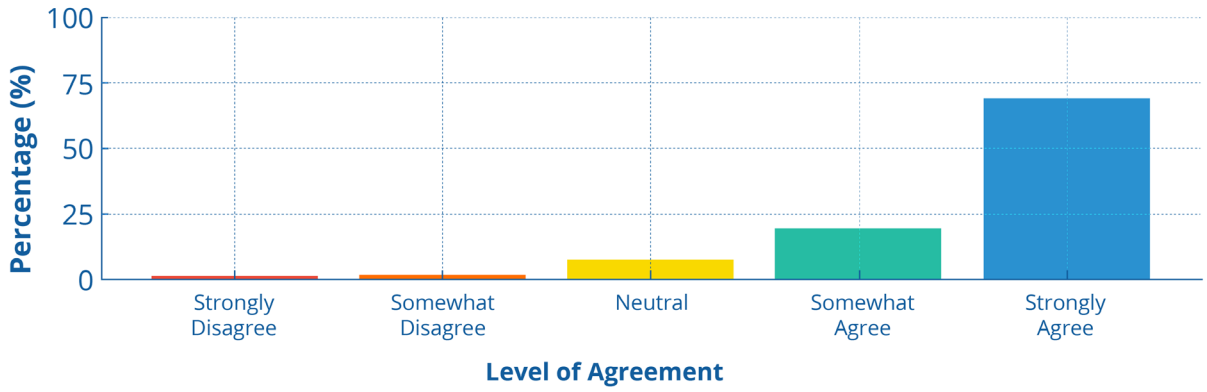

Source: Author, 2023.

Figure 9. Question 9 - The experience of using the chatbot motivated you to seek more information on topics related to the "Sandra and Sofia" Knowledge Module.



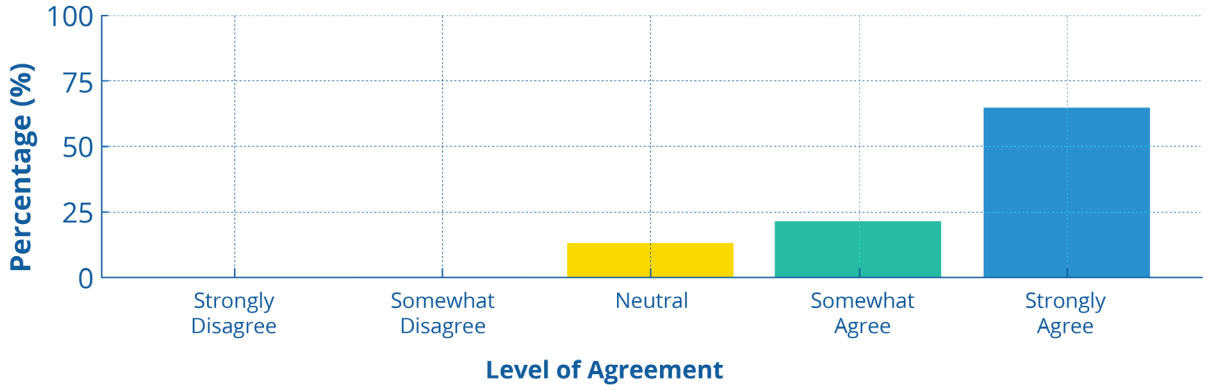

Source: Author, 2023.

Figure 10. Question 10 - Would you use the chatbot in all course modules?



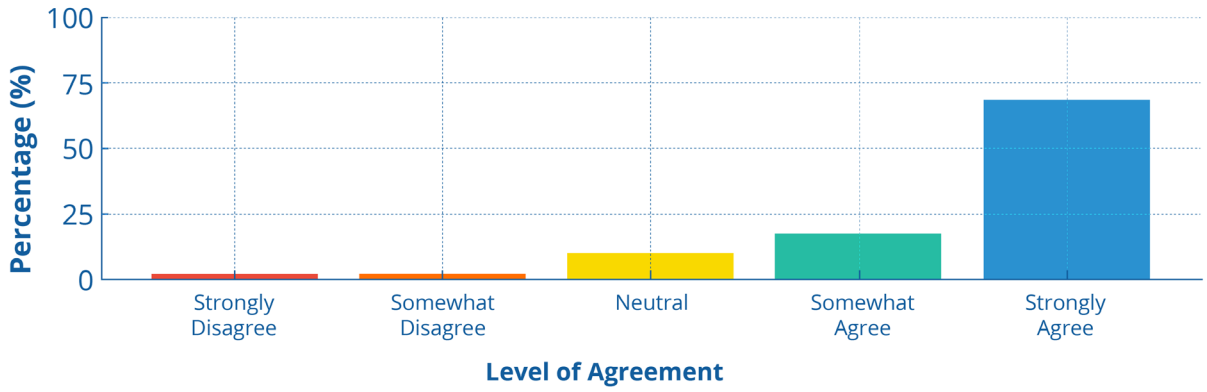

Source: Author, 2023.

Figure 11. Question 11 - Would you include the chatbot to resolve doubts about activities and provide support in the course?




Source: Author, 2023.

Figure 12. Question 12 - After your experience using the chatbot, do you believe this tool was an important support for your academic performance in the "Sandra and Sofia" Knowledge Module?




Source: Author, 2023.

The statistical analysis of the questionnaire responses was conducted using the Likert scale, where the mean represents the average value of the participants' responses and the standard deviation indicates the dispersion of the data relative to the mean. A higher mean suggests greater agreement, while a lower mean indicates disagreement or neutrality. The standard deviation measures the consistency of the responses, with lower values indicating greater uniformity in the answer.

Most of the calculated standard deviation values were low, suggesting coherence and consistency in the questionnaire responses. The results for the questions were as follows: Question 1: Mean = 4.44, Standard Deviation = 0.75. Question 2: Mean = 4.51, Standard Deviation = 0.78. Question 3: Mean = 4.34, Standard Deviation = 0.83. Question 4: Mean = 4.29, Standard Deviation = 0.89. Question 5: Mean = 4.01, Standard Deviation = 0.93. Question 6: Mean = 4.26, Standard Deviation = 0.91. Question 7: Mean = 4.02, Standard Deviation = 0.94. Question 8: Mean = 4.23, Standard Deviation = 0.92. Question 9: Mean = 4.06, Standard Deviation = 0.97. Question 10: Mean = 4.29, Standard Deviation = 0.88. Question 11: Mean = 4.08, Standard Deviation = 0.99. Question 12: Mean = 4.26, Standard Deviation = 0.88.

Regarding the exploration of topics by the students, a uniform distribution was observed, with the questions distributed as follows: 23% related to the topic "Sandra and Sofia"; 18% on "Dermatoses in Childhood"; 17% on "Oral Health in Childhood"; 16% on "Acute Respiratory Tract Infections"; 14% on "Growth and Development"; and 12% on "Mental Health in Primary Care and Abdominal Pain".

## 4. Discussion

The literature on the use of Chatbots in education highlights their potential to support teaching and learning in distance education (Topal et al., 2021; Siddique, 2021). In one study, students who interacted with a Chatbot via the web rated the experience neutrally, but acknowledged the technology's potential for future improvements (Thomas, 2020). In contrast, the use of Chatbots in the ESF17 course demonstrated potential for greater engagement and efficient support for students, aligning with the goal of providing constant and personalized interaction.

Studies such as the one by Tamayo et al. (2020), conducted in Spain, show that the progressive digitalization of materials and the use of Chatbots in virtual classes yielded positive results, emphasizing the importance of adapting technology to educational needs.

The study conducted by Topal et al. (2021) aimed to provide a Chatbot to assist 5th-grade students with the content "Change of State of Matter." In addition to textual functions, the Chatbot was designed to provide images and videos via the web, using the Dialogflow® program integrated with Telegram for sending instant messages. Although the results indicated a positive impact on the students' online learning experience, no significant difference in academic performance was found between the experimental and control groups.

Another study, conducted by Gudala et al. (2022), evaluated the advantages, disadvantages, and needs of using Chatbots to assist elderly individuals aged 65 to 75 in obtaining information about medications. The research, based on qualitative interviews with geriatrics experts, revealed that the tool contributed to increased knowledge and medication adherence, as well as providing general health information.

Chien et al. (2022) developed a contextual learning environment in English using the LINE Chatbot software, with the aim of improving students' speaking and listening skills. The inclusion of competitive features in the learning activities proved effective, resulting in satisfactory student performance and highlighting the positive impact of the contextual learning environment on English skill acquisition.

Fulmer et al. (2022) investigated the feasibility and effectiveness of using AI to reduce symptoms of depression and anxiety in university students. The study showed that participants who used the AI-based application reported a significant reduction in symptoms, suggesting that AI could be a viable and accessible option for providing therapeutic support.

Entenberg et al. (2023) explored the effectiveness of a Chatbot intervention for parents in developing parenting skills. While the results showed that participants learned the proposed skills, there were no significant differences in reported knowledge between the experimental and control groups, indicating that brief digital interventions may be useful, but more intensive interventions might be necessary to achieve therapeutic changes.

In the present study, we faced challenges such as the need to convert module content and categorize questions and answers according to specific themes. However, the results showed that students positively evaluated the Chatbot in aspects such as location, accessibility, layout, and design. These findings suggest that students consider the Chatbot an effective alternative tool for resolving their doubts.

The ease of access and convenience provided by the Chatbot allowed students to receive quick answers to their questions before resorting to tutors. This efficiency optimized tutors' time and enhanced the interactivity between students and course content.

Moreover, the majority of students reported that their experience with the Chatbot in the "Sandra and Sofia" module had a positive impact on their motivation to seek additional information, stimulating interest in exploring other modules of the course. The data indicates that students recognize the potential of the Chatbot to assist them throughout the course, particularly in activities and support.

Previous studies, such as the one by Chang et al. (2022), show that the integration of Chatbots in university environments can enhance interactivity by providing instant feedback and supplementary learning materials. Additionally, initiatives like the Duolingo Test® (2023), which incorporated gamified elements into its language-learning Chatbot, highlight how interactivity and student motivation can be significantly improved through this technology.

Corporate training programs, such as those reported by Pataranutaporn et al. (2021), which personalize learning paths and recommend specific modules based on students' interests and performance, also demonstrate how the use of Chatbots can facilitate more meaningful interactions with tutors and enhance the learning experience.

Such experiences reinforce the potential of Chatbots to improve interactivity and the effectiveness of teaching and learning processes. Overcoming communication barriers between students and instructors through technological innovations like Machine Learning can mitigate challenges encountered in educational processes and enhance dialogue.

However, it is important to consider the challenges that the use of Chatbots and AI in

education may present. The limitations of these technologies include the difficulty in perceiving students' emotional and affective issues, the risk of creating dependency on the Chatbot for solving common questions, the inability to handle issues that require critical thinking, and concerns about data privacy. These critical counterpoints should be carefully analyzed and integrated into the development and implementation of AI-based educational solutions to ensure that their benefits are not undermined by their limitations.

In this perspective, more recent studies, such as the one by Al-Zahrani and Alasmari (2024), emphasize the need for a critical analysis of the impact of this technology, especially regarding ethical and social challenges. These authors argue that, while Chatbots offer advantages, such as quick and personalized support, they also present significant limitations, such as the difficulty in capturing the emotional and affective nuances of students. This limitation can compromise the quality of interaction and the ability to address the more subjective and complex needs of students.

Furthermore, Al-Zahrani and Alasmari (2024) emphasize the risk of student dependency on chatbots, particularly for recurring questions, which may diminish the encouragement of critical thinking development. Another significant concern raised is data privacy, as these technologies often utilize personal and learning-related information of students, necessitating stringent regulations to ensure the security and integrity of such data. These counterpoints highlight the importance of implementing chatbots in an ethical and responsible manner, balancing technological benefits with the commitment to address the emotional and cognitive needs of students in educational settings.

Intelligent adaptive learning systems, such as chatbots, have the potential to enhance teaching interactions by mediating learning according to the specific needs of each student. By reducing the time between question and answer, these systems streamline the study process. Furthermore, they allow for more personalized follow-up, as the chatbot handles recurring questions, particularly those related to administrative and technical issues.

Thus, the use of chatbots in courses with high demand and a large number of students can be essential for maintaining active communication, which is crucial for ensuring the engagement of all participants. Distance Education (DE) is a complex process that requires responsibility and commitment, in addition to techniques and multi-agent systems to improve interaction. The integration of technological tools that promote intelligent tutoring, based on patterns and evidence, can optimize educational experiences and enhance academic performance.

Finally, it is essential that technological interventions focus on user-centered approaches, promoting an enriching educational experience without distracting students' attention. Optimizing these experiences is crucial for achieving the best possible outcomes in the teaching-learning process.

## 5. Conclusion

The results indicate that the chatbot implemented in the Family Health Specialization Course by UNA-SUS Unifesp was well received by students, standing out for its speed and effectiveness in addressing inquiries.

This interaction allowed tutors to focus on more complex tasks, promoting efficient time management and greater student satisfaction. Additionally, the chatbot proved to be a promising

tool for supporting learning, encouraging students to deepen their knowledge in a more autonomous and motivated manner.

The positive acceptance of digital solutions also emerged as a significant point, including suggestions for new features to enhance academic support. Thus, the chatbot demonstrated feasibility and effectiveness as an educational resource, particularly in complex fields such as healthcare.

In summary, the integration of the chatbot into the course proved to be an effective and replicable strategy for supporting teaching in distance education, with the potential for expansion to other courses and academic areas.

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