

Integration of Chatbot as a support tool in the Tutorial process for UPMH students

Glendamira Serrano¹ and Víctor M. Zamudio¹

¹ Universidad Politecnica Metropolitana de Hidalgo, Boulevard acceso a Tolcayuca, No. 1009, Tolcayuca, Hidalgo, Mexico

Abstract

The present research proposes to develop a chatbot in the Tutoring processes to answer the frequent questions presented by the students of the Educational Programs of Engineering in Information Technologies and Engineering in Animation and Visual Effects of the Metropolitan Polytechnic University of Hidalgo. The research approach is quantitative with a non-experimental transversal exploratory design, the survey technique was used on the questionnaire instrument, through probabilistic sampling two samples were obtained: 251 students and 8 teacher tutors, both men and women of both educational programs. Data processing was carried out within a matrix, to cross-reference the information obtained from the two questionnaires that were applied. With the results obtained, a chatbot was developed that answers the different questions that students have so that they can continue with their academic procedures without waiting until the tutor can respond.

Keywords

Chatbot, tutorial, doubts, technological tool

1. Introduction


With technological advancement, new tools have been discovered that help improve processes that are part of different sectors, one of them: Education. This is how different technological tools have been integrated into the processes that are part of Education. In this research we will be addressing improving the Tutoring process in the Educational Programs of Information Technology Engineering (ITI PE) and Animation and Visual Effects Engineering (IAEV PE) of the Metropolitan Polytechnic University of Hidalgo (UPMH).


In this context, the tutorial action occurred in 2000, when the National Association of Universities and Higher Education Institutions issued two important proposals that constituted a fundamental impulse for the development of Institutional Tutoring Programs in HEIs in Mexico. According to the United Nations Educational Scientific and Cultural Organization (UNESCO), the work of Tutoring is part of the teaching function and therefore, the teacher must provide support and advice to students to improve their academic performance.

To describe the meaning of the word chatbot, according to [18], it is composed of “chat”, as a conversation, and “bot” referring to a robot, but in relation to the AI that tries to give a adequate and logical response in a human-machine interaction. Therefore, a chatbot is a web program that convincingly simulates, as a human would, behavior in a conversational environment, processing text in natural language and interacting to generate intelligent and relative responses.

The use of chatbots has had satisfactory results, as well as the improvement of some processes as a technological tool and their integration into the educational sector, as mentioned, chatbots have reached education since it is a relational act based on communication and interaction.

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 gfranco@upmh.edu.mx (G. Serrano); v zamudio@upmh.edu.mx (V.M. Zamudio)

 0000-0003-3176-3433 (G. Serrano); 0000-0002-4660-8025 (V.M. Zamudio)



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According to [12] mentions that within the educational context chatbots provide new opportunities. For example, they can answer and ask questions, guide students, and help solve problems. This means that students could progress even when the teacher is not available, which means that they do not feel alone during the learning process.

1.1. Problem Statement

It is important to mention that tutoring in education appears as an activity that guarantees the academic success of students, its purposes are: to increase terminal efficiency rates and reduce educational lag and school dropout. As a consequence, the National Association of Higher Education Institutions in Mexico ANUIES 2001 indicates that by 2020, the Higher Education Institutions (IES) in Mexico, students will have a comprehensive tutoring program that accompanies them from their entry into school until your degree.

Based on the above, the full-time teacher will be in charge of one to two groups to serve as tutor in each semester. The academic loads of teachers at UPMH are days of more than 8 hours for the teacher, since apart from teaching classes, they also carry out research, class preparation, consulting, industrial visits, academy meetings and finally tutoring. Within this perspective, some cases have been identified where students do not receive timely attention to their doubts during their academic development, although it is true, sometimes it is difficult for the tutor to attend to them if it is not during their tutoring schedule or classes, because he has to attend to the other academic activities he is responsible for.

In relation to the problem presented, different support strategies have been sought that favor the tutoring process, in this way contributing to teaching performance without affecting their complementary activities, even when the working day is excessive, it is essential to maintain constant communication with the teachers, students to be able to answer their questions in a timely manner and to continue with their school procedures.

1.2. Research question

How to develop a chatbot as a technological tool that helps dispel the frequent doubts that students present and give continuity to their procedures without the need to wait for the consultation with their Tutor for the Educational Programs of Engineering in Information Technologies and Animation and Effects UPMH visuals?

1.3. General objective

Investigate how to develop a chatbot as a technological tool that helps dispel the frequent doubts that students present and give continuity to their procedures without the need to wait for the consultation with their Tutor for the Educational Programs of Engineering in Information Technologies and Animation and Effects UPMH visuals.

1.4. General objective

- Investigate the frequently asked questions that students present during their academic training.
- Develop the web platform to integrate with the chatbot.
- Develop the chatbot that will answer students' questions.
- Train the chatbot with the possible questions and answers that were identified.

1.5. Hypothesis

With the development of a chatbot as a technological tool within the Tutoring processes for the Educational Programs of Engineering in Information Technologies and Animation and Visual Effects of the UPMH, it will help to dispel the frequent doubts that students present, to, from of the response, give continuity to your procedures without the need to wait for the consultation with your Tutor, until the next scheduling of your Tutoring.

2. State of the art

According to the research found, we can mention [9] who created a chatbot as a teaching support tool. Their study consisted of socializing the experience of the design and implementation of a chatbot in teaching-learning processes developed during the health emergency. to speed up the work of teachers in responding to queries, thereby facilitating more time to be allocated to the academic work of the subject. Similarly, we can cite [10] where they created a virtual assistant that would provide solutions to the doubts of archival and library science students in the virtual modality of the Inter-American School of Library Science -EIB- of the University of Antioquia, with the in order to optimize the communication processes between students and those who coordinate the dynamics of virtuality in the institution.

On the other hand, we can identify in the research of [6] the development of a chatbot as a support tool and, at the same time, as a guide in the students' learning process, providing advice and showing concern for them. From the perspective of [2] mentions Internet access in rural and urban areas of Peru as a problem, according to their research they present a proposal for a solution to said problem, through an innovation such as the use of chatbot technology.

3. Methodology

The present research was developed under the quantitative method, in relation to the research of [1] they describe quantitative research as rationalist or positivist, it is one that is based on numerical aspects to investigate, analyze and verify information and data. On the other hand, [13] mentions that the most important purpose of the quantitative approach lies in the description, explanation, prediction and objective control of its causes and the prediction of its occurrence based on their revelation.

The research design is non-experimental transversal exploratory, in relation to the research of [7] its purpose is to describe variables and analyze their incidence and interrelation at a given time. On the other hand, [14] describes them as those that are carried out at a specific time to analyze a phenomenon that happens in the present. Therefore, within this explanatory framework regarding the research design, according to the evidence described above, the variables will be collected at the same time, from the perspective of the agents involved, which are: students and teachers.

Consequently, Figure 1 describes the methodological model used for the development of the chatbot, which includes a series of entities and processes that allow visualizing the flow that was carried out for the development of the chatbot, which are explained below:

1. Objectives:
 - Identify the purpose of the chatbot (resolve frequently asked questions from ITI/IAEV undergraduate students).
 - Improve user experience and provide accurate and useful answers.
2. Determination of requirements:
 - Choose a programming language for the development of chatbots, according to technical needs and preferences, python will be used.
 - Will work with Visual Code software
3. Identification of questions:
 - Obtain relevant data, such as frequently asked questions, answers, and any specific information about the degree program, through a Forms, where the majority of questions described by the students will be recorded.

4. Conversation flow design:
 - Create a conversation design that addresses frequently asked questions from students.
 - Define intuitive and natural dialogue flows for effective interaction.
 - The design of the structure and conversation flow will be carried out.
 - Perform data cleaning of the questions obtained according to the survey applied to the students.
5. Web application design:
 - Design the user interface of the web application for interaction with the chatbot, different programming languages will be used for its development.
 - Implement chatbot logic and integration with the user interface.
 - It will be configured so that the design is friendly and easy to use for the student
6. Chatbot training:
 - Use natural language processing (NLP) techniques to train the chatbot to understand the students' language, according to the data collected.
 - Feed the model with question and answer data to improve its responsiveness (all answers were obtained from the university's official website).
7. Trials and errors:
 - Conduct extensive testing to ensure accurate responses and a smooth user experience.
 - Adjust the model and logic of the chatbot according to the results of the tests, in the same way some possible questions that the students will introduce will be increased.
8. Launch and monitoring:
 - Implement the chatbot on the website, so that it begins to be used by students.
 - It will begin with monitoring the answers given to the students, according to the questions.
 - Necessary improvements will be made continuously according to the questions that users ask.
9. Monitor and improve chatbot:
 - Continuously monitor chatbot interactions and collect student feedback, such as possible new questions.
10. Continuous optimization:
 - Make continuous improvements based on analysis of usage data and student feedback.
 - Add new questions and answers as new FAQs arise.

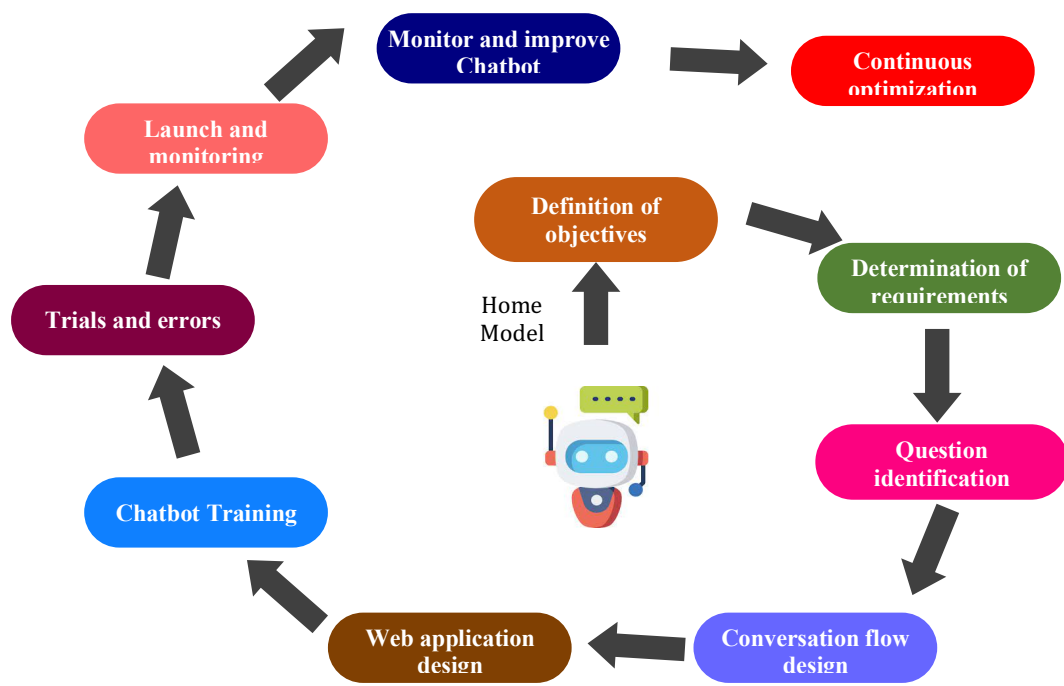


Figure 1: Methodological model diagram

3.1. Technique and instrument for data collection

For this study, the survey technique was used, in relation to [5] it states that the survey aims to obtain information from a group or a portion of the population of interest. Likewise, it is confirmed by [17] by indicating that the survey can be defined as the application of a standardized procedure to collect information (oral or written) from a large sample of subjects. Therefore, it was decided to work with written information using the questionnaire as an instrument to collect the required information. Therefore, [17] describes the questionnaire as an instrument that groups a series of questions related to a particular event, situation or topic, about which the researcher wishes to obtain information.

Consequently, two questionnaires were developed to be applied to both students and teachers, where the process was examined to resolve the doubts that students have when they want to carry out a new academic procedure, the time it takes to obtain the answer and how favorable it is. To apply both questionnaires, the Google Forms tool was used, for both students and teachers, their corresponding link was shared where they could only answer the questionnaire once.

3.2. Information triangulation

Subsequently, when applying the questionnaires in our two samples, we continued with the analysis of the data obtained, when recruiting all our information, information triangulation was used according to [4] describes it as the action of gathering all the information relevant to the object of study arising in an investigation through the corresponding instruments. With the data obtained from both samples of students and teachers, the information was processed within a matrix, to have a better comparative analysis and statistically understand all the information collected.

4. Results

As results obtained from the instruments applied to support the development of the chatbot, the data was emptied into a matrix to obtain triangulation of information and analyze the results obtained with both questionnaires from different perspectives. As a consequence, variables with dependence between both instruments were identified, which are presented in Table 1, which shows the frequency with which the tutor responds to the students regarding their doubts.

Table 1
Estimated time to receive a response

Item	Respondent	Immediate	Following	By mail	In Tutoring	Does not know
How long does it take to hear back from your Tutor?	Student	40.3%	35.5%	12.9%	8.6%	2.6%
How long does it take you to respond to the student?	Teacher	40%	28.5%	12.5%	11.5%	7.5%

On the other hand, the frequency with which students ask questions to the Tutors was identified. The data is shown in Table 2, both from the tutors and from the students. The

information is analyzed, verifying that these questions are repeatedly asked even when there is no Tutoring session.

Table 2
Frequency of questions asked by the tutors by the student

Item	Respondent	Diary	Three times per week	Once a week	Once a fortnight	Once a quarter
How often do you ask your tutor procedural questions?	Student	3.3%	18.5%	29.6%	32.9%	15.7%
How often do you receive questions from your tutors?	Teacher	6.6%	19.5%	32.5%	35.5%	5.9%

According to the workload that tutor teachers have, a question belonging to the student questionnaire was identified, where the means that the student uses to obtain an answer to their question is analyzed. The information is shown in table 3, according to the data obtained, students go to other people to resolve their doubts or through the university website, they look for the answer to continue with their academic process when they do not see a prompt response by his tutor.

Table 3
Possible means of obtaining answers for the student

Item	I'm looking for it alone	With my friends	I check it on the University website.	Other teacher
If the tutor does not answer your question, who do you go to clarify your doubts regarding your academic development?	25.2%	27.8%	19.2%	27.8%

According to the questionnaire that was applied to the students, it was made up of different questions regarding some doubts that students most frequently present during their academic development, which consisted of whether all the questions they present are external to their tutor so that he can answer them, which as a response only consisted of a Yes or No, of the aforementioned are classified in table 4, which describes the percentage of answers with Yes or No, that the students answered in each one of these questions.

Table 4
Variety of questions, if the student comes with his tutor

Item	Answer	
	Yes	No
In which building is an area located where you have to carry out a procedure?	57%	43%
Calls for international mobility, and you have questions about being able to apply or about the requirements you have to meet	68.9%	31.1%
Process a certificate of studies or renewal of credential, and you don't know where to carry out your procedure.	66.2%	33.8%
Doubt with a process or service that you have to go to to carry out a procedure with your studies	78%	21.2%
Justify your absences due to health reasons or force majeure.	91.4%	8.6%
When you want to apply for a scholarship and you don't know who to turn to and where the Scholarship area is located.	70.2%	29.8%
When you fail a subject and you don't know what the next process is, whether it is permanent withdrawal or temporary withdrawal	80.1%	19.9%

According to the data obtained in Table 4, all the answers of Yes were grouped in a graph, where the student goes to his tutor to resolve his doubts and with the answer No, where he does not go and looks for the answer with another person. In Figure 2, you can see all the results grouped according to the aforementioned responses.

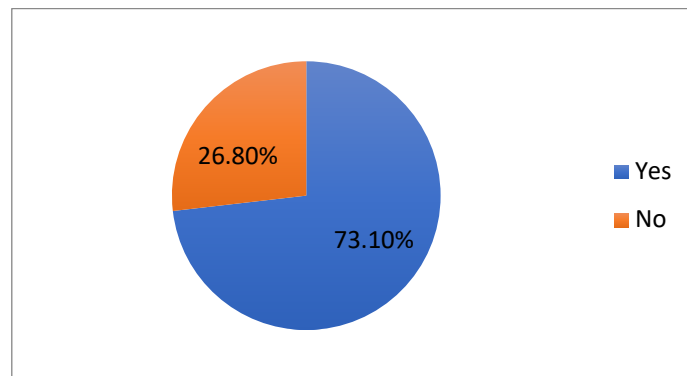


Figure 2: Student goes with a tutor.

According to the findings obtained from the previous work, the development of the chatbot was chosen to maintain closer communication with the students to resolve their doubts. As achieved results, some screen images are shown that show how the chatbot works, when entering a question and the answer it returns is the correct one for said question. Figure 3 identifies a question related to the emotional state of the student, where the chatbot responds to the area to which they should go and where they are located.



Figure 3: Chatbot emotional help

To continue with the demonstration of how the chatbot works, we can see in Figure. 4, when entering a question about how to obtain a certificate of studies, you can see the response that directs you to the school services area, but first you must complete a procedure. On your Metronet platform (internal system of the university to carry out different procedures) locate the procedures area, choose to pay for your studies certificate, when making the payment you can go to School Services to collect your studies certificate.

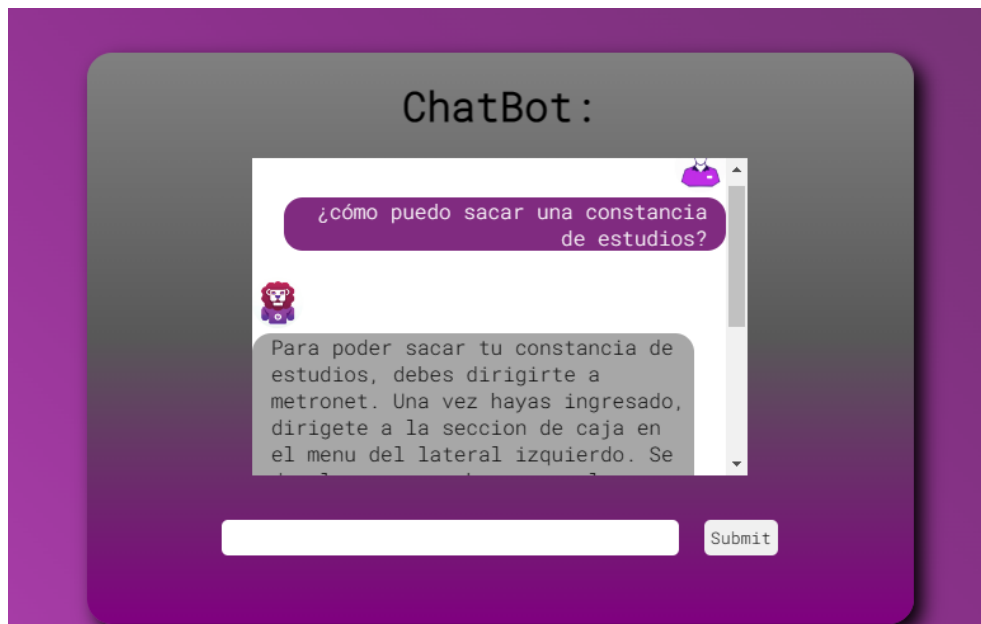


Figure 4: Chatbot proof of studies.

As a result of the above, the use of the chatbot within the Tutoring processes will be a fundamental support for the student, so that they do not delay their personal procedures and can obtain more concise answers, since sometimes the tutor is unaware of some processes and does not know which area to address, or has an excessive academic load, so the student has to look for the answer through other means.

According to the analysis that was carried out with the data that was collected and the proper functioning of the chatBot in the web application, it was identified that in order to be able to respond in a timely manner to the doubts that students frequently present, it is necessary to be able to integrate a chatbot trained so that it can correctly answer all the doubts that students have during their academic development, on the other hand, the tutor does manage to answer the questions, but sometimes it is a little late, or it does not resolve it and the student has to search other means to find an answer to your question.

5. Discussion

From everything expressed above, it is convenient to highlight the findings obtained from both the surveys applied and the solutions that the use of the chatbot is beginning to generate for students in their first interaction encounters.

Among them we can highlight the improvement in the efficiency of responses to questions and the reduction of time, allowing students to advance more quickly in their academic tasks and projects, since due to the continuous availability of the chatbot, they can obtain answers at any time, even outside of regular class hours or when tutors are not available.

This contributes to the student's processes being able to be completed in a timely manner without the need to search for answers through other means, having the advantage of being able to resolve their doubts 24 hours a day and seven days a week, which which before he could only consult it during class hours and if his tutor was available.

It is well known that the chatbot is in the Monitor and Improve stage, through the constant use that students are having with the chatbot, they may come across questions that do not have answers, since they are not within the database. data, therefore the chatbot itself will record them in order to feed those questions with their respective answers and they are also stored within its database. Consequently, interactions with the chatbot will be improved to contribute to the uniformity and reliability of the information, ensuring that all students receive consistent and accurate responses.

Likewise, by delegating frequently asked questions to the chatbot, students no longer look for tutors for ordinary questions. Only when the student is in a more critical state with feelings of anxiety, frustration or stress is there direct contact. with his tutor. In turn, this alleviates the tutor's workload and allows them to provide more personalized and higher quality attention to students who require help more urgently, so that their attention is immediate in individual tutoring and, if necessary, channeled to the tutor psychology area.

6. Conclusions

Recapitulating, within the findings presented here, the research question was answered: it was possible to integrate a Chatbot as a technological tool in the tutoring processes, without the need for the student to wait for the consultation with his tutor. With respect to the objective of the research, we investigated how to develop the Chatbot as a technological tool in the tutoring processes to dispel the frequent doubts that students present and provide continuity to their procedures, streamlining this process with the answers obtained from the Chatbot. As for the hypothesis, it was positive, by integrating the Chatbot into the Tutoring processes, it was possible to verify that the doubts that students most frequently present were dispelled, so that they can continue with their academic processes and not delay the process until they wait for The tutor will answer them and if he does not answer, they will have to look for other means to find the answer to their question.

On the other hand, with the implementation of the chatbot, it has been possible to respond to multiple queries simultaneously, which will help reduce the time and resources necessary to serve each student individually. Likewise, students will be able to obtain immediate answers, without the need to wait for a consultation with their tutor.

With the implementation of the chatbot, another important point that has been identified is the collection of data on the most frequently asked questions that students may mention, as well as the areas in which they need more support. This data can be collected and analyzed to identify problem areas and common needs in students. On the other hand, it can be used to improve the quality of tutoring and the performance of each of the students.

It is worth mentioning that the use of these new technologies has benefited many educational organizations and institutions, it is time for the students of this house of study to benefit, starting with the PE of ITI and IAEV and subsequently it is expected to be used by others. University Educational Programs.

Finally, by transmitting the information from the web application link, it begins to be used by students to monitor and improve the chatbot's interactions with new questions and their respective answers, with the purpose of continually improving its ability to provide more accurate answers to questions. as you interact with more students.

A second investigation is expected to begin to continue the use of the chatbot and the first results described by the students.

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