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ENHANCING ADMINISTRATIVE EFFICIENCY IN HIGHER EDUCATION WITH AI: A CHATBOT SOLUTION

QUALITATIVE STUDY

Cristina Doritta Brandão Majorana [1]
Renata Benigna Gonçalves[2]
Fernando Luis Abegao Neto[3]
Ricardo Zagallo Camargo[4]

ABSTRACT

Objective: To alleviate high demand on the Stricto Sensu secretariat through a chatbot designed for various inquiries.

Method: Utilized a qualitative approach, leveraging interviews for empirical analysis and Ishikawa diagrams for process mapping.

Results: Demonstrated the chatbot's capacity to streamline secretarial tasks, especially highlighted during pandemic-induced challenges.

Practical Implications: The initiative offers a scalable model for enhancing administrative efficiency across higher education institutions, promoting interdisciplinary collaboration and technological integration.

Conclusions: By improving response efficiency and reducing wait times for student requests, the chatbot exemplifies the transformative potential of AI in educational administration, suggesting a strategic direction for future technological adoptions in higher education.

Keywords: Chatbot, Higher Education Administration, Digital Transformation, AI in Education, Process Optimization

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[1] Escola Superior de Propaganda e Marketing - ESPM, São Paulo (Brazil). Email: crisdoritta@gmail.com ORCID: https://orcid.org/0000-0002-6999-8855

[2] Escola Superior de Propaganda e Marketing (ESPM), São Paulo (Brazil). ORCID: https://orcid.org/0000-0002-3044-9031

[3] Escola Superior de Propaganda e Marketing (ESPM), São Paulo (Brazil). ORCID: https://orcid.org/0000-0002-4324-6663

[4] Escola Superior de Propaganda e Marketing (ESPM), São Paulo (Brazil). ORCID: https://orcid.org/0000-0003-2697-296X

1. INTRODUCTION

The crisis caused by COVID-19 has affected and is still affecting various sectors of the economy, changing the way goods and services are offered and consumed, bringing challenges for companies of all sizes to overcome. However, many Higher Education Institutions (HEIs) already offer Distance Learning (DL) classes; this is not the reality of other HEIs that have had to adapt their business model overnight, changing the environment from on-site classrooms to virtual classrooms (Liguori & Winkler, 2020).

Following recommendations from the World Health Organization (WHO, 2020) and state and municipal bodies, many HEIs established preventive and educational measures (Liguori & Winkler, 2020). Even before the official decree of the pandemic (WHO, 2020), the HEI that is the subject of this study, anticipated measures to ensure the health of students and staff, and on 03/12/2020, all face-to-face classes were suspended.

On 03/20/2020, the President of the HEI sent an email to all students, informing them that systems and software had been developed and acquired, as well as equipment and methods, to promptly carry out an unprecedented training program for support areas and teachers. With all the effort and investment, the HEI was ready to restart activities on March 23, 2020, with full professors present live in synchronous classes, maintaining the exact schedules as face-to-face classes for the same classes that make up each class, with chat and interventions in real-time, in an attempt to provide a service as close as possible to face-to-face teaching. This effort was summed up by the informative and promotional phrase, "teaching without any distance," used as the title of the HEI President's message, communicating the understanding of technology as an ally to reduce the distance of the remote experience and provide quality equivalent to face-to-face teaching.

Given this panorama, it is understood that the HEI, when facing the challenge caused by the COVID-19 crisis, took advantage of an opportunity arising essentially from the external environment that triggered the search for the retention of students already enrolled and the conquest of new students during the pandemic period via an innovative and online entrance exam, given the rapid development of a differentiated synchronous teaching-learning model, composed of a series of initiatives to support student and teacher practice, such as digital literacy training, the provision of computer equipment, the purchase of videoconferencing platform licenses and the offer of a health and wellness program, in a move carried out in a short space of time and capable of creating superior value to the services already provided by the HEI (Marcondes, Miguel, Franklin, & Perez, 2017).

However, even with all the changes made, it can be seen that the HEI has a real problem to solve that was already identified even before the pandemic: it is going through a period of administrative

transition, in which the activities of the Undergraduate Secretariat have been integrated with the Stricto Sensu Postgraduate Secretariat, as a result of the creation of a National Secretariat, with adapted and unified processes to generate standardization.

With the pandemic, the support and assistance provided by the Stricto Sensu postgraduate secretariat have been in greater demand, and responses were only sent by email or telephone. In contrast, before the crisis, there was face-to-face assistance. Currently, these services are used by a few people, and it is natural that as requests for support and assistance increase, the response time of the secretariat increases, and consequently, the waiting time of students, which can result in low satisfaction (Ranoliya, Raghuwanshi, & Singh, 2017).

The problem situation to be addressed, therefore, involves the usual difficulties of administrative transition processes, aggravated by the atypical situation caused by the pandemic, and consists of offering a solution to the following question: "How can we improve the efficiency of responses at the Stricto Sensu Postgraduate Office to reduce the waiting time for student requests, while maintaining high satisfaction rates and differentiating ourselves from the competition?" In order to solve this situation, the aim is to minimize the high demand in this office by developing a chatbot that can initially help to reduce the office's overload by dealing with more straightforward requests whose resolution or forwarding is already available on the website and other virtual environments accessible to students, offering a set of automated responses that can later be improved to deal with an increasingly wide range of requests, allowing the office staff to dedicate themselves to issues that require personal attention, as well as being able to engage in the systematization and continuous improvement of their practices.

Many web-connected services have been used as additional tools to improve human communication, such as emails, Whatsapp, virtual technical assistance, live chat, speech-based assistants such as Siri, Google Chrome, and Cortana, and chatbots (Abdul-Kader & Woods, 2015; Ranoliya et al., 2017; Dahiya, 2017), and this type of solution is suitable for the education system, significantly higher education (Ranoliya et al., 2017; Mikic et al., 2009).

In order to guarantee the quality and productivity of the results achieved by the proposed solution, the methodology follows the process suggested by Marcondes et al. (2017) for practical and applied work. It was based on observing the interaction between students and the teacher responsible for a subject, focused on the study of innovative practices, in the Professional Master's Degree offered by the HEI, whose final product was the development of a chatbot; and the HEI's administrative team, represented by the Pro-Rector of National Research, the National Secretariat and two professionals linked to the Stricto Sensu Postgraduate Secretary (identified as Interviewees 1 and 2).

This interaction was monitored from the outset, from an in-depth understanding of the specific problem, data collection, and subsequent validation with the Dean and the secretariats to the acceptance of the proposed solution via the development of the chatbot. In addition, to enable the development of the proposed solution, a chatbot workshop was held with a professor from the undergraduate course in Information and Communication Systems (Tech), which is part of the interface between the subject offered in the Professional Master's Degree and the undergraduate course in Tech, whereby the innovative projects started in the former are developed in greater depth in the latter.

2. CONTEXT INVESTIGATED

The environment and history of the HEI is a higher education institution operating in the private sector. Its community includes São Paulo, Rio de Janeiro, Porto Alegre, and Florianópolis campuses. Around 12,400 students, including undergraduate, postgraduate, continuing education, and distance learning students, spread throughout Brazil and abroad. The HEI comprises a group of permanent lecturers, guest lecturers and visitors, a population of in-house and outsourced staff, and a board of directors.

The physical structure and culture of the HEI favor an environment of shared interaction between students, teachers, and staff. Although it is a professional service-providing relationship, this closeness aims to promote a relationship of trust between the two, establishing a norm of reciprocity since students recognize this closeness as a benefit and begin to exhibit more loyal behaviors, including transferring personal loyalty to the HEI (Robinson, Kraatz, & Rousseau, 1994; Bove, & Johnson, 2006; Matute, Palau-Saumell, & Viglia, 2018).

In particular, the Stricto Sensu postgraduate secretariat follows the same concept of proximity because it is staffed by just a few people, which allows students to be known by name as early as the first semester. Thus, the HEI maintains one of its points of differentiation, offering a highly humanized service, which is characterized by having interactive processes with high levels of personalization, communication, courtesy, understanding, and personal contact, differentiating itself from other institutions that are based on mass strategies (Surprenant, & Solomon, 1987; Wang, & Groth, 2014; Matute, Palau-Saumell, & Viglia, 2018).

These characteristics of the HEI corroborate the behavior of its students, who need to be more accustomed to formal procedures, bureaucracy, and the lack of face-to-face contact when providing services, which, before the pandemic, occurred predominantly in person. The stance adopted by the general secretary of the Stricto Sensu ratifies the characteristics of the HEI when she states that "I like to serve everyone, you know, if I could I would embrace everything" (Interviewee 1) and demonstrates

the type of personal connection established from the interaction with the service, which can trigger a strong feeling of affiliation among students because it is based on bonds, such as personal identification. Therefore, loyalty to the HEI is enhanced through developing interpersonal loyalty between students and the secretariat (Guenzi & Pelloni, 2004; Matute et al., 2018).

2.0 Reality of the sector: before and during the pandemic

Even before the pandemic, the Brazilian economic scenario showed no signs of recovery and challenged the private education sector. The crisis caused by COVID-19 has aggravated this scenario by impacting enrollment in 2020 and causing an even more significant challenge in retaining regularly enrolled students, including those who have lost income. Actions such as efficient cost management and the presentation of competitive differentials based on strategies that allow problems to be solved on a case-by-case basis have become necessary, reinforcing the importance of a culture of personalized service (Lima, 2020; Desidério, 2020).

The Educa Insights consultancy (Desidério, 2020) also identified that students interested in starting a course consider the price and the use of technological tools, the latter considered a path to transforming education. However, the ban on face-to-face classes has impacted approximately 1.5 billion students worldwide and during the lockdown has forced students, teachers, and managers to adapt and learn to overcome insecurities and lack of experience with technologies applied to education, such as digital platforms and videoconferencing applications, called edtechs (Kiperman, 2020; Challenges in Education, 2020). In 2019, US$18.6 billion was invested worldwide in edtechs. In Brazil, education startups have grown by 23% in two years, and the new reality constituted post-pandemic will possibly further expand the focus on innovation, driving the shift from the traditional education market to digital learning and personalized classrooms (Desafios da Educação, 2020).

2.0 Scenario found at the start of the study.

The HEI is going through a period of transition that imposes a challenging environment. The first challenge relates to the change in structure, which began to change in 2019, when the HEI established the National Secretariat, giving it responsibility for coordinating and supporting the Stricto Sensu Postgraduate and Undergraduate secretariats, and the need to standardize processes emerged to ensure uniformity, facilitate access to information for students and establish a single, more integrated HEI (interviewee 2's account). As a result, the second challenge arose: the Stricto Sensu secretariat team was separate from the Undergraduate secretariat team, and although these secretariats are located on the same campus, their workplaces are in different buildings. Now, these teams are working together, requiring integration so that they both know and understand the differences between the Stricto Sensu

and Undergraduate processes. For this reason, the secretariats mapped out their activities and responsibilities to implement a new management format, including the management of tacit knowledge, which was often consolidated in the hands of a single person (Interviewees 1 and 2). It is necessary to change some of the customs already incorporated in the secretariat, coordination, teachers, and students, who are used to the culture of personal contact at the HEI, to overcome this challenge. This detailed, medium-term project aims to maintain the closeness and mutual respect that has already been achieved, reconciling the humanized management of people with systemic integration and adequacy. The third challenge stems from the current work overload, as the team has only one person dedicated solely to the demands of Stricto Sensu, who is the only one who knows the specific procedures and processes and the number of demands from professors and students. The latter, students come to the secretariat to ask for support and clarify doubts despite receiving information before the start of the academic semester. Demands that, with the pandemic, are now answered exclusively by email or telephone, further aggravating the workload (interviewee 1).

2.1 Understanding the problem situation.

The challenges arising from the scenario found show that the establishment of the National Secretariat has led to changes in the structure of the HEI that impact the Stricto Sensu Postgraduate and Undergraduate secretariats and that standardization processes and procedures are being developed for subsequent implementation; the secretariats are going through a time of integration during the pandemic and doing their best to maintain services to students while they work on adapting and getting to know their new activities and responsibilities. The HEI and the secretariats do not want to retain the humanized character that sets them apart and generates value. However, there is an overload of work at the Stricto Senso secretariat, which needs a quick solution to meet the needs of the students, reducing the waiting time for responses to their requests. Therefore, it is understood that the problem consists of improving the efficiency of responses at the Stricto Sensu secretariat to reduce the waiting time for student requests while maintaining high satisfaction and differentiating itself from the competition.

3.0 DIAGNOSIS OF THE PROBLEM SITUATION

The approach is qualitative, and the diagnosis covers the Stricto Sensu postgraduate secretariat. In order to find the effective causes of the problem, we sought to deepen the discussions on the main latent demands to understand their practical implications and validate the problem posed, as suggested by Marcondes et al. (2017).

The method used for the empirical analysis is interviews (Creswell, 2010; Creswell, 2014; Yin, 2016). The empirical research corpus and data analysis planning involved the following field procedures: a) criteria for selecting and composing the corpus: by means of an intentional strategy, with a specific focus on the demands of the Stricto Sensu Postgraduate secretariat, two secretaries directly involved with the functioning of the secretariat were selected (Interviewees 1 and 2), in addition the corpus also involved, in a complementary way, the students themselves and, in particular, students who act as "bridges", assisting in the demands of colleagues with the secretariat; b) Units of analysis: these consist of the services considered to be a priority and which most demand responses from the secretariat, which will be the object of the chatbot proposal; c) Sources: in-depth, semi-structured interviews, communication emails sent by the President of the HEI and the National Pro-Rector of Research, internal documents from the national and Stricto Sensu secretariats; d) Data collection: the interviews were carried out in June 2020, conducted by eleven researchers - students and a lecturer in the Professional Master's discipline - who interviewed two secretaries directly involved in the functioning of the Stricto Sensu Postgraduate secretariat in the same meeting, using the Zoom platform. With a semi-structured script, the interviews followed a conversational mode with semi-structured and open questions (Yin, 2016), and internal documents were made available.

The data analysis plan included:

Data: the content of the interviews, which were recorded and transcribed.

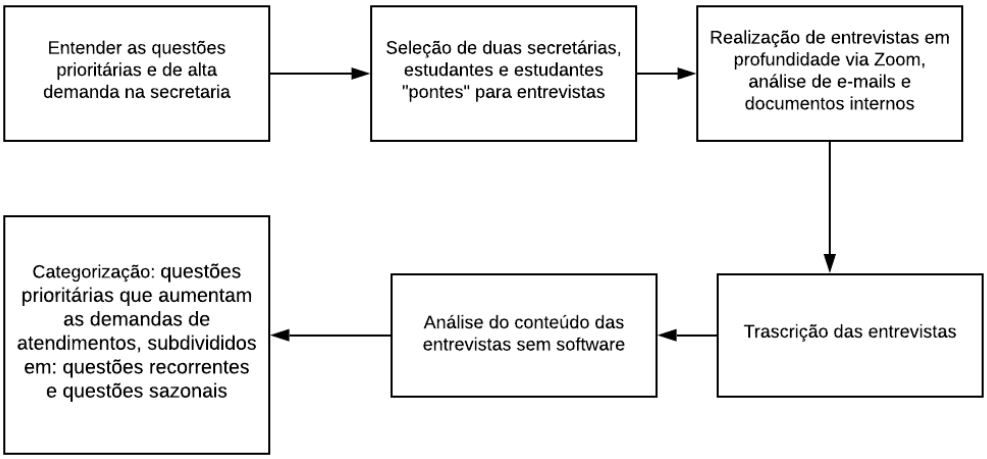
Content analysis: content analysis technique proposed by Krippendorff (2004) and Bardin (2007), without the use of software.

Categories: The primary category refers to the priority issues that increase demands on the Stricto Sensu secretariat.

The data was sorted into the following subcategories: recurring issues that substantially increase demand and can be resolved quickly via referrals and issues that substantially increase demand but are seasonal. The criterion adopted for analyzing the categories is semantic (Krippendorff, 2004; Bardin, 2007).

The corpus and the analysis plan are shown in Figure 1.

Figure 1. Steps to carry out the research.



Source: Elaborated by the authors (2021).

- Understand the priority issues and high demand in the secretariat.
- Selection of two secretaries, students, and student "bridges" for interviews.
- Conducting in-depth interviews via Zoom, analysis of emails, and internal documents.
- Transcription of the interviews.
- Content analysis of the interviews without software.
- Categorization: priority issues that increase service demands, subdivided into: recurrent issues and seasonal issues.

Process analysis was also used to visualize the flows between the secretariat's activities, with a clear-cut start and end, indicating actions and activities (Marcondes et al., 2017), via the Ishikawa diagram (Figure 2), used to investigate and identify several different causes of a problem and guide the allocation of resources and investments needed to correct it (Bilsel, & Lin, 2012), making it possible to visualize the causes and effects from the responses of Interviewees 1 and 2.

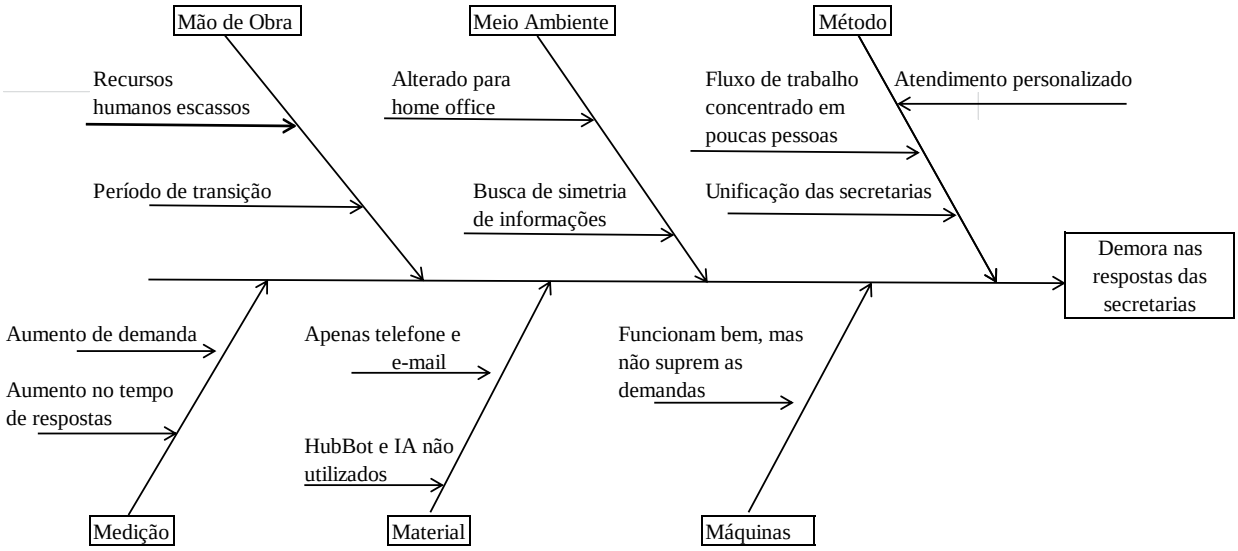


Figure 2. Causes and effects considered to indicate actions and activities.

Source: Elaborated by the authors (2021).

- Labor
  - Scarce human resources
  - Transition period
  - Increase in demand
  - Increase in response time
- Environment
  - Changed to home office
  - Search for symmetry of information
  - Only telephone and email
- Method
  - Workflow focused on few people
  - Personalized service
  - Unification of the secretaries
  - They work well, but do not meet the demands
  - Delays in the secretaries' responses

The bottom labels are:

- Measurement
- Material
- Machines

And the connecting node between the telephone/email and "They work well, but do not meet the demands" is:

- HubBot and IA not used

The findings of the integrated empirical and process analyses make it possible to link the findings, justifications, and arguments for the resulting propositions. Based on this integration, the logical diagram is shown in Table 1.

Table 1. Logical diagram of the problem situation analyzed.

	Findings	Conclusions	Hypotheses
Empirical analysis	Recurring issues that increase demand at the secretariat and can be solved quickly via referrals: financial solutions, questions about scholarships and information about the qualification and defense of master's dissertations and doctoral theses.	Two types of issues increase the demands on the secretariat: recurring and seasonal. Of these, the recurring ones have a greater impact on the secretariat's activities, while the seasonal ones can await a solution in the future.	Recurring issues should be prioritized and resolved quickly via referrals.
	Issues that increase demand at the secretariat, but are seasonal: doubts about the timetable, the calendar for the academic term - the start of classes, subject credits, enrolment of freshmen, and can await a solution in the future.		

Process analysis	Method: generates work overload.	The HEI doesn't want to lose its edge when it comes to serving students, but the method, the environment and the workforce create a work overload.	The development of a chatbot can maintain the HEI's differential and add value because it is a new technology that makes the method more flexible, expands the environment to the virtual and helps the workforce.
	Environment: impacted by the pandemic and in a transition phase, causing a backlog of activities.		
	Manpower: scarce, with the aggravating factor that the moment of transition and the pandemic do not support immediate hiring and training.		
	Material: uses classic resources, despite having underused tools.	Underused material can be added to the machinery, positively impacting the measurement, without completely losing its humanized character.	The material is no longer underused, but is integrated into the HEI's machinery to help answer recurring questions, partly maintaining the humanized character and individualized service to students.
	Machinery: does not meet demands, although the HEI has materials available that can be added to the machinery.		
	Measurement: it is necessary to reduce the waiting time for responses to students and free up the secretariat's time to deal with more complex problems, including unification with the Undergraduate secretariat.		

Source: Elaborated by the authors (2021).

The report produced in this diagnosis was presented, discussed, negotiated and approved in a Zoom meeting with the HEI's Pro-Rector and secretaries, which enabled the project to continue (Marcondes et al., 2017).

2.1 Proposed solution to the problem

We propose the implementation of a new practice for the Stricto Sensu Postgraduate Office, which includes the implementation of an innovative resource for this department: the development of a chatbot, considering that this is the best option for the HEI at the moment, given the tool's suitability for the educational system (Ranoliya et al...), 2017; Mikic et al., 2009; Abdul-Kader, & Woods, 2015; Dahiya, 2017) and the fact that chatbots are a prevalent resource, but are considered a relatively new technology (Dahiya, 2017).

Using a chatbot can bring the following advantages to a company: users can make their queries in natural language and receive information quickly and easily; the development and improvement of chatbot design can grow at an unpredictable rate due to the variety of methods and approaches used to design it, so they can be increased to meet demands beyond those initially anticipated; they offer

entertainment, save time and answer hard-to-find questions (Dahiya, 2017); offer a new opportunity for the company to provide individualized attention to users on a large scale and can encourage interactions between users and brands, which can result in better brand performance (Xu et al., 2017), in addition to influencing user behavior (Abdul-Kader, & Woods, 2015). These advantages serve the scope of the problem by showing that developing a chatbot is a viable solution for the secretariat in question.

The proposal takes into account the fundamental requirements listed by Marcondes et al. (2017) for its viability: (a) it meets the primary conditions, including user-friendly implementation, respect for legal requirements and adaptation to HEI policies with regard to stakeholders, compatibility with the HEI's culture, which has a humanized character and is recognized for being innovative and technological, and not changing processes beyond the secretariat level; (b) it provides concrete results (pre-defined and subsequently measurable); (c) the benefits of the solution are more significant than the implementation costs because the HEI has the tool at its disposal; (d) the Pro-Rector and others involved in the solution have decision-making power for implementation; e) the deadline for completion is January/2021, which can be brought forward with gradual implementation, and the changes resulting from the adoption of the chatbot have been accepted by the secretariats that are the actors directly impacted by the solution.

2.2 Action Plan for change

To provide discipline and rationality to the process, the plan specifies the necessary actions, how the proposal should be implemented, who will be responsible and involved, the deadlines, areas, and costs (Marcondes et al., 2017), as shown in Table 2.

Table 2. Action Plan

Proposal: Develop a chatbot that answers recurring questions via referrals			
Action	How	Responsible	Involved
Improving the efficiency of responses at the secretariat Reduce waiting times for students Free up secretariat time to deal with more complex issues	Phase 1: Develop a chatbot prototype; present the prototype to those responsible and involved for approval. 2nd Phase: Forward the prototype to the areas that will continue developing and deploying the chatbot	Phase 1: Subject teacher and Dean. 2nd Phase: Tech course lecturer and Pro-Rector	1st Phase: Stricto Sensu students and Secretariats. 2nd Phase: Tech students; Secretaries and Marketing and IT departments
Deadlines		Area	Costs
In July 2020, the project and prototype were sent to the tech teacher who, together with the students, will continue developing the chatbot in the second semester of 2020.		Tech course subject	Free of charge because there is a project for the transversality of technologies that involves the Stricto Sensu and Undergraduate Tech courses
Forwarding of the project to the Marketing and IT departments in December/2020		Marketing and IT departments	No cost because the teams are from the HEI and the functions, they perform involve the proposed solution
Tests with a Stricto Sensu class in December/2020 to January/2021		Stricto Sensu Secretariat	Free of charge
Implementation scheduled for January or February/2021		Marketing and IT departments with Stricto Sensu Secretariat	Free of charge

Source: Elaborated by the authors (2021).

The risk assessment shows that the action plan has a high probability of being fulfilled since all those responsible, involved, and areas are aware of the schedule, except Tech students, who will be informed at the start of the next semester about the inclusion of the chatbot project for the Stricto Sensu secretariat in the teaching plan for the subject or activity of curricular interest. The analysis points to a gain in benefit that exponentially outweighs the possible risks, which are almost null.

3. PROPOSED INTERVENTION

The development of the solution is based on the adaptation of the concepts of Lean Startup and Minimum Viable Product (MVP) (Ries, 2011; Moogk, 2012; Eisenmann et al., 2012; Lenarduzzi & Taibi, 2016; Alqudah & Razali, 2016).

The MVP concept applies to two dimensions of the proposed solution: selecting the tool for developing the chatbot and prioritizing the topics to be dealt with in the first version to be developed. In this way, the solution development tool must have minimal acquisition costs and simultaneously

provide rapid capacity for subsequent absorption of the development work by the technology and secretariat teams that will continue the chatbot's evolution.

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In line with the hypotheses arising from the diagnosis, the decision was made to intervene in recurring issues that increase demand and can be resolved quickly via referrals, i.e., to deal with topics whose requests can be answered directly by the chatbot, with answers that direct students to repositories in the student portal channels and the HEI's virtual environment, which resolve these issues and also make documents available directly, where appropriate. In this way, the solution responds to three requests for the MVP: information on the financial situation, scholarships, and qualifications and defenses.

These three categories have been inserted into a logical classification model in a spreadsheet, which makes it possible to define the steps the chatbot should follow and acts as a subsequent repository of types of requests as the tool evolves. The first component of the logical classification is the initial greeting and the request to identify the student, followed by the list of processes and sub-processes that can be started from the first identification. Table 3 shows the first logical level with the prioritized categories and themes.

Table 3. Prioritized categories and themes (types of requests).

ID	Category	Prioritized topics
1	Financial situation	Consultation of payments already made
		Consultation of payments due or outstanding
		IR payment reports
2	Scholarships	Institutional grants
		Funding grants
3	Qualifications and dissertation and thesis defenses	Template for dissertation or thesis qualification and defense
		Documents for submission of dissertation, thesis, and qualification report
		Form for requesting an extension of the deadline for the qualification or defense

Source: Elaborated by the authors (2021).

After defining the categories and their respective themes, the logical steps and the dialog interface suggested for adoption in the chatbot were developed, as illustrated in Figure 3.

<Chatbot>: Hi, what's up, student? Before I start with you, I would like to know who I'm talking to. Can you enter your CPF?
<Student>: Enter your CPF number in the text area (xxx.xxx.xxx-xx)
<Chatbot (if correct)>: Thank you, <student´s name>! How can I help you?
or
<Chatbot (if incorrect)>: Sorry, I couldn't find your registration. Could you please try again?

Figure 3. Example of the welcome dialog.

Source: Elaborated by the authors (2021).

For the interaction between the chatbot and students, a model based on predetermined options was adopted, in which the student is presented with the request options so that they can choose from among the categories, which one answers their question so that the answers are given as previously programmed, i.e., the chatbot does not respond like an open text question and answer model. The model with predetermined options was chosen because it is simpler to program and evolve, but a text intelligence model can be introduced later. Figure 4 shows the logic of the options offered by the chatbot.

<Student> has valid identification in the tool.
<Chatbot> Thank you, <student´s name>
<Chatbot> How can I help you?
< Option box 1> Financial situation
< If selected, it leads to the choice of prioritized themes >
<Option box 2> Scholarships
< If selected, it leads to the choice of prioritized themes >
<Option box 3> Qualifications and dissertation or thesis defenses >
< If selected, it leads to the choice of prioritized themes >

Figure 4. Example dialog and instructions for selecting options and theme groups.

Source: Elaborated by the authors (2021).

Once this was done, sessions were held to test the dialogs and options, which, after validation with those responsible and involved in this first phase, resulted in the prototype shown in Figure 5.

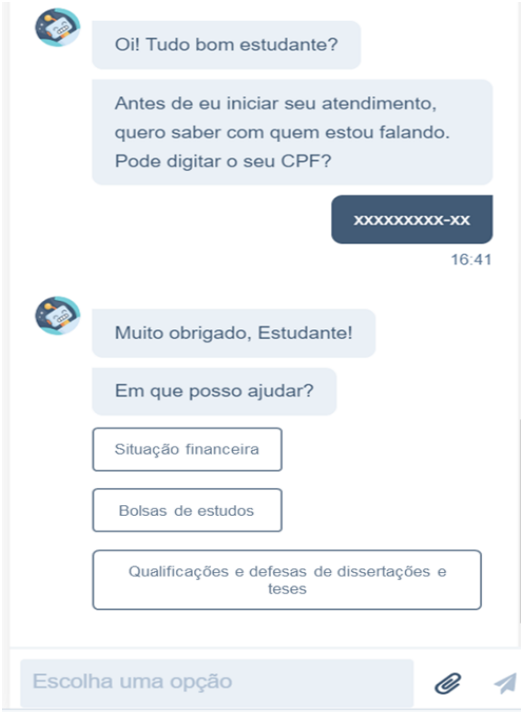

Figure 5. Presentation of the prototype with examples of real screens programmed.

Source: Developed by the authors (2021).

The development stages described were validated with the Pro-Rector, secretariats, and subject lecturer, and the chatbot prototype was approved. Although it is ready to be implemented, it will be forwarded to the areas that will continue the 2nd Phase of the project, according to the Action Plan shown in Table 2.

4. RESULTS

The first result obtained was the fulfillment of the objectives of the course focused on innovative practices within the Stricto Sensu. Both in terms of the process, which involved the effective participation of the group made up of 10 students and the lecturer, including the functioning of a multidisciplinary team as an accelerator for product development, and the development of the product itself, in an MVP version of a chatbot for the Stricto Sensu secretariat ready to be implemented. However, the time experienced during the pandemic does not favor the immediate launch of the MVP since automation and user input may not be well received or may be misinterpreted at a time marked by social distancing. It seems more prudent to try out this new tool with a small group of Stricto Sensu students in a process that makes the scientific and innovative nature of the proposal explicit. At a second stage, as planned in the Action Plan, at the beginning of the 2021 academic year, the MVP can be launched with the student and teaching community, without the risk of it being confused as a step

towards dehumanization, but as an initiative aimed at freeing the secretariat staff to reflect on their practice and continue with humanized care in more sensitive matters.

The second result was the contribution in organizing the practice and suggesting a technological option to overcome the existing challenges in integrating the secretariats, aggravated by the anomalous situation brought about by the pandemic. The initiative to create the chatbot, which came from the perception of students as users of the secretariat's services, converged with the integration of the HEI's secretariats and especially with the process, which was already underway, of systematizing the practices of the Stricto Sensu secretariat, which meant that the initiative was very well received by those directly involved.

The third result was progress in the strategic partnership between the Stricto Sensu Dean's Office and the Tech undergraduate program through developing a joint solution that includes integrated content and procedures, bringing a technological contribution to Stricto Sensu and reinforcing scientific procedures and reflections for the undergraduate program.

5. TECHNOLOGICAL AND SOCIAL CONTRIBUTION

The results and lessons learned provide at least three technological and social contributions. The first refers to the solution offered via chatbot to the problem faced, which can serve as an example to help other HEIs going through the same challenges and want to improve the efficiency of their secretariats or other departments that allow the inclusion of a chatbot. Even if they do not have the tool at their disposal, an analysis between costs (e.g., hiring more human resources versus developing a chatbot) and benefits (e.g., after implementing the chatbot, the tool can be improved to cover other categories, such as seasonal issues, among other advantages described in the problem-solution proposal that HEIs can obtain with the use of this tool) will indicate the feasibility of implementing the proposal.

The second contribution is in interdisciplinarity and integration between the Stricto Sensu program and the undergraduate program in Tech, motivating the exchange of knowledge between different educational levels through the transversality of the development and implementation of new technologies. In this specific case, students from two levels are immersed in understanding a phenomenon at the HEI of which they are a part, strengthening their sense of belonging, not least because there was explicit recognition and thanks from the Pro-Rectory for the mobilization of those involved in creating the chatbot to support the secretariat amid the pandemic.

The third contribution comes from the implementation of the chatbot, which involves several benefits for the HEI: responses from the Stricto Sensu secretariat will be more efficient, and there will be time available for the secretariat to deal with more complex problems; the waiting time for responses

to students will be reduced while maintaining the differentiating characteristics of the HEI and the secretariat, given that the chatbot provides individualized service; and, finally, high levels of satisfaction will be maintained, and the added value of the HEI will be increased about the competition because it is recognized for being highly human, innovative and technological.

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