

## THE DEPLOYMENT OF CHATBOT TO IMPROVE CUSTOMER SERVICE IN HIGHER EDUCATION INSTITUTIONS DURING COVID-19

*A IMPLANTAÇÃO DE CHATBOT PARA MELHORAR O ATENDIMENTO DAS INSTITUIÇÕES DE ENSINO SUPERIOR DURANTE A COVID-19*

*EL DESPLIEGUE DE CHATBOT PARA MEJORAR EL SERVICIO DE LAS INSTITUCIONES DE EDUCACIÓN SUPERIOR DURANTE EL COVID-19*

 Gustavo Silva Gonçalves<sup>1</sup>  
 Thiago de Luca Sant'ana Ribeiro<sup>2</sup>  
 Jose Eduardo Valladares Teixeira<sup>3</sup>  
 Benny Kramer Costa<sup>4</sup>

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### Abstract

**Objective of the study:** Present the customer service chatbot solutions implemented by MKT4EDU in three Brazilian HEIs.

**Methodology/Approach:** We adopted the case study as a research method. In-depth interviews with four employees of MKT4EDU, the company responsible for the changes implemented in the student support processes at 3 HEIs, collected the data for this technical report interviews.

**Originality/Relevance:** Describes in detail the chatbot implementation process adopted at these HEIs and the results obtained.

**Main Results:** After implementing the changes, by introducing automated bots available 24/7, HEIs met the pent-up demands for student services at a lower cost.

**Theoretical/ Methodological Contribution:** This study contributes to the chatbot literature by investigating how the education sector can implement this technology from five perspectives: interaction, information, accessibility, entertainment, and customization. We present the number of conversations between chatbot and users and the main topics addressed in these conversations.

**Social/Management Contribution:** By reporting the improvements implemented with chatbot technology in three different HEIs at a time of crisis, we believe we are collaborating with organizations that face similar situations and need to adapt to a new context.

**Keywords:** Chatbot. Higher education institutions. Covid-19. Service marketing.

### Resumo

**Objetivo do estudo:** Apresentar as soluções de chatbot de atendimento implementadas pela MKT4EDU em três IES brasileiras.

<sup>1</sup>PhD in Business, Universidade Nove de Julho. São Paulo – SP, Brasil. [gustavo@mkt4edu.com](mailto:gustavo@mkt4edu.com)

<sup>2</sup>PhD in Business student, Universidade Nove de Julho. São Paulo – SP, Brasil. [thiago\\_delucka@hotmail.com](mailto:thiago_delucka@hotmail.com)

<sup>3</sup>PhD in Business student, Universidade Nove de Julho. São Paulo – SP, Brasil. [j.e.teixeira@hotmail.com](mailto:j.e.teixeira@hotmail.com)

<sup>4</sup>PhD in Business, Universidade de São Paulo - USP. São Paulo – SP, Brasil. [bennycosta@yahoo.com.br](mailto:bennycosta@yahoo.com.br)

**Metodologia/abordagem:** Foi adotado, como método científico, o estudo de caso. As principais informações deste relato técnico foram coletadas por meio de entrevistas de profundidade com quatro colaboradores da empresa Mkt4EDU, responsável pela implementação das mudanças nos processos de atendimento aos alunos de três IES diferentes.

**Originalidade/Relevância:** Apresenta detalhadamente o processo de implementação de chatbot em IES e os resultados obtidos.

**Principais resultados:** Após as mudanças implementadas, as IES tiveram as suas demandas reprimidas atendidas e com redução de custo, tendo em vista que os bots atendem 24/7 e de forma automatizada.

**Contribuições teóricas/ metodológicas:** Este estudo contribui para a literatura de chatbot ao investigar o funcionamento da tecnologia no setor educacional sob cinco perspectivas: interação, informação, acessibilidade, entretenimento e customização. Como resultados da implantação, são apresentados número de conversas entre chatbot e usuário e principais assuntos abordados.

**Contribuições sociais / para a gestão:** Ao relatar as melhorias implementadas com o uso da tecnologia chatbot em três IES diferentes passando por um momento de crise, acreditamos colaborar com outras empresas e/ou projetos que estejam passando por mudanças institucionais semelhantes e que precisam se adaptar ao novo contexto.

**Palavras-chave:** Chatbot. Instituição de ensino superior. Covid-19. Marketing de serviços.

## Resumen

**Objetivo del estudio:** Presentar las soluciones de chatbot de atención al cliente implementadas por MKT4EDU en tres IES brasileñas y los resultados obtenidos.

**Metodología / Enfoque:** El estudio de caso se adoptó como método científico. La información principal de este artículo se recopiló a través de entrevistas en profundidad a 4 empleados de la empresa Mkt4EDU, responsables de implementar los cambios en los procesos de atención de estudiantes de 3 IES diferentes.

**Originalidad / Relevancia:** Presenta en detalle el proceso de implementación del chatbot en IES y los resultados obtenidos.

**Resultados principales:** Luego de implementados los cambios, las IES tuvieron sus demandas reprimidas cumplidas y con una reducción de costo, considerando que los bots atienden 24/7 y de manera automatizada.

**Contribución teórica / metodológica:** Este estudio contribuye a la literatura del chatbot al investigar el funcionamiento de la tecnología en el sector educativo desde 5 perspectivas: interacción, información, accesibilidad, entretenimiento y personalización. Como resultado de la implementación, se presentan la cantidad de conversaciones entre el chatbot y el usuario y los principales temas tratados.

**Contribución social / de gestión:** Al reportar las mejoras implementadas con tecnología chatbot en tres IES diferentes que atraviesan un momento de crisis, creemos que estamos colaborando con otras empresas y / o proyectos que están atravesando cambios institucionales similares y que necesitan adaptarse al nuevo contexto.

**Palabras-clave:** Chatbot. Institución de enseñanza superior. Covid-19. Marketing de servicios.

## 1 Introduction

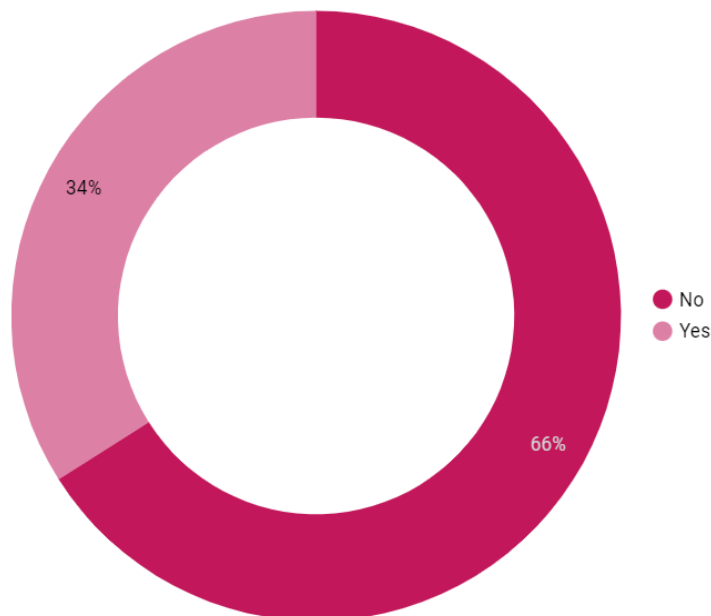
Across industries, companies are increasingly discovering the potential of conversational chatbots to automate and streamline processes, improve productivity, and drive more significant customer and employee engagement (Accenture, 2018). Although the first versions of chatbots were simple conversational platforms, the current AI (Artificial Intelligence) bots are much more powerful. Therefore, chatbots are a trend in the educational market, especially in their student service processes. In this sense, process robotization,

cognitive automation, or social robotics evoke several implications in terms of individual business models, along with their new attributes (Kaczorowska-Spychalska, 2019).

The Servion group predicts that by 2025, AI will provide 95% of all customer interactions, including live, phone, and online conversations that will leave customers unable to ‘identify the bot’. Despite positive projections and consolidated results in various sectors and regions, in Education, 66% of Higher Education Institutions in Brazil still do not have chat technology (see Figure 1) (Mkt4Edu, 2019).

**Figure 1**

*Use of chatbots by the 500 largest HEIs in Brazil*

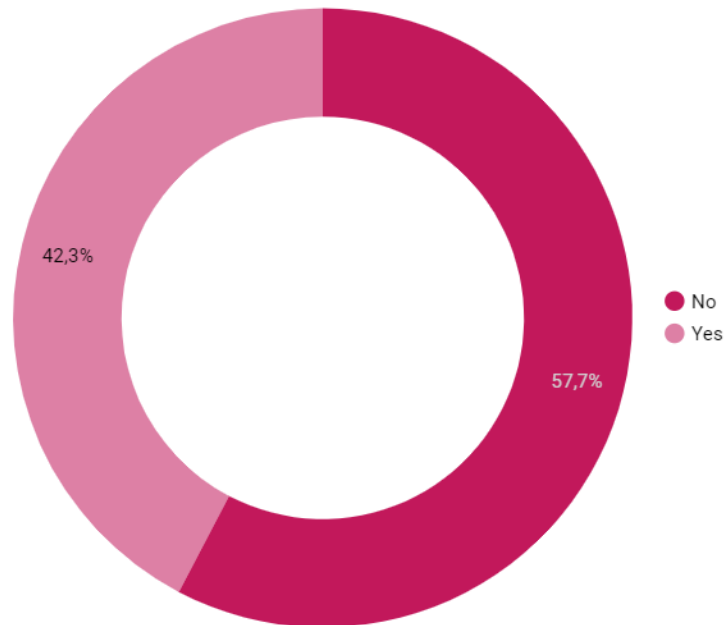


**Source:** Mkt4edu (2019)

It is essential to consider that even among Brazilian HEIs that have chat technology, more than half still cannot respond to messages sent by consumers. In practice, they have a small form in the format of a chat on their websites that receives this information, stores it, and distributes it among the organization’s stakeholders to use in future actions. Effectively, only 42.4% of the HEIs that have chat actually have chatbots (see Figure 2) (Mkt4Edu, 2019).

**Figure 2**

*Responsiveness of HEIs with chats in Brazil*



**Source:** Mkt4edu (2019)

The world has been affected by a pandemic with unprecedented dimensions since 2019, with the number of infected exceeding 182 million cases and 3.9 million deaths. The trend is no different in Brazil, with more than 18 million confirmed cases and 516,000 deaths (data updated through June 30, 2021 - Google COVID-19 Community Mobility Reports). Social isolation has been one of the measures most used by governments in several countries to contain the spread of the virus, along with travel restrictions, quarantine, and temporary closure of schools and shops. Social distancing reduces, or at least delays, the risk of a person being affected and needing care from the health system. Conversely, it can seriously damage the economy as a whole and the system of Higher Education Institutions (SEMESP, 2020).

Given this context, considering the commitment of HEIs to their students during the covid-19 pandemic, this technical report aimed to present the service chatbot solutions implemented by MKT4EDU in three Brazilian HEIs and the results. Such improvements were initially executed while answering questions related to the functioning and processes of the HEIs during the pandemic. The results reveal that with the opening of a more fluid communication channel with the customer 24/7, there was a decrease in calls in the call center and, consequently, a relief in demand and cost reduction.

This work is structured as follows. In addition to this introduction, the second section

presents the theoretical framework including chatbot literature, chatbot dimensions, chatbot trends, and service marketing focusing on the educational sector. In the third section, we discuss the method and highlight how we proceeded with the case study, and the actions applied during the chatbot implementation. Following, the next section presents the results found in management documents and the developed interviewees. Finally, we discuss contrasting the results with the theory raised and close with the considerations of this work.

## 2 Theoretical framework

This section presents the chatbot and service marketing theoretical frameworks used in this technical report.

### 2.1 Chatbot

Digital technologies have gone beyond the limits of what we used to think of as characteristics of a human being. They show a wide range of skills such as image recognition, thought patterns, decision making, communication, adjusting the context of a statement to a situation, etc., while engaging us in a fascinating journey into the unknown (Kaczorowska-Spychalska, 2019). They are complex interfaces based on the analysis of a natural language and rules of interpersonal communication, which allow better human-machine interactions and an intentional and defined dialogue conducted (Przegalińska, 2016).

In parallel, artificial intelligence (AI) technology is growing in today's society. Through sufficient and convenient mechanisms, marketers can address consumers' needs for online products and services (Seiders et al., 2007, Cheng & Jiang, 2021). In this sense, marketing strategies enacted in the digital space (websites, social media, and online platforms) use bots since as they suggest specific content or a way of interpreting and understanding reality. Unlike old market applications, current chatbots are more sociable, friendly, and real, and may even have a charming personality that efficiently guides a given buyer through subsequent stages of transactions, saving the buyer time and cognitive effort. The most advanced chatbots can advise buyers and suggest specific choices (products, services, brands) before the consumer realizes their needs and expectations (Kaczorowska-Spychalska, 2019). In this way, chatbots can be a key value for organizations, distinguishing a given brand from its competitors.

Generally, there was a dominant type of chatbot on the market whose function was limited to operating only in a variety of specific closed databases. However, new bots are designed to be dynamic and able to learn and change; therefore, companies/brands must

determine what boundaries to set as their bots evolve (Daugherty & Wilson, 2018). Several works are studying the subsequent levels of cognitive and emotional interactions (Tegmark, 2017). Riikinen, Saarijarvi, Sarlin & Lahteenmaki (2018) claim that AI is increasingly driving chatbots, so that companies take advantage of their data and combine it with natural language processing and machine learning in their interface, automatically providing customers with different types of information.

## 2.2 Chatbot dimensions

Next, we discuss the five main dimensions identified by Cheng & Jiang (2021) about chatbots.

1st Interaction. Communication between customers and brand chatbot agents in the digital space is critical. Similar to real-world human conversations, chatbots have transformed one-way customer purchases into two-way communication with virtual service agents, which has fundamentally changed the dynamics of marketing communication (Chung et al., 2018, Cheng & Jiang, 2021). Several actors argue that the interaction that occurs between the user and the company or other stakeholders is the main focus of value co-creation (Vargo & Lusch, 2004, 2008; Glyptou, 2020; Xie et al., 2020).

2nd Information. Every chatbot needs to carry information that the user needs or is useful in general. In the educational sector, chatbots can answer questions regarding registration documents, course schedules, financial issues, academic issues, etc. More and more users prefer to obtain information from AI-based digital tools than from other internet platforms, as AI digital tools offer relevant and quickly classified information that allows users to make better decisions (Brill et al. al., 2019).

3rd Accessibility. It concerns the ease and speed in responding to information raised by the user. As chatbot marketing activities mainly rely on messaging apps, they can help many customers get direct access to services anytime and anywhere (Cheng & Jiang, 2021).

4th Entertainment. Entertainment is a significant component of marketing efforts that induces a positive brand image, generates purchase intent, and increases brand awareness (Kim & Ko, 2010). Chatbots need to delight since users are not interested in cold applications that do not arouse engagement.

5th Customization. Chatbots that personalize messages that consider the history and individual preferences of each customer are proven to have better results. Personalization allows for a high level of exclusivity and novelty (Hinson, Osabutey, & Kosiba, 2018) and

acclimates consumers' cultural and identity differences (Lugosi, 2014; Sugathan & Ranjan, 2019).

### *2.3 Trends in the future development of chatbots*

Jepma (2019) suggested that the future development of chatbots will involve some critical trends:

Chatbots will be more widely applied in various industries. With the increasing development of AIs, chatbots will be able to perform more tasks as well as more accurately identify the doubts and intentions of the users with whom they are interacting. As a result, chatbots will be better prepared to respond to users and solve problems.

Companies will have more than one chatbot and will manage different technologies. Companies may have more than one chatbot technology developed for different purposes, such as internal service, external service, scale measurement surveys, etc. In addition, the management of chatbot technologies should not be restricted to IT teams.

Organizations will have to deal with different message channels. In ideal conditions, chatbots should integrate messages received from different channels (for example, websites and WhatsApp). When integration is not possible, human activity will be necessary to intervene and respond to the necessary demands.

### *2.4 Marketing of services for the educational sector*

According to Giglio (1996), “the customer values the services he receives according to his expectations, and not according to the evident functions of the product or service”. This means that the value of the same service can vary between customers, depending on the purchase motivation, the intensity of the purchase desire, and the customer's prediction about how the service will be performed. Among the factors that service consumers consider important to formulate their concept, Normann (1993) highlights “the nature and quality of the contact employee, physical facilities and equipment used by the organization, the way they are presented, and the identity of other customers”. These aspects are part of the benefits that the service consumer expects to receive.

All the developments in the educational sector have resulted in a huge change in the attitude of institutions about marketing. What was previously considered something mercantile, even seen with a certain disregard by higher education institutions, in recent decades has become seen as a means of salvation to ensure that the institution survives simply by adopting

marketing principles (Souza, Arantes, & Dias, 2005). According to Coimbra (2004), this change in attitude occurred due to the increase in competition in the sector, triggered by the improvement of the population's economic situation and by the expansion of the possibilities of access to education, especially at higher education.

The internet accelerated the communication process and changed the way consumers relate to brands. Offline marketing actions were characterized as a one-way street (advertiser to the consumer), while online marketing provides two-way communication, with interaction, where the consumer has a more active role in marketing communication (Stewart, & Pavlou, 2002). Google released a survey conducted in 2011 on the process of choosing an HEI by consumers and the data revealed that 70% of the research is done through information collected on the internet on the websites of higher education institutions and through opinions made available on networks, social networks, and that people start this research process six months before the date they intend to start a higher education course.

### 3 Method

In this section, we present methodological data regarding data collection and analysis, and the process of actions implemented in the solution.

#### 3.1 Case study

We adopted the case study as a scientific method for this technical report. According to Yin (2015), since the study is performed in its natural environment and the researcher does not exercise control over the researched environment, the case study method allows for preserving the characteristics of the events in the administrative and organizational processes of a company. We collected the primary information in this technical report through in-depth interviews with four employees of the company Mkt4EDU (see Table 1). This company is responsible for implementing changes in the processes of service to students from three different HEIs (See table 2). The period between implementation and analysis of the results obtained was April 10 to May 15. The actions focused on automating the service process of the HEIs, which during the pandemic could not have face-to-face hours. Additionally, the pandemic increased the volume of changes, and HEIs did not have the physical capacity to serve all students who called to ask for information and questions about changes in the functioning of the HEI. We also analyzed internal management documents that contained the numbers of daily conversations, main topics covered, number of users per week, and average messages per



conversation of chatbots. Thus, this work relied on the experience of the interviewees and the analysis of the documents mentioned here.

In temporal terms, this study is characterized as cross-sectional since it contains data collected within a single period. Regarding the approach, this technical report fits as descriptive, as it presents and describes the actions implemented by the three analyzed HEIs.

**Table 1**

*Interviewees*

<b>Position</b>	<b>Company</b>
CEO	MKT4EDU
Project Manager	MKT4EDU
B.I Analyst	MKT4EDU
IT analyst	MKT4EDU

**Source:** The authors.

**Table 2**

*HEIs*

<b>Code</b>	<b>Who is</b>
HEI A	The group offers one of the most fundamental tools to truly learn and take the first step towards a professional future: practice. With a 50% practice-oriented curriculum, HEI students, whether from undergraduate, graduate, or technical courses, expand their learning possibilities and assimilate content more efficiently and with much more ease.
HEI B	Educational Group is a private higher education institution, accredited by the Ministry of Education (MEC) in 1965 in Varginha (MG). It offers undergraduate and graduate courses, both in person and at a distance, in the areas of human, exact, and biological sciences.
HEI C	Teaching Network is a non-profit private higher education institution in Brazil. It has higher education courses (in person and EAD undergraduate courses and classroom and EAD postgraduate courses) and technical education.

**Source:** The authors

*3.2 Actions implemented*

We utilized the IBM Watson Assistant for the solution. For implementation, we followed five steps:

1. Analyze the briefing of each HEI to identify the main questions that the HEI intends to answer with the chatbot to contacts, subscribers, and students currently enrolled.

2. Create a bot persona to understand how it will position itself in the face of customer questions. For example, will the bot be relaxed or serious and objective? Information like this is defined by the persona.
3. Create and develop the bot. Having in hand the set of information of the main questions to be answered, the bot will be created with an answer for each item. For example: How do I talk to my course coordinator? Will I get a discount? Will there be a call? All these questions will have answers to address people's queries without needing human assistance.
4. Seek the HEI's approval so that the entire structure of the previous step goes to the platform. With this schedule saved, all questions and answers will go to the platform where the bot is hosted.
5. Deploy the chatbot on the IES website. A script code is sent to the customer along with a tutorial for them to upload the chatbot correctly on their website.

The chatbot has a learning time that varies according to the demand the bot receives. In general, in a few hours, the bot can be online properly. However, it is essential to understand that the chatbot made by AI is a "child" that needs someone to teach everything that must be done in its beginning.

## 4 Results

In this section, we present the results obtained after implementing the chatbot in each of the HEIs.

### 4.1 HEI A

Based on management documents, we present the number of conversations per day, the main topics covered, and the specific requests for the HEI A secretariat. We also introduce the main points raised during the interviews with those responsible for implementing the chatbot technology.

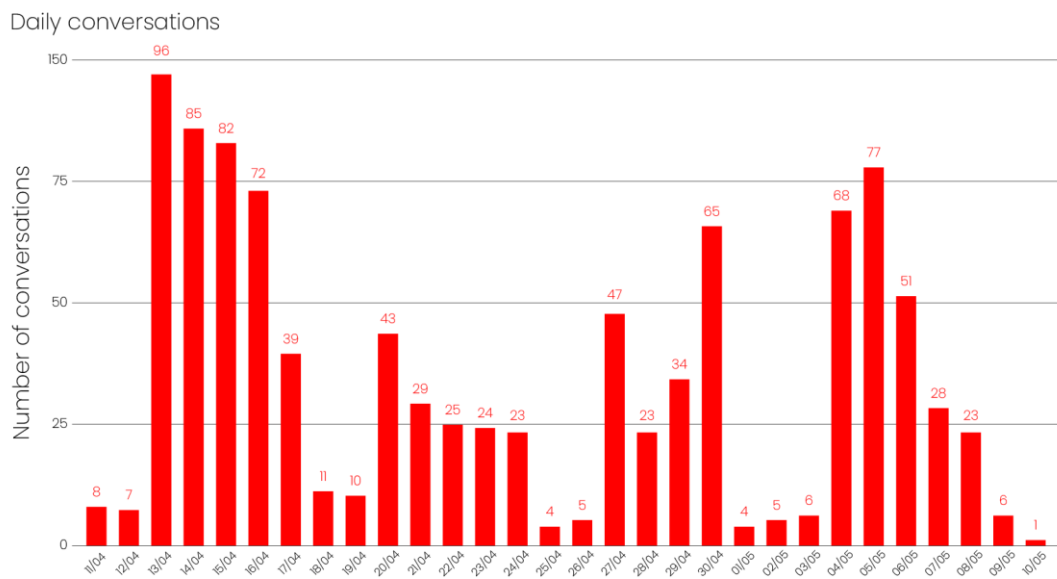
Between April 11 and May 10, 1,001 conversations took place with the chatbot, with the main topics covered being requests for the secretariat, issuance of slips, tuition reduction, and financing. Figures 3 and 4 display these results.

The CEO of MKT4EDU highlighted that "the volume of daily conversations was high during April and May 2020, with drops only on weekends. It would need to invest a

considerable amount of resources in call centers and training to meet all the pent-up demands caused by the crisis scenario of the covid-19 pandemic”. The analyst added that “the volume of conversations was constant, not having a rapid drop. This indicates a large pent-up demand or a constant demand. In addition, it indicates that the technology has been working well considering that the flow of service was continuous”.

**Figure 3**

*Number of conversations per day at HEI A*

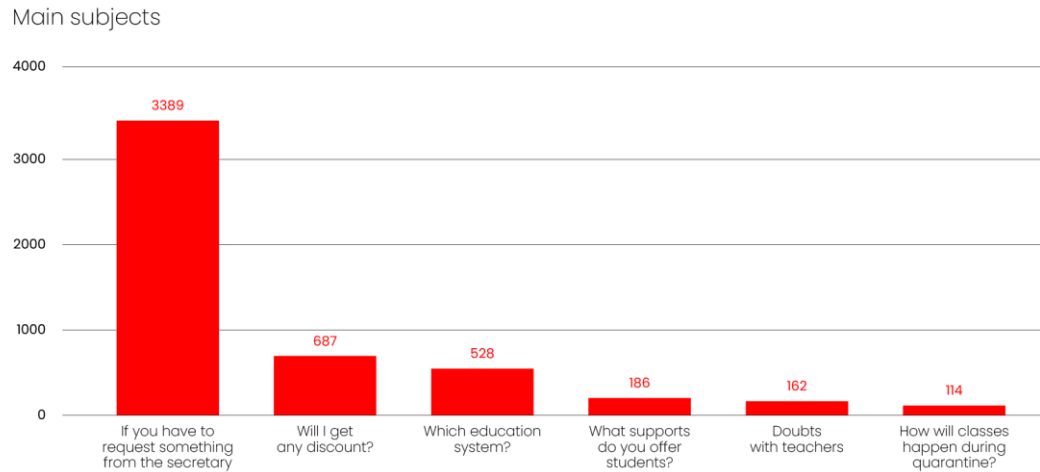


**Source:** The authors

In addition to the secretariat requests, many users had financial-based queries (for example, discounts and financing) and what would be the learning method used during the pandemic period (for example, face-to-face, distance learning, or hybrid).

**Figure 4**

*Main subjects of HEI A*

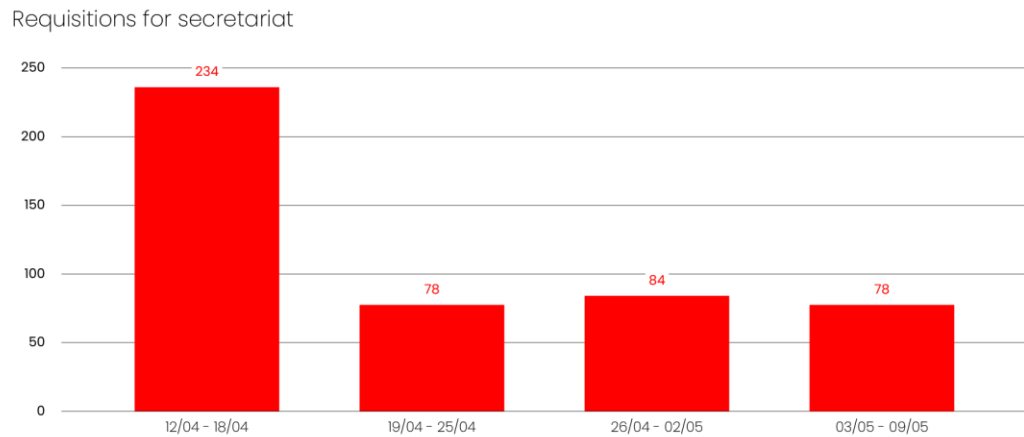


**Source:** The authors.

The requests for the secretariat decreased considerably over the weeks (see Figure 5), showing that the large number could be a repressed demand of the days without classes. Chatbot solved this stored demand quickly, adequately, and at a low cost. For the MKT4EDU project manager, “the rapid drop in demands for the secretariat in a short period of time adds even more value to the investment made in chatbot technology” and adds “we solved the pent-up demand, and the chatbot started to focus on the normal day-to-day demands of HEI students”.

**Figure 5**

*Requests for the HEI A secretariat*



**Source:** The authors

#### 4.2 HEI B

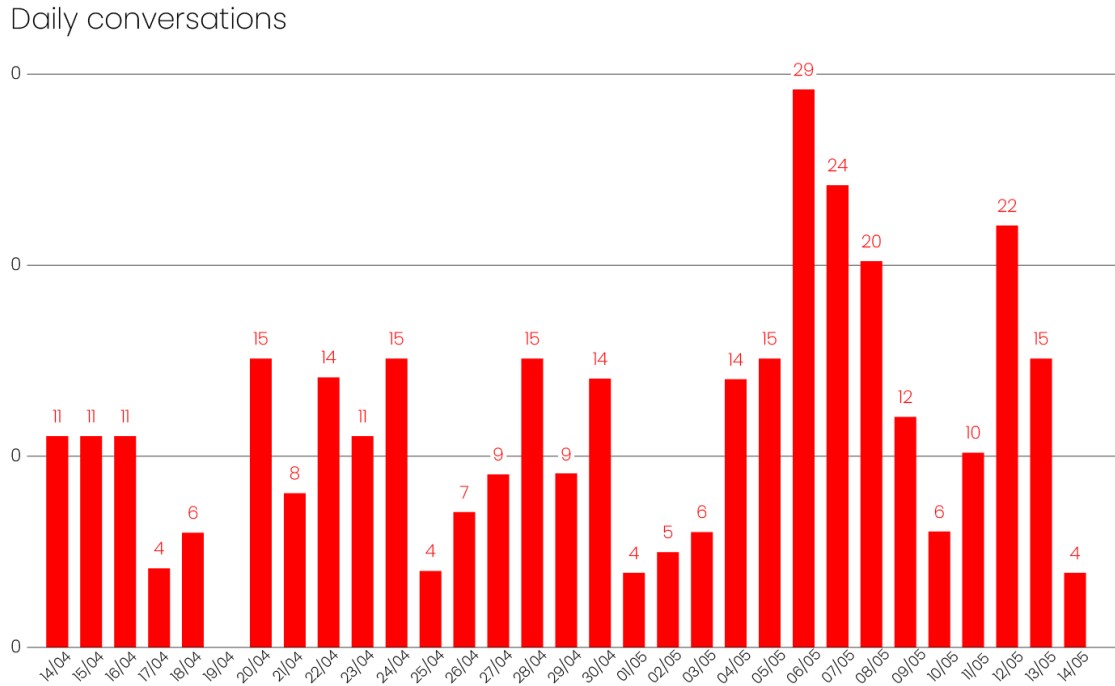
Based on management documents, we present the number of conversations per day, the main topics covered, and specific conversations regarding HEI B login. We also submit the main points raised during the interviews with those responsible for implementing the chatbot technology.

Between April 14 and May 14, 350 conversations took place with the chatbot, with the main topics covered being information about login, tuition discount, and information regarding classes during the quarantine period. Figures 6 and 7 show these results.

The project manager commented that “conversations with the chatbot grew as contacts became more familiar with the tool. Several issues that generated doubts were addressed, such as Login and Discount. Regarding COVID-19, there was a lot of interaction and resolution of doubts about how classes would proceed during the quarantine and about doubts related to COVID-19. The education system and support for students, for example, were some of the topics related to the pandemic”.

**Figure 6**

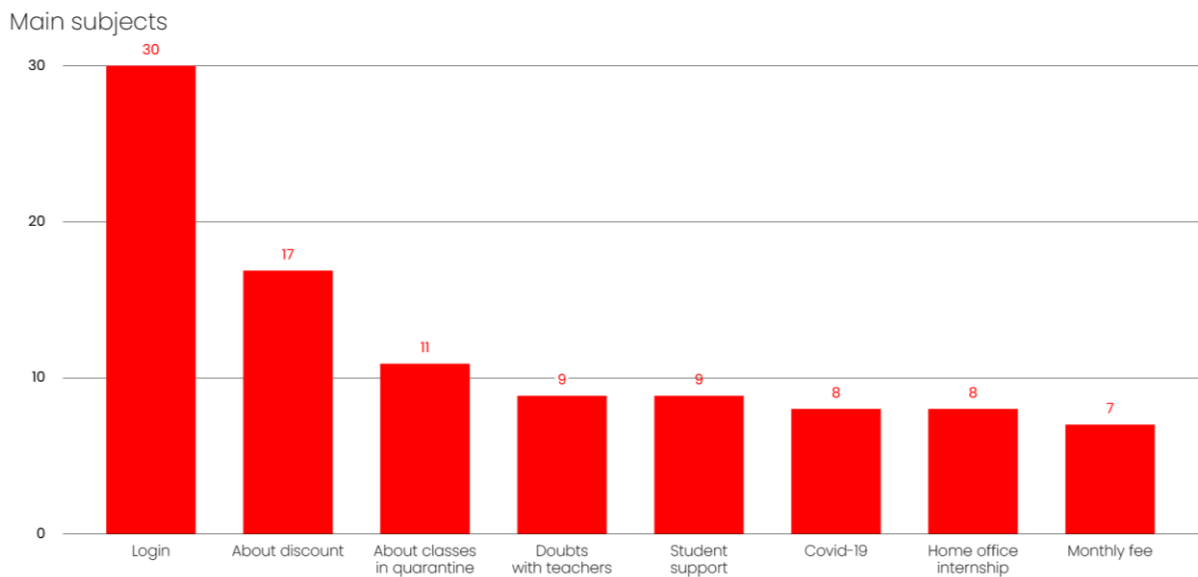
*Number of conversations per day at HEI B*



**Source:** The authors

**Figure 7**

*Main subjects of HEI B*

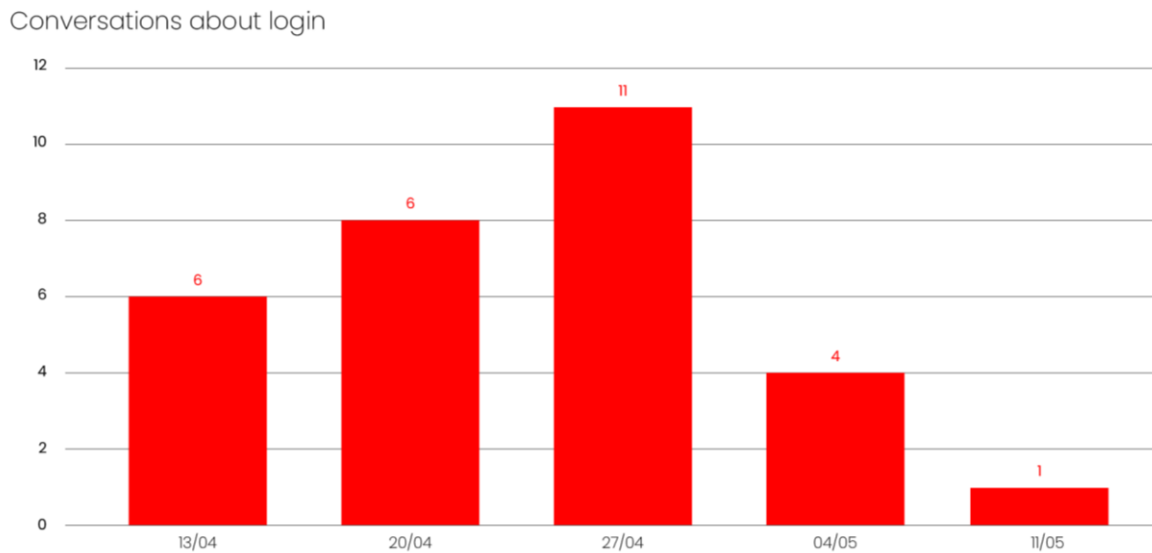


**Source:** The authors.

Searching for how to log in rose, however as the contacts were learning and the repressed demand was being resolved, this issue gradually began to be overcome (see Figure 8). The IT analyst highlighted that “once the majority of the student community understands how the platform works, in addition to reducing demands for questions about this specific topic, there are benefits for the users. The users can access the platform with greater ease and better use all its functionality”.

**Figure 8**

*Conversations about HEI B Login*



**Source:** The authors

The IT analyst explained that “there was a pent-up demand from contacts needing to resolve access to Login into the system. With the chatbot, in a few weeks this demand was overcome.” This result clarifies the service potential of the technology implemented, as it is capable of speeding up and resolving poorly resolved processes, and at a much lower cost than previously spent.

**4.3 HEI C**

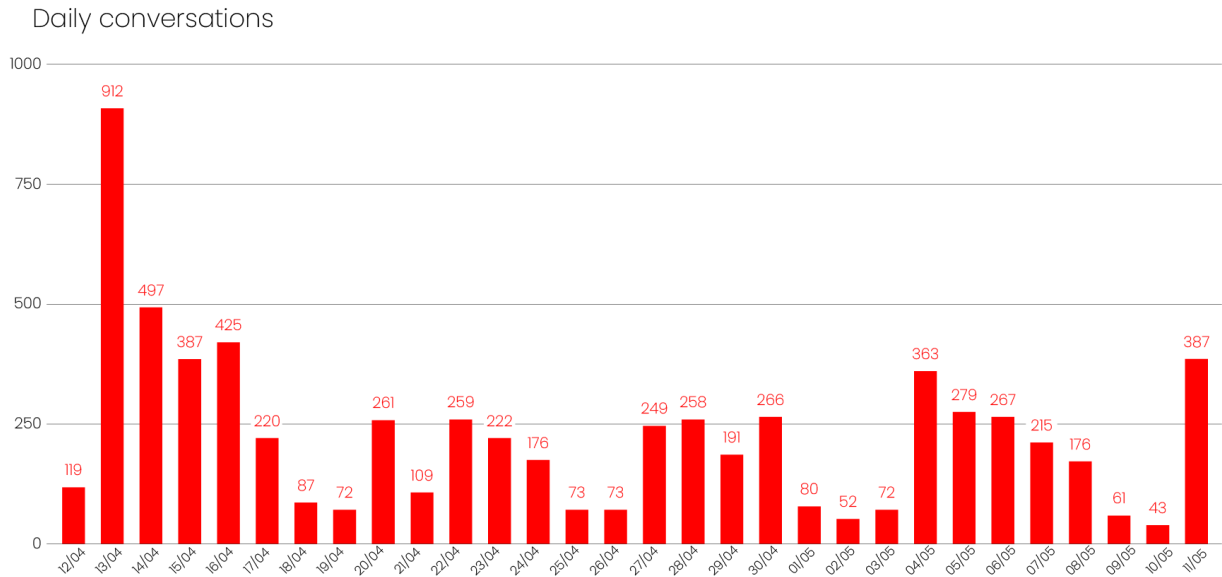
Based on management documents, we present the number of conversations per day, the main topics covered and the specific requests for the secretariat of IES C. We also bring the main points raised during the interviews with those responsible for the implementation of chatbot technology.

Between April 11 and May 10, 6,958 conversations took place with the chatbot, with the main topics covered being requests to the secretary, tuition discount, education system, and support and questions with teachers. Figures 9 and 10 show these results.

Once again, the bot played a key role in resolving the pent-up demand for secretarial services (see Figures 9 and 11). For the CEO of MKT4EDU “having 912 conversations in a single day attended by a robot with the idea of the dimension that the tool represents. The drop in conversations by half overnight indicates the effect that technology had early on, solving the accumulated pent-up demand”.

**Figure 9**

*Number of conversations per day at HEI C*



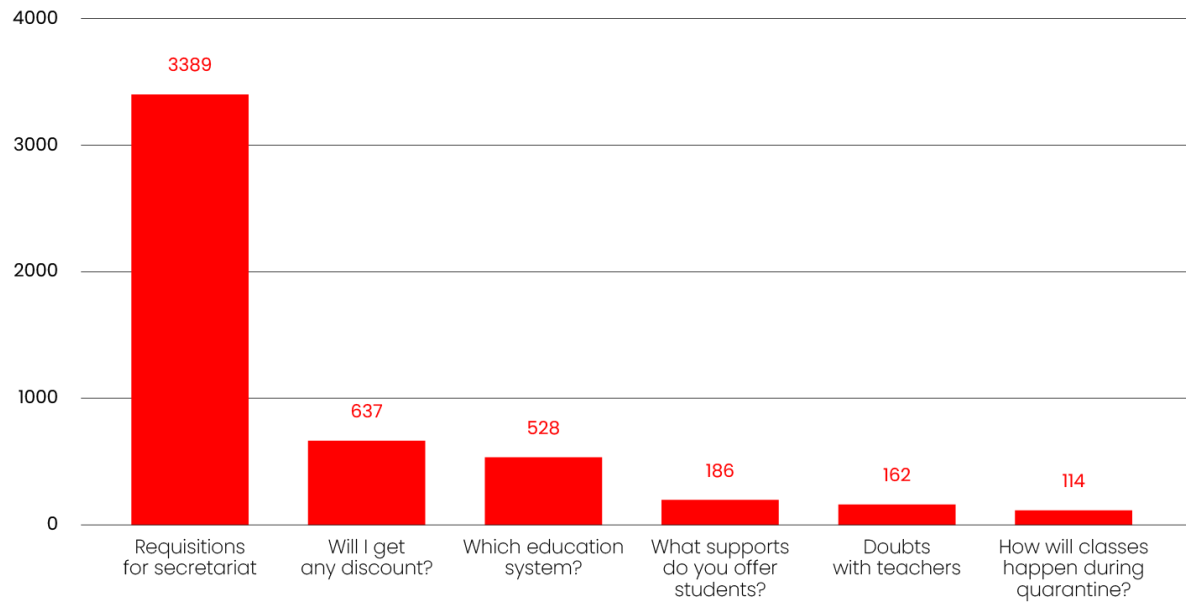
**Source:** The authors.



**Figure 10**

*Main subjects of HEI C*

Main subjects

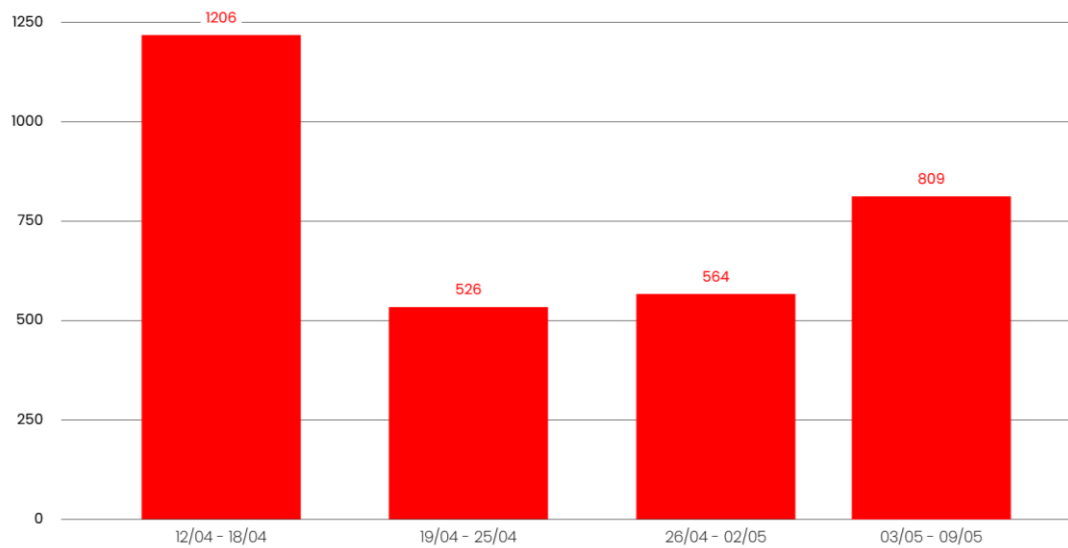


Source: The authors.

**Figure 11**

*Requests for HEI C secretariat*

Requisitions for secretariat



Source: The authors.

Despite considerably decreasing the specific demand for the secretariat, in the other weeks, the bot continued to receive considerable demands in HEI C. This means that there is a continuous flow of demands from students in this organization; therefore, the chatbot played an essential role in meeting the continued service.

Following, we present our discussions on the results presented after we implemented the chatbot in the three HEIs.

## 5 Discussions

The whole world has faced many challenges caused by the COVID-19 pandemic. In Brazil, as of May 1, 2020, there were 96.9 million requests for emergency assistance to the federal government (Dataprev). A survey conducted by Mkt4EDU (2020) with 34 different HEIs from 4 regions of Brazil (Northeast, Midwest, South, and Southeast) identified that of candidates enrolled in HEIs, 89% are financially affected in some way. It is evident that the current scenario is complex, full of challenges, and it needs innovative and creative solutions so that it is possible to combine cost reduction and an increase in productivity in the solutions.

Since face-to-face service was not initially possible, utilizing chatbots solved the quarantine problem and generated several benefits for HEIs. Unlike human service, bots do not rest and, therefore, work 24 hours a day, and are an accessible and dynamic tool that provides instant answers (Chung et al., 2018, Cheng & Jiang, 2021). Bots are also capable of assisting candidates in the purchase journey by directing courses to customers based on entered keywords. The information suggested to the user is provided quickly, accurately, and with enchantment, since the chatbots are configured not only to send messages but also to entertain the user and generate a satisfactory experience.

There are also economic benefits in cost reduction when factoring that the call center does not need as many employees (Rodrigues et al., 2021). Chatbots can be integrated with CRMs and other communication platforms, such as Facebook Messenger, Skype, Telegram, Store Portal, among others (Jepma, 2019). According to a report by consultancy Juniper Research (2018), the adoption of Chatbots in the retail, banking, and healthcare sectors will provide cost savings of US\$ 11 billion per year by 2023. This savings is because companies will drastically reduce response and interaction times by phone and social channels. The report predicts that companies in these industries will save 2.5 billion hours by 2023. Other areas such as the Education sector expect similar results.

Employing chatbots enhances relationships between customers and HEIs as it generates a two-way interaction, giving the consumer a more active role in marketing communication (Stewart, & Pavlou, 2002). The most advanced chatbots, such as those implemented in this research, can answer certain questions, solve problems, and understand users' intentions. The chatbot becomes a technological reflection of man, which leads to the dehumanization of what is human and the humanization of technology (Kaczorowska-Spychalska, 2019). Interaction in this sense is high, and at times consumers may not even realize they are talking to a bot.

Our results identified that most of the topics addressed by users in the chatbot were previously resolved by a series of call center and secretary employees. Answers regarding discounts, monthly fees, and administrative demands started to be answered and solved easily by bots. In addition to cost reduction, the solutions were more objective and faster, reducing the frustration that service failures often cause to consumers. Many of these administrative and financial problems generate stress for students when they have long queues and often end up not receiving the desired solution. With the use of a chatbot, these doubts are resolved with greater speed and, in addition, the standardization of responses according to defined protocols largely avoids the error of passing inaccurate information to students or passing differing information on the same topic to different students.

In general, the chatbot solution solved the problem caused (or accentuated) by the pandemic, solving the bottleneck of demands, reducing costs, and being fast and efficient.

## 6 Final considerations

In evaluating the improvements by implementing chatbot technology in three different HEIs going through a moment of crisis, we believe it is beneficial to collaborate with other companies and / or projects undergoing similar institutional changes that need to adapt to the new context. With such implementations made and reported, we also hope to lessen skepticism about the boundaries of technology use. Many managers feared the idea of having a robotic service, but the crisis forced them to rethink scenarios and break paradigms, and the consolidated results were encouraging.

### 6.1 Contributions to practitioners

This technical report provides some practical implications. We highlight two of them.

First, we present the step-by-step implementation of the IBM Watson Assistant chatbot technology. HEI managers and marketing professionals (student acquisition and retention) can

benefit from this technology, improving communication with their users and reducing bottleneck costs in their organizations. Given that bots are available 24/7 and automated, this technology is valuable in times of health crisis such as Covid-19. Chatbots provide a safe service (without physical contact), fast and automatically.

Secondly, in light of our results, these professionals can generate insights into what are the main issues that demand time and care in their HEIs and, consequently, think of solutions that relieve care.

### *6.2 Social contributions*

Chatbot technology collaborated with social distancing between marketing professionals, HEI secretariats, and users (students and candidates) in critical moments of the Covid-19 pandemic. Chatbots allowed HEIs to continue to work on attracting and retaining students, and for new people to enroll in HEIs and follow the dream of higher education, even amidst the pandemic crisis. This means that chatbot technology has contributed so that higher education did not stop in Brazil and, more than that, continued to function safely.

### *6.3 Future research agenda*

We believe that research on chatbots in higher education institutions should not be limited to the firm level but should also be analyzed at the level of society and other stakeholders. In this sense, we propose in the form of questions a series of possibilities for future research.

#### 1) How can chatbots in HEIs be analyzed in the light of institutional theory?

The institutional field is the recognized area of institutional life: key suppliers, consumers of resources and products, regulatory agencies, and other organizations that produce similar services or products “and only exist” insofar as they are institutionally defined (DiMaggio & Powell, 1983). A bibliometric work on institutional theory in HEIs identified five research strands through the mapping of keywords. Namely, a) focus on responses to institutional and stakeholder pressures; b) efficiency and productivity in HEIs; c) exploration and application of models within the higher education sector (quality and satisfaction measurement, for example); d) management and strategy of HEIs (looking at higher education as a business and its sector as a market, and the challenges that sector players face); and e) innovation, knowledge transfer, and entrepreneurship (Hsu et al., 2018). These clusters related

to institutional theory in HEIs can serve as a starting point for further research on the implementation of chatbots and their impacts on society.

2) How can chatbots help in technological governance and cooperation between HEIs and other organizations in terms of skills and knowledge in chatbot use?

The elements of technological governance involve the managerial and structural resources that define the current stage of a company's management concerning local and global open innovation activities, impacting the dynamic capacity of cooperation (Costa & Porto, 2014). There are some Cooperation Management Models analyzed in Brazil, such as the Brazilian Compressor Company [Embraco]. The model is organized into 11 administrative practices, namely: definition of the portfolio of cooperative projects; selection of technology partners; technological cooperation planning; definition of cooperative contracts; physical and financial structuring; structuring work teams; execution of cooperative projects; monitoring of cooperative activities; evaluation of technological partnerships; knowledge transfers; and guarantee of intellectual property (Costa, Porto & Feldhaus, 2010). For companies to develop technological governance and dynamic capabilities related to innovation, it is necessary to understand their dispersion and recognition.

Companies need to engage in innovative interactive processes (Costa & Porto, 2014). It seems opportune to investigate Cooperation Management Models in HEIs that have implemented or are implementing chatbots in their student recruitment and retention processes. Considering that, in general, innovative processes do not happen in isolation, it seems reasonable to investigate how the interactive processes between HEIs and other actors develop in the implementation of chatbot technology.

3) How can HEIs' relationships be improved with other university stakeholders, taking advantage of urban and regional stakeholder networks within the innovation ecosystem?

Regions are increasingly being seen as ecosystemic agglomerations of organizational and institutional entities or stakeholders with conflicting socio-technical, socio-economic and socio-political goals, priorities, expectations and behaviors, as well as converging (cooperative), exploration and implementation of actions, reactions, and interactions (Carayannis et al., 2017). A mapping of the literature on Stakeholder Theory in the context of Urban Management uncovered three important strands of research: a) sustainable urban strategy; b) power of networks; and c) urban marketing (Beck & Storopoli, 2021). It is

advantageous to understand how the technological structure of chatbots influences ecosystem agglomerations in different ways such as biosecurity, conflicts, and cooperation. In addition, the design of the chatbot structure impacts the way HEIs are marketed in attracting students, consequently impacting the management and urban marketing of cities and regions.

#### 4) How do chatbots co-create value between HEIs, customers, and other stakeholders?

Value co-creation is a comprehensive concept that describes collaboration between multiple stakeholders (Prahalad & Ramaswamy, 2014; Ranjan & Read 2016) that creates value and generates mutual benefits (Ind et al., 2013). In experience-oriented segments, such as education and tourism, value co-creation is structured in five dimensions: significance (reflects an individual's belief in how important, meaningful, and worthwhile service is); collaboration (understood as cooperation for mutual gain between two or more actors); contribution (the belief about the extent to which a beneficiary shares its resources to achieve desired outcomes); recognition (represents the recognition of both intrinsic and extrinsic beneficiaries of its essential value in the value co-creation process); and affective response (represents emotional reactions -fun, stimulation, enjoyment, among others) (Ribeiro et al., 2021). It seems valuable to analyze how chatbot technology co-creates value between HEIs and external users (candidates for the entrance exam and students already enrolled), and between HEIs and internal clients (their employees answering questions about internal bureaucracy through the chatbot).

#### 6.4 Limitations

First, we highlight the choice of only higher education institutions. New research may consider chatbot services in other educational institutions, such as private high schools and technical schools. Further research may also consider sectors other than education (e.g. tourism – see Li et al., 2020). Another important limitation is that we only analyzed the role of the chatbot in the external environment. New researchers may consider the role of the intra-organizational chatbot, with chatbots able to collect relevant information from employees such as schedules and responsibilities (Rajdev 2017) using dialog trees, which structure the conversation and systematically extract the necessary information (Kaiser et al. 2019). Finally, we use chatbot technology in just a single channel. We recommend that in further research, scholars consider two or more different channels in the use of the chatbot, comparing the results between them and analyzing the process of integrating conversations and problem-solving in

an integrated way. Additionally, it is important to analyze the real need for human intervention during the integration of these different channels (Jepma, 2019).

### Authors' contributions

Contribution	Gonçalves, G. S.	Ribeiro, T. L. S.	Teixeira, J. E. V.	Costa, B. K.
Contextualization	X	X	X	X
Methodology	X	X	X	----
Software	----	X	----	----
Validation	X	X	X	----
Formal analysis	X	X	X	----
Investigation	X	X	----	----
Resources	X	-----	----	-----
Data curation	X	X	X	----
Original	X	X	X	----
Revision and editing	X	X	X	X
Viewing	X	----	X	X
Supervision	-----	-----	X	X
Project management	X	-----	----	-----
Obtaining funding	----	----	----	-----

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