



WORKER ENGAGEMENT IN CHATBOT IMPLEMENTATION AT A UNIVERSITY

ENGAJAMENTO DE TRABALHADORES NA IMPLEMENTAÇÃO DE *CHATBOT* EM UMA UNIVERSIDADE

COMPROMISO DE LOS TRABAJADORES EN LA IMPLEMENTACIÓN DE *CHATBOT* EN UNA UNIVERSIDAD

ABSTRACT

Objective: understand the engagement of workers in a chatbot implementation project to serve users at a university in Rio Grande do Sul.

Methodology: case study, exploratory and qualitative, carried out in a higher education institution. Data collection techniques: semi-structured interviews, focus group and document analysis. The data organized with the support of the NVivo®11 software, triangulated and analyzed through content analysis.

Results: indicate that there was the engagement of workers, but, for some factors, this is presented in different ways, demonstrating oscillation in the state of engagement throughout the project.

Limits: lack of full chatbot implementation for user service.

Theoretical implications:

Contributions to the advancement of knowledge are pointed out in relation to the fluctuation of engagement in a technological innovation project, as well as demonstrating the importance of the organization and the people management area to analyze the best resource strategies and work demands; demonstrates the possibility of deepening qualitative research on worker engagement; highlights the possibility of expanding studies that seek to understand engagement in a given period of time, considering a specific activity, through the application of the recognized theoretical model JD-R (Bakker & Demerouti, 2008) of investigation of engagement.

Practical implications: demonstration that the investigation of workers' engagement in specific periods or specific activities can help in a more qualified way in people management strategies.

Originality: it shows that engagement can be an oscillating state that depends on several factors, thus showing the uniqueness and significance of this study.

Keywords: Engagement at work. Artificial intelligence. Project. *Chatbot*. Higher education institution.

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RESUMO

Objetivo: compreender o engajamento dos trabalhadores em um projeto de implementação de *chatbot* para atendimento aos usuários de uma universidade do Rio Grande do Sul.

Metodologia: estudo de caso, exploratório e qualitativo, realizado em uma Instituição de Ensino Superior. Técnicas de coleta de dados: entrevistas semiestruturadas, grupo focal e análise documental. Os dados foram organizados com o apoio do *software* NVivo®11, triangulados e analisados por meio da análise de conteúdo.

Resultados: indicam que houve o engajamento dos trabalhadores, mas que, por alguns fatores, este se apresenta de formas distintas, demonstrando oscilação do estado de engajamento no decorrer do projeto.

Limitações: a falta da implementação completa do *chatbot* para o atendimento aos usuários.

Implicações teóricas: contribuições para o avanço do conhecimento em relação à flutuação do engajamento em um projeto de inovação tecnológica, bem como demonstração da importância da organização e da área de gestão de pessoas para analisar as melhores estratégias de recursos e demandas de trabalho; demonstra a possibilidade de aprofundamento das pesquisas qualitativas sobre engajamento de trabalhadores; evidencia a possibilidade de ampliação de estudos que buscam compreender o engajamento em um determinado período de tempo, considerando uma atividade específica, por meio da aplicação do reconhecido modelo teórico JD-R (Bakker & Demerouti, 2008) de investigação do engajamento.

Implicações práticas: demonstração de que a investigação do engajamento dos trabalhadores em períodos determinados ou atividades específicas podem auxiliar de forma mais qualificada nas estratégias de gestão de pessoas.

Originalidade: evidencia que engajamento pode ser um estado oscilante que depende de diversos fatores, mostrando, então, a singularidade e a significância deste estudo.

Palavras-chave: Engajamento no trabalho. Inteligência artificial. Projeto. *Chatbot*. Instituição de Ensino Superior.

RESUMEN

Objetivo: comprender el compromiso de los trabajadores en un proyecto de implementación de *chatbot* para atender a los usuarios de una universidad en Rio Grande do Sul.

Metodología: estudio de caso exploratorio y

cuantitativo, realizado en una IES. Técnicas del

datos recolectados: entrevistas semiestruturadas, grupo focal y análisis de documentos. Los datos fueron organizados con el apoyo del software NVivo®11, triangulados y analizados a través del análisis de contenido.

Resultados: indican que hubo compromiso de los trabajadores, pero que, debido a algunos factores, este se presenta de diferentes maneras, demostrando una oscilación en el estado de compromiso durante el proyecto.

Limitaciones: falta de implementación completa de *chatbot* para atender a los usuarios.

Implicaciones teóricas: Contribuciones el avance del conocimiento en cuanto a la fluctuación de la participación en un proyecto de innovación tecnológica, además de demostrar la importancia de la organización y el área de gestión de personas para analizar las mejores estrategias de recursos y demandas de trabajo; demuestra la posibilidad de profundizar la investigación cualitativa sobre el compromiso de los trabajadores; destaca la posibilidad de ampliar los estudios que buscan comprender el compromiso en un período de tiempo determinado, considerando una actividad específica, mediante la aplicación del reconocido modelo teórico JD-R (Bakker & Demerouti, 2008) de investigación del compromiso.

Implicaciones prácticas: demostración de que la investigación del compromiso de los trabajadores en determinados periodos o actividades concretas puede ayudar de forma más calificada en las estrategias de gestión de personas.

Originalidad: muestra que el compromiso puede ser un estado oscilante que depende de varios factores, mostrando así la singularidad y la importancia de este estudio.

Palabras clave: Compromiso en el trabajo. Inteligencia artificial. Proyecto. *Chatbot*. Institución de enseñanza superior.

INTRODUCTION

Gradual changes in the organizational scenario have been taking place due to the continuous inclusion of new technologies. Thus, organizations demonstrate the constant need to review strategies to keep up with the demands of Industry 4.0. It is noteworthy that the driving force behind the rapid advancement of the 4th Industrial Revolution is made up of the “internet of things”, technology that promotes a dialogue



between systems and machines autonomously, in addition to artificial intelligence (AI) and robotics with automation (Amorim, 2017).

In this scenario of Industry 4.0, as well pointed out by Facin et al. (2022), different organizations have intensified the use of digital technologies in processes to generate more efficiency, especially in the 2020s. Disruptive technologies such as AI have gained prominence and potential for application in several areas. With regard to Higher Education Institutions (HEIs), the empirical field of this research, AI has been inserted in research development, student support, professional training and also in management itself, since one of the focuses may be on automation of processes and improvement of services, especially in activities that involve a decrease in the number of workers and an increase in demands related to the specificities of the areas (Vendruscolo & Moré, 2018). As the authors refer, one of the purposes of AI is to use cognitive abilities and processing power to improve the human being's ability to act.

In this sense, as Nunes (2018) points out, AI seeks, by computational means, to reproduce planning, reasoning, decision-making and problem-solving capabilities, and can contribute to various organizational demands to achieve positive results. In this context, the chatbot can be used to identify a conversational software agent, which interacts with users through a natural language (Abushawar & Atwell, 2015). Thus, in organizations, chatbots are used to optimize time and to meet low-complexity demands, interfering with the decongestion of channels and service lines, since they serve several people at the same time (Chatbots Brasil, 2018).

On the other hand, the human dimension cannot be forgotten in this context, as well punctuated by Mozzato et al. (2019) and Braz, Mendes and Ferreira (2022). Thus, based on the principle that organizational development depends on people, being essential to have competent, satisfied, committed and engaged workers, studies focused on such issues are relevant. Focusing on workers' engagement, which is considered a positive state, according to Schaufeli and Bakker (2004), Bakker and Demerouti (2008) present a theoretical model

that was developed to understand engagement at work, entitled Job Demands-Resources (JD-R model). Such a model is considered highly popular among researchers and is used as a central axis in this research. Schaufeli (2017) points out that this model is well equipped also due to the fact that it integrates an approach to occupational health and reduction of work stress with an approach that seeks to increase work motivation and engagement. Thus, the author considers that the JD-R model plays an important role in prioritizing and implementing actions to increase engagement at work.

With the unpredictability of the market and organizational competitiveness, companies are looking for new techniques and instruments that promote engagement, connectivity and the meaning of work for workers (Santinho, 2018). From this perspective, the people management (PM) area has the responsibility not only to monitor technological evolution, but also plays a fundamental role in mediating between these two universes.

It is known that workers have different ways of engaging in their work activities, which is no different in the area of technology. Therefore, projects aimed at the application of AI, as is the case with chatbots, demonstrate one of the spaces that deserves an intense look to understand this topic, as presented in the studies by Zumstein and Hundertmark (2017) and Prentice et al. (2023).

The teams that are part of the chatbot development process, in addition to being engaged, need to know the organizational activities, processes, means of interlocution with users and their needs, in order to make the chatbot interact with the user in the most natural way possible (Nunes, 2018). The author states that this means that more and more chatbots will be developed to be close to human characteristics. Thus, researches like this demonstrate their relevance in a moment of evolution so intense and abrupt that they can help in the construction of alternatives to make this process of integration between man and technology more humanized, not serving only a managerial logic, as pointed out by Braz, Mendes and Ferreira (2022).

Exposing the problem, according to Costa (2021), when analyzing the national production



of articles on engagement at work linked to the journals of CAPES and SPELL, in the period between 2010 and 2019, 74 articles were located and 15 were actually related to the topic, emphasizing the importance of research in the area. Therefore, the need for further work with such an intersection is necessary. Another research gap in national studies on engagement is presented by Chinelo et al. (2019), with the need for more Brazilian research that considers variations in engagement in different periods, linked to the tasks performed by workers, in addition to the importance of investigating the influence of work demands and resources on engagement and performance through the model JD-R, without forgetting the work context of the individuals. The authors reinforce this justification also based on the statements by Bakker et al. (2014), as they consider that research with this approach is very recent. Thus, this study is justified by contributing to the reduction of these gaps, which aims to understand the engagement of workers in a chatbot implementation project to serve users at a university in Rio Grande do Sul (RS).

THEORETICAL FRAMEWORK

AI and Chatbot

AI, according to Nunes (2018), can be defined as a field of computer science that seeks, by computational means, to reproduce planning, reasoning, decision-making and problem-solving capabilities, making use of inductive and deductive processes, storing knowledge and still communicating through a language that can perceive and adapt to the environment. AI-related studies have been developing since the 1950s in various branches of science and various lines of research with the aim of providing computer systems with the necessary skills to perform functions that only the human brain would be able to solve (Kelly, 2015).

Nunes and Maciel (2020) state that the information society is advancing towards a society that places human beings at the center of innovation and technological transformation. For the authors, the use of new technologies based on AI such as big data, internet of things, robotics, among others, must respect the individual and collective needs of its users. In this context,

intelligent systems will become allies in problem solving, expanding the debate to ethical, social, political, economic and cultural discussions that pervade this theme. As much as there is no denial in the face of increasing technological advancement, with AI as an ally, there is nothing that overcomes the human brain and its ability to think and analyze (Mozzato et al., 2019). According to Sichman (2021), the social and ethical impact of AI covers many domains and, for this reason, researchers recognize the need for approaches that guarantee AI technologies with safe, beneficial and fair use. Therefore, in this context, a responsible view towards human beings must be premised, which must be respected (Mozzato et al., 2019).

The market for robots that are capable of interacting with people is growing every year, which is reflected in the fact that new machine functions are quickly redefined. They can be successfully used as different follow-up devices or in different areas, including everything from rehabilitation processes to educational processes (Oleksiewicz & Civelek, 2019). Massaro et al. (2018), as well as Herrero and Varona (2018), describe that the fusion of robots with AI opens up potential perspectives for the future, especially with regard to virtual assistants, called "chatbots". These can dialogue like real personal assistants and, as robots allow mechanical automatisms, the chatbot implemented with AI allows the automation of information and represents the opening of perspectives for the future in its application scenarios. Thus, it acts as a human computer interface created to facilitate communication, understanding natural language questions and responding with real answers.

Thus, over the last few years, chatbots have become a sophisticated tool, capable of carrying out natural conversations and optimizing time due to the quick support they can offer. Although a chatbot cannot handle all demands of a given customer, it can be used to handle many of the routine situations that trigger service requests (Nunes, 2018; Oleksiewicz & Civelek, 2019). In this way, some benefits of using chatbots in organizations refer to the optimization of time since the chatbot does not suffer from human congestion when having to serve several people at the same time (Chatbots Brasil, 2018). Another



advantage may be the reduction of rework rates, since the chatbot has a response collection that can be expanded, according to demand; thus, recurring questions, when answered by the chatbot, can optimize the organization's time and work (Ghidini & Mattos, 2018).

Therefore, the use of chatbots has an impact on organizations. Ghidini and Mattos (2018) speak of two types of consequences: on the one hand, they modify the way of informing, communicating and carrying out transactions between the company and its customers or other interested parties; on the other hand, they can influence and change the communication and collaboration of workers within the company. The authors also agree with Zumstein and Hundertmark (2017) in the perception that users' excess of information when using chatbots leads to new potentials. Among them, the authors cite the possibility of getting to know their customers better, expanding the perception of user behavior, creating a new collection of data that offers companies the opportunity to approach their customers and users in a personalized way.

Engagement at work

The term "engagement" related to the work context has, over the years, received different definitions (Schaufeli et al., 2013). Workers with high levels of engagement show enthusiasm, involvement and satisfaction with their work, having the energy to solve and carry out work activities, with involvement and efficiency (Siqueira et al., 2014). Schaufeli et al. (2002) state that engagement is a positive and satisfying state of mind related to work, which is characterized by vigor, dedication and absorption. According to the authors, vigor is represented by high levels of energy and resilience when carrying out work activities, as well as the willingness to invest effort in one's work and persistence in the face of difficulties. The second dimension, dedication, is characterized by an understanding of meaning, enthusiasm, inspiration, pride, and challenge. The third dimension, called absorption, is associated with concentration and dedication to work, making it difficult for the individual to detach from it. Depending on the concepts presented, engagement is strengthened when there is a

connection between the experience of performing a certain activity and the people involved in it.

It is observed that there are few studies that relate the engagement of workers to the development of activities aimed at AI, since studies in this area tend to be carried out from the user experience of the artificial tool, such as chatbots, like Lucchesi et al. (2018), among others. Despite this, according to Prentice et al. (2023), there are significant relationships between AI and work engagement, as AI technologies are easily modified, programmed and reprogrammed, being adapted to meet demands and tend to have lasting effects. In turn, Andrade and Hervé (2023) point out that AI brings benefits such as automation and intelligent data analysis, as well as can generate positive impacts for employees, such as commitment and loyalty to the project.

Although the state of engagement is intrinsic to the person, organizations are able to provide conditions, resources and tools to facilitate its achievement (Freitas & Charão-Britto, 2016). Prentice et al. (2023) points out that managers should seek balance in the investment of resources to improve AI and worker engagement, as well as provide adequate organizational support. According to the authors, leadership and organizational support have been the main strategies to improve workers' engagement at work, making associations with AI. Andrade and Hervé (2023) state that it is the duty of the project manager to understand how AI will affect the emotions and performance of the team. Therefore, it is important to consider that several elements can influence engagement at work, which is not always constant, varies according to the distinction of activities, in addition to suffering interference from internal and external conditions (work environment) of individuals (Sonnetag & Kühnel, 2016).

Schaufeli et al. (2013) present some benefits that can be considered arising from engagement at work: better performance, loyalty to their organizations and pro-social attitude. Engaged managers, for example, are perceived as inspiring leaders; people engaged at work make fewer mistakes; engaged workers tend to feel more comfortable with themselves. For Bakker (2011), when these elements are aligned, engaged people tend to express several behaviors that are important for the organizational context,



such as reconciling work demands and resources more assertively, as they experience positive emotions, such as gratitude, joy and enthusiasm. The authors also state that engaged people may be more sensitive to opportunities at work, which increases their capacity for creativity and new experiences, as well as experiencing better physical and psychological health and tend to transfer their involvement to others in their work environment. In the health logic, recent research developed by Obregon et al. (2021) demonstrates that the more engaged a worker is, the lower the chance of having burnout syndrome (physical and mental exhaustion).

On the other hand, it is observed that the advancement of AI can create some job insecurity for workers, despite its positive impact on them, with regard to the engagement associated with AI practices (Prentice et al., 2023). In this sense, Andrade and Hervé (2023) point out that technology can cause certain concerns for workers regarding their careers, stability and opportunities when, for example, they observe that certain routine tasks are being replaced by computers. According to these authors, this can lead to a feeling of frustration, anxiety and even anger on the part of workers. Such feelings cannot be ignored.

Aware that such feelings can interfere with people's engagement at work, understanding the process of engagement at work is important. A theoretical model developed to explain work engagement is the Job Demands-Resources (JD-R), by Bakker and Demerouti (2008), which includes, in its structure, work resources, personal resources and work demands, relating these to the engagement of workers. Schaufeli and Bakker (2010), based on the JD-R model, defend the mediating role of engagement at work between resources/demands and performance, pointing to it as an indicator of worker health. Based on Bakker and Demerouti's (2008) JD-R model, job resources allow achieving goals and personal growth. These are considered extrinsic resources and are characterized as aspects of the work context that stimulate the desire to dedicate oneself to tasks, which facilitates the achievement of goals, such as support from colleagues and supervisors, clarity of roles and participation in decision-making. Work resources need to be

energy and support providers so that workers can use the specific resources available to them in order to carry out their work (Schaufeli et al., 2013).

For Schaufeli et al. (2013), normally, work resources are understood as the physical resources or working conditions existing in the organization. However, they also consider the existence of other types of work resources that correspond to social support or companionship from colleagues, constructive feedback from the supervisor, possibility of self-development and autonomy to act professionally. Personal resources, considered intrinsic, satisfy basic human needs, characterized by optimism, self-efficacy and self-esteem.

In turn, Bottcher and Monteiro (2021) state that the work resources understood from the informational, emotional and instrumental social support factors and the personal resources analyzed from the factors identity, competence, development, cooperation, self-efficacy, among others, are correlated with work engagement in a positive way. In the case of work demands, they are associated with aspects that require physiological and psychological effort from the individual and can end up overloading him, when at a high level (Schaufeli & Bakker, 2010). However, challenging demands consist of aspects of the work context that, although stressful, contribute to the individual's personal growth (Chinelato et al., 2019).

The dimensions that make up work engagement, according to Schaufeli et al. (2002), and which are present in the JD-R model presented by Bakker and Demerouti (2008), are presented in Table 1 for a better understanding of their definitions.



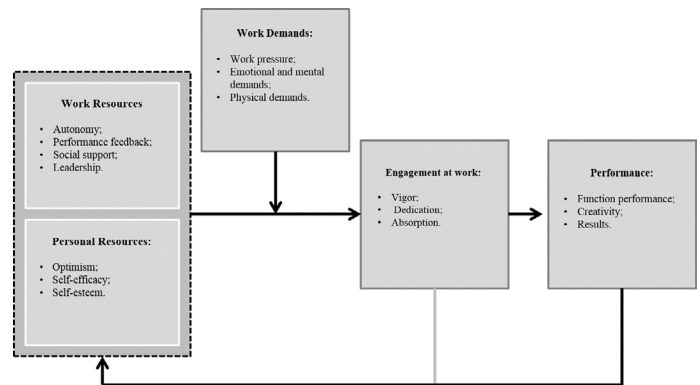
Table 1
Dimensions of Engagement

DIMENSIONS	DEFINITION
Vigor	It refers to high levels of energy and resilience, willingness to invest effort, not getting tired easily and persisting in the face of difficulties. Those with high vigor scores often have a lot of energy when they work.
Dedication	It refers to a sense of meaning for work, feeling enthusiastic and proud about one's work. Those who score high on dedication identify strongly with their work because the experience is meaningful, inspiring, and challenging. In addition, they generally feel enthusiastic and proud about their work.
Absorption/ Concentration	It refers to being fully immersed in your work and having difficulty letting go of it. Consequently, everything around is forgotten and time seems to fly by.

Source: Adapted from Schaufeli and Bakker (2004).

Schaufeli and Bakker (2010), based on the JD-R model, defend the mediating role of engagement at work between resources/demands and performance, pointing to it as an indicator of worker health. Figure 1 demonstrates the relationships established by Bakker and Demerouti (2008), as well as showing where the dimensions presented in Table 1 are identified in the respective model.

Figure 1
JD-R Work Demands and Resources Model



Source: Adapted from Bakker and Demerouti (2008).

This model shows that personal resources (considered intrinsic, satisfy basic human needs, characterized by optimism, self-efficacy and self-esteem) and work resources (considered extrinsic, relate to physical resources or working conditions existing in the organization), intersected by the demands of the work lead to greater or lesser engagement. It is worth remembering that Salanova and Schaufeli (2009) state that these resources are directly connected with the individual's perception of the contingencies that surround him, they are not the circumstances as such, but the way in which people see them. Continuing with the understanding of the model, engagement (and its dimensions vigor, dedication and absorption), consequently, directly interferes with the greater or lesser performance of people, therefore, of organizations. In this way, both engagement and performance are directly related to the organization's resources, creating a cyclical process.

METHODOLOGICAL PROCEDURES

This research corresponds to a case study and has a qualitative approach (Flick, 2009; Yin, 2016). Based on what Mozzato and Grzybovski (2011) point out, the scientific rigor required in qualitative research was followed, adopting the various steps in scientific elaboration, in order to gain strength and make connections with relevant issues. In view of the objective of this



study, its nature is exploratory-descriptive. Based on Gil (2016), it is understood that the research is exploratory because it seeks to provide greater familiarity with the problem to be researched and descriptive because it establishes relationships between the study variables: AI and engagement.

The empirical research was developed at a university in the state of RS, due to the demand identified by the partner company in this project, which worked on the implementation of a chatbot in the information technology (IT) area of a university, specifically in customer service. As for the field of investigation, this can be identified as a large institution, belonging to the segment of performance in the area of higher education. In numbers, the Higher Education Institution (HEI) had, at the time of this research, 16,013 students enrolled in undergraduate, graduate, foreign languages and high school.

The IT division, a specific field of this research, has as its main attributions the fulfillment of the needs of the various publics of the academic community related to planning, administration, updating, development, implantation and maintenance of IT systems, computer networks and communication of voice and data. The chatbot to be implemented would have the objective of assisting users, focusing on the service of changing passwords linked to the system already in use, which represented, at the time of the research, approximately 40% of the assistance provided by the support service.

The participants of this research are the IT Division workers, who were directly involved in the chatbot implementation project. This team consists of a project manager, a support assistant and three user support professionals, who are working on the implementation of the service chatbot. In addition to the IES team, the manager responsible for the company providing the chatbot development is also involved in the process. This company works directly with IT services and makes clear in its line of work the search for humanization in technological innovation. The supplier company is responsible for developing the chatbot on the digital platform, while the IES team works with the integration of data between the chatbot and the institution's internal systems. With regard to the personal characteristics of the

research participants, mention is made of the fact that there are four women and two men, all aged between 26 and 45 years old, all of whom have higher education and two are postgraduates and all with training in technology area. As for the length of time at work, it is very diversified, with no one having worked for less than a year and only one with more than 15 years.

For data collection, the following techniques were used: semi-structured interview, focus group and document analysis. The semi-structured interview was worked on in the logic of Flick (2009) and Yin (2016). The semi-structured script for the interview and focus group was based on the structure of the Utrecht Work Engagement Scale (UWES) instrument, validated and adapted by Vazquez et al. (2015). Six interviews were conducted, lasting approximately 40 minutes each. The focus group reflects its importance, as it can reach a reflective level that other techniques cannot reach, revealing dimensions of understanding that may remain unexplored by more conventional data collection techniques (Flick, 2009; Yin, 2016). The technique was performed in the presence of four team members, the project manager, a developer, a support assistant and a supervisor. Documentary research corresponds to sources of evidence that allow the contextualization of information (Flick, 2009). In this research, the documents used were: meeting summaries, project registration in the management platform, project schedule, project status registration and integration routine implementation registration. With the information, in order to meet the objectives proposed by the study, the data collection techniques were triangulated (Flick, 2009; Yin, 2016).

Data were organized with the support of the NVivo®11 software, triangulated and analyzed through content analysis, following the three phases proposed by Bardin (2016). In the first phase, the pre-analysis, a floating reading of the research corpus was carried out, seeking to define the documents to be used, as well as the elaboration of indicators through the clippings, carrying out a more refined preparation of all the study material. In the second phase, the exploration of the materials, the coding was carried out according to the research analysis



categories, as well as the definition of the context units in the documents, which made it possible to qualify the interpretations. Finally, in the third phase, corresponding to the treatment of data, the condensation and verification of highlights of information for analysis were carried out, followed by the elaboration of interpretations and inferences through an in-depth study, guided by the theoretical framework.

Analytical categories were defined *a priori* based on the JD-R model (Bakker & Demerouti, 2008), even though they have been refined *a posteriori*, in data collection and analysis. Such categories, their definitions and units of analysis are described in Table 2, below. It should be noted that the analysis units were described based on the theoretical framework, taking into account each analytical category.

Table 2

Analytical Categories, Definitions and Units of Analysis

ANALYTICAL CATEGORIES	DEFINITION	UNITS OF ANALYSIS
Work Resources	Support offered on the job, learning opportunities and work tools made available.	Work tools
		Feedback
		Leadership in the project
Personal Resources	Emotional stability, flexibility in the face of demands, feeling of self-efficacy.	Optimism
		Self-efficacy
		Self esteem
Work Demands	Pressure exerted by the work environment, emotional demands and established requirements.	Pressure
		Emotional demands

Engagement	Vigor: corresponding to high levels of energy and resilience, persistence in the face of difficulties.	Energy
		Resilience
		Persistence
	Dedication: referring to enthusiasm and pride in relation to work, corresponding to the sense of meaning of work and the sense of challenge.	Meaning of work
		Pride
		Challenge
Absorption/ Concentration:	Immersion	
	Intensity	
Performance	Performance in work activities, creativity and results obtained.	Creativity
		Result

Source: Prepared by the authors (2019).

Thus, seeking rigor and not the scientific rigidity highlighted by researchers such as Mozzato and Grzybowski (2011) and Czarniawska (2016), the analyzes were carried out and presented in sequence, following the JD-R model (Bakker & Demerouti, 2008). It should be noted that the research was carried out in accordance with the Guidelines and Norms Regulating Research Involving Human Beings, according to the Resolution of the National Health Council (CNS) n. 466/2012, being submitted and approved by the Ethics Committee.

ANALYSIS AND PRESENTATION OF RESULTS

Work Resources

The data presented in this category of analysis are intended to understand the existing work resources in the implementation of the chatbot for user service. As mentioned by Schaufeli et al. (2013), it is the specific resources that workers have for their activities that should provide enough support to feed their energy, in addition to supporting the effort expended to meet the demands of work. In Table 3, below, the



analysis units, with the respective context analyzes that make up this category are presented.

Table 3

Work Resources

ANALYTICAL CATEGORY	ANALYSIS UNITS	CONTEXT UNITS
Work Resources	Holding meetings	<i>We have a task reporting routine, every 15 days, in addition to talking to the teams, I also generate an artifact of how that project delivery is going. [...] I have some minutes of meetings, of the main decisions, we also have the project's record in a tool called GLPI to know what stage it is in, but basically the tool that we have used most within the bot project and even because it is a subject that is sometimes difficult just to write about is face-to-face conversation. (E1)</i>
		<i>The project manager is responsible for doing the survey for the meetings, so there is a conversation between the leaders of both parties. (E6)</i>
	Leadership in the project	<i>The leadership did this midfield, so any difficulty we reported to her, so for me that was okay and clear [...] we had two main leaders, one from the university and the other from the supplier company, the two talked to each other and also brought feedback to us. (E-4)</i>
		<i>Our leadership always gave full support, also received what we said and tried to take the necessary measures. (E-5)</i>

Through the context units, it is evident that the interviewees identify different forms of work resources in the chatbot implementation project. Some strategies involving the use of technology, such as project management software, conversation chats, task reporting system. Other tools make up some more informal resources, considering personal conversations, constant feedback and approximation with project leadership. In this logic, in the speech of E1 it is identified that, even for a work team focused on the use of technology, the approximation between colleagues allows for greater clarity of information, emphasizing the need for face-to-face dialogue to clarify doubts and establish assertive communication. Such evidence is in line with the notes by Schaufle, Dijkstra and Vazques (2013), that there are different types of important work resources, such as support from co-workers, constructive feedback, possibility of self-development, exchange of experiences and autonomy, among other elements.

As for the question of the leadership element, according to the statements of respondents E4 and E5, it is clear that the project leaders were identified and acted in the search for the best performance of the team. For Bakker and Schaufeli (2000), managers who are involved and engaged with their teams have an accurate view of their needs, which contributes to engagement at work. It should be noted that the management style of the leaders and the organizational environment are directly linked to the engagement of workers (Bakker et al., 2014) and, in this research, it can be inferred that the management style was a point that positively influenced the workers' engagement, as pointed out by Prentice et al. (2023), even though it is not denied that the lack of deadlines and the non-fulfillment of the task until the end had a negative impact on the workers' engagement.

Personal Resources

Data related to the second analytical category are presented in Table 4.

Source: Prepared by the authors (2019).



Table 4
Personal Resources

ANALYTICAL CATEGORY	ANALYSIS UNITS	CONTEXT UNITS
Personal Resources	Optimism, self-efficacy and self-esteem	<p><i>I felt a lack of proactivity at times, on the other hand, afterwards, I evaluated why these members did not do the task, I realized that we could have planned better, so we took a step back and planned better, this group that is participating in relation to the motivation to do it, they are very motivated, especially the development resource there, they encountered technical difficulties, but they are a resource that they believe they can achieve, in that sense. (E1)</i></p>
		<p><i>I consider it as an experience with a new technology, a technology that I had not worked with until then, and everything adds knowledge, right? (E2)</i></p>
		<p><i>It got to a point where it was as if both teams felt that way, as if the solution was no longer in their hands, because to solve the problem, it went beyond what the two teams could solve, so to solve the problem that arose, it would be necessary to bring in a third team [...] trust existed, but I also perceive a certain feeling [...] I'm not saying that it would be a feeling of giving up or lack of confidence, I think it would be more a feeling of lack of conditions and resources to solve it. (E6)</i></p>

According to Schaufeli et al. (2013), personal resources in the concept of engagement correspond to characteristics of optimism, self-efficacy and self-esteem, but also proactive attitude, flexibility, assertiveness, emotional stability and extroversion. In general, the participants emphasized their interest in completing the implementation successfully, they emphasized how much they were involved in seeking solutions corresponding to each of their areas. In addition, the group demonstrated alignment among themselves, which contributed to the smooth running of the project. In the focus group, this was explicit, as in the evidence: "We always worked very closely, there was no tug of war" (E3).

As shown in the supporting statements in Table 4, elements of optimism, self-efficacy and self-esteem were present. However, it gradually became noticeable that there was a decline in personal resources due to the progress of the project. E3's speech in the focus group, which was confirmed by the others, is corroborative: "At first, the excitement was cool, but then the same error continues and you lose the excitement".

Since self-efficacy is a belief in the ability to gather cognitive, motivational and behavioral resources necessary to perform a task (Bandura et al., 1999), it is observed that: a) in the case of self-esteem, aspects of depreciation were not verified, reflecting on the presence of self-esteem throughout the project; b) regarding optimism, although at times the participants perceived the lack of working conditions to carry out the activity, as in E6 and E3, they demonstrated the idea that the difficulties would be faced; c) the difficulty of cognitive, motivational or behavioral resources corresponding to the concept of self-efficacy were perceived, especially with regard to demotivation, for not being able to give the necessary referrals to the task, as in the statements of E6 and E3.

Work Demands

The data used in the third analytical category identifies the pressure exerted by the work environment and is shown in Table 5.

Source: Prepared by the authors (2019).



Table 5
Work Demands

ANALYTICAL CATEGORY	ANALYSIS UNITS	CONTEXT UNITS
	Pressure	<p><i>There wasn't much pressure, because it's in partnership with the supplier company, it's not a supplier that's receiving it, it would be a case for them and it would be good for us, like pressure, there wasn't much. (E3)</i></p>
		<p><i>There was no such pressure, because we, of course, have a schedule, but as we tested and understood more about the project, we adapted this schedule, it wasn't something like "you have to deliver this by the day". (E5)</i></p>
	Emotional demands	<p><i>Well within the bot's work, we had several perspectives, I speak for myself, I always thought that artificial intelligence was something even faster for you to pass on knowledge and it is a very sensitive, very critical process, at the beginning I had a frustrated expectation, I thought it was faster. (E1)</i></p>
		<p><i>We are in a testing phase, in which we have not been able to arrive at a definitive version of it, we have some problems, we have not been able to arrive at a solution for some problems and, therefore, closer to the end we got discouraged with the project, you know? (E2)</i></p>
		<p><i>It was very peaceful, very cool, because we know another tool, collaborate with the project... when it's shot, I'll be able to say "Look, I was there, I helped", so, it's a challenge, I thought it was really good. (E5)</i></p>

With regard to the pressure analysis unit, the research participants do not emphasize the existence of considerable pressure in the chatbot implementation project. Since it is an experimental project, they compare it to other demands in the sector that require a differentiated urgency, which, in a way, ends up attenuating the degree of pressure experienced. This evidence is in line with the notes by Chinelato et al. (2019) that challenging demands at work contribute to the individual's personal and professional growth. Thus, it is inferred that projects with a defined fixed term and the need for systematized deliveries can contribute to generate a more challenging demand and, consequently, have repercussions on greater employee engagement. Considering this aspect, it is inferred that the absence of pressure highlighted by the participants may have influenced the way they engaged with the project, since the characteristics and context of the project did not require a strict deadline. Corresponding to the emotional demands, there are some evidences indicated by the interviewees, such as the presence of frustration and lack of motivation.

Engagement

The data worked on in this item aim to understand the fourth analytical category, following the three units of analysis: 1) vigor; 2) dedication; 3) absorption/concentration.

Schaufeli and Bakker (2003) consider as items that measure the vigor unit, within the engagement category, high levels of energy and resilience, investment of effort, not getting tired easily and persistence in the face of difficulties. Therefore, the following elements were determined as descriptive of this unit: energy, resilience and persistence, so that, based on these items, the vigor of the workers involved in the chatbot implementation project could be described. The speech of respondents E1 and E2 portrays differences in perceptions of respondents E4 and E6. The first demonstrate that during the implementation there was frustration and demotivation: "There were several times when the team was frustrated" (E1), "This is kind of a pattern in our area when a project starts to take a long time, starts to take a long time to



finish, most developers end up having this issue of demotivation" (E2). These elements of energy, resilience and persistence related to the questions that were linked to the workers' vigor were not included in the speech. In turn, respondents E4 and E6 highlighted the intensity of vigor present in the workers involved: "At least I didn't feel that frustrated, I knew that some things were going to have to be improved, but well, as it's not something I know [...] so for me it didn't cause me any kind of frustration" (E4). "They wanted to find a solution, they are wanting, they want to find a solution, [...] so, for sure, their persistence and energy was visible, very visible, 100%, on both sides" (E6).

Considering that vigor reflects the willingness to invest efforts and persist even in the face of difficulties at work, revealing energy while the individual works (Schaufeli & Bakker, 2004; Bakker, 2011), it is possible to identify the presence of different perceptions regarding the behavior of workers, both with their individual experience and the vision of the collective experience. Thus, this project identifies different forms of work performance, especially in view of the existence of a scenario contemplated by diversities of technical knowledge and behavioral skills. Therefore, it is inferred that these aspects can influence the presence of different opinions about the strength of the team in the implementation of the project.

For Schaufeli and Backker (2003), dedication refers to a sense of meaning for work, in addition to enthusiasm and pride in relation to their tasks, also providing feelings of inspiration and challenge. Schaufeli and Bakker (2004) and Bakker (2011) report that the experiences lived in the work routine, when they are significant, inspiring and challenging, can reflect strong involvement in responses, such as enthusiasm, pride and a sense of belonging and importance of the work performed. In this line, in the reports presented in the dedication analysis unit, there is the identification of notes that portray a sense of challenge in the face of the chatbot implementation. In addition, elements such as belonging, curiosity, learning and pride are also considered by the research participants, as can be seen in the following reports:

People like to work on this type of

project, so they have this feeling of belonging, of doing something new. [...] The level of challenge was high, because it was a new experience and there were also problems that we didn't know how to solve, right? So the pressure level was low and the challenge level higher. (E1)

I consider more of a professional growth than a personal satisfaction, so to speak, maybe there are other types of projects, other lines of projects that satisfy me more personally than this specific project, but it added value. (E2)

It's a challenge because until then I didn't know many bots, I didn't really know how it worked and such, so it was a learning thing and also a challenge. I still want to look and say that I participated, I want to look and feel proud. (E5)

According to Borges, Alves Filho and Tomayo (2008), the meanings that individuals attribute to their work are associated with their motivations and the way they relate to the environment and the organization. Thus, the authors' idea can help in understanding that the actions carried out in the implementation project influence the impact of the meaning attributed to this activity by the workers. Given the above, two important aspects are evident, both the unique experience of the worker and the context of the HEI. It is necessary to consider the particularities of the different daily attributions, since some can have a broader impact on engagement, while others do not reach this impact, so desired by organizations.

Regarding the absorption/concentration unit of analysis, absorption corresponds to the idea of immersion in work, also considering a certain difficulty in detaching oneself from it (Schaufeli & Backker, 2003). The authors also mention that individuals who present these elements in their tasks also engage in other activities outside the work context, which corresponds to a healthy level of absorption, because even if they may feel tired, they associate this with a pleasant state, of positive achievements, which was not



evidenced as something intensely present in the empirical evidence. In this line, the contextual aspects that influence its understanding are highlighted again, showing the importance of considering the context of the HEI for the engagement of workers. The interviewees point out that the implementation project had an experimental nature, that is, it was not within the scope of emerging demands from the sector or the institution. In addition, the work team is made up of members who work on different projects at the same time, each contributing with the expertise of their knowledge. Here is the supporting testimony:

This project was seen as a proposal to make it work, but it was an experiment project, so automatically as the team is in an experiment project, it is already working in a multi-project team, so its focus will be divided, the experiment project will have a little less pressure compared, for example, to a project where you need to comply with legislation, an entrance exam, so, in that sense, there was no immersion, a need for you to work overtime, because it was treated as a priority yes, but not as the first priority of the division (E1).

Another aspect pointed out in the field reports and validated by the interviewees is that the project, because it has this experimental characteristic, involving a partnership between the HEI and a supplier company, was not regulated by a contract involving values. That is, if the experiment was successful, the gains would be: a) for the supplier company, a success case related to the implementation of a chatbot to assist users in an HEI; b) for IES, the innovation in a service in the IT sector that demands approximately 40% of the team's attention and that could be absorbed with the implementation of the chatbot, in addition to having the possibility of expanding its performance to other needs of the HEI. On the other hand, if there was no success in completing the bot implementation, both parties would not have considerable losses and could still benefit from the learning obtained from the steps taken. This scenario of the field of investigation had repercussions on notes that describe a low degree of absorption, as can be seen in the statements:

This project was an experiment, so as the team is on an experiment project, it is already working on a multi-project team. The experiment project will have less pressure compared to a project that needs to comply with legislation. So there was no immersion, a need for you to work overtime, because it was not treated as a priority. (E1)

There was no need to drop all the activities and just stay at that, because the activity they were doing was the activity they did on a daily basis, so when demands for tests were passed they organized it within their schedule or another time that needed to allocate were the feedback meetings, so there was no need to leave the routine they had to do the activities. (E6)

Therefore, considering all the aspects identified in the scenario of the research field, it is possible to infer that the level of absorption, both individually and the general view of the group itself, cannot be considered profound, influencing the perception of engagement of all those involved.

Performance

The evidence of this category, which sought to point out the performance in work activities, creativity and results obtained, are shown in Table 6.



Table 6
Performance

ANALYTICAL CATEGORY	ANALYSIS UNITS	CONTEXT UNITS
Performance	Results and creativity	<p><i>I would say that we had a lot of learning in this project, the greatest baggage was not so much the delivery as the learning, and in relation to the delivery, we had the dialogue side of the bot, we were satisfied, regarding the performance of the platform in relation to how we wanted it to interact with people, we were a little frustrated, we wanted better, so there were two feelings involved there, one side that, yes, worked well, we saw that it is possible to do that using artificial intelligence, but we wanted something even better. (E1)</i></p>
		<p><i>I see that most of our deliveries that depended on us, some were late, but most of them were made as expected, some were late, some were not made with the expected quality, but they were delivered, there are different ways you can deliver. (E2)</i></p>

Source: Prepared by the authors (2019).

There was a perception that the results correspond more significantly to the learning obtained throughout the process than to the final delivery. This did not happen as expected, as can be seen in E1's report. It can be seen in the workers' speech that some agreements regarding the project did not occur the way it was ini-

tially planned, including the deadline for completion. These data, when related to the elements that make up performance, which are creativity, results and performance itself, according to Bakker and Demerouti (2008), it is evident that partial results existed, as well as the presence of creativity in some moments. Entretanto, o resultado final esperado não foi possível. Here is evidence from the focus group in this regard:

I think what could have made us more engaged was to have more evolution, to have more results. (E4)

Engagement might have been different if the supplier's response had been faster. (E3)

However, it is identified that workers signal the search for results, within the work context to which they are inserted, as in the following evidence: "We reached the point where the possibilities for the solution to come out of the two teams ran out" (E6). This speech corroborates with other empirical evidence, demonstrating that there was a positive performance as far as possible with the contribution of the parties involved, however, for the project to have the expected final result, it was necessary to invest in new work resources. These aspects can also be noticed when checking the documents corresponding to the implementation of the chatbot, as they appear in the meeting minutes, in which the steps to be taken in the search for results are detailed. In addition, there was a concern with the next steps for implementation, so that data was periodically fed into the project management software. Given the fact that the chatbot was not available to the user, it led to the team's engagement and interfered with the personal resources applied to this project. However, it is still possible to perceive that there were, concomitantly, aspects that characterize engagement, such as the presence of involvement, investment of attention, search for results, pride, constant feedback.

Finally, it was verified, through the different sources of data, three outstanding points of the context of the HEI: 1) initially, the moment of technological evolution is considered, which brings the need for constant adaptations in the market, including for HEIs. Thus, the presence of an open attitude towards the need for innovation



is verified, but also with difficulties due to the impossibility of greater investments in the area, due to the current economic and financial context of the HEI; 2) the HEI's financial difficulties have required a new market repositioning, and with it some administrative decisions involving massive cost reduction. The cuts made have an impact not only on the reduction of investment, but also on the organizational climate; 3) the context of the HEI corresponds to its traditional characteristic, making its processes bureaucratic and actions slower.

Furthermore, it was also possible to observe the chatbot implementation context. This item brings even more specificities, since it would be the first chatbot to be implemented in the institution. The HEI workers had all the knowledge of the supplier company, which has experience in implementing chatbots, unlike them, none had worked on projects with this characteristic. It is possible to see that both the engagement process and the institutional context add particularities to the research, which could present different results if carried out in another scenario. Thus, particularities that negatively influenced engagement in the implementation are outlined: experimental characteristic of the project, absence of a contract based on values, flexibility of the implementation deadline, the fact that the end objective of the chatbot is not linked to a primordial demand of the HEI, feelings of frustration in the face of difficulties encountered during implementation, lack of knowledge of the platform used, priorities of the HEI, priorities of the supplier company and the concurrence of projects.

Regarding the aspects that positively influence engagement in that context, there is innovation regarding a new technology that is not yet present in the HEI, an expectation in view of the experimental nature of the project, feeling of challenge and pride in the work involving new knowledge, belonging in an action that can have great positive repercussions, collegiality among team members and constant feedback for the workers involved.

CONCLUSIONS

In the present study, work resources and the presence of personal resources of workers

were identified, and their intensity was seen differently during the course of the project. From the moment that work resources were limited, there was a decline in the team's personal resources, more specifically in relation to optimism. Considering the three dimensions of engagement, vigor, dedication, absorption/concentration, different aspects present in these dimensions were noticeable. However, just like personal resources, they also began to show a certain decline from the moment the team found it difficult to progress with the project due to difficulties related to technical issues. This decline was evidenced, mainly, with regard to the energy and involvement of workers, characteristic of the vigor element and the feeling of pride, characteristic of "dedication". As for performance, even though the chatbot was not fully implemented, it was perceived as positive, both in daily deliveries and in the results obtained by the group when it was able to fulfill the requested deliveries during the implementation stages.

The initially outlined objective of understanding the engagement of workers in a chatbot implementation project to serve university users was achieved. Although the complete implementation did not occur, it is considered that there was engagement of the workers in the other phases, but that, due to some factors, this is presented in different ways, demonstrating an oscillation in the state of engagement during the implementation project. Therefore, it is evident that engagement can be an oscillating state that depends on several factors, thus showing the uniqueness and significance of this study.

This study brings as theoretical/academic contributions the possibility of furthering qualitative research on worker engagement, in addition to investigating this topic in a context of technological evolution with an HEI as a backdrop. Another contribution refers to the possibility of expanding studies that seek to understand engagement in a given period of time, considering a specific activity, through the application of the recognized theoretical model JD-R (Bakker & Demerouti, 2008) for investigating engagement. As for practical and managerial contributions, studies aimed at investigating engagement in certain periods or specific activities, as is the case of the present research, can help in the formulation of



more strategic PM policies and practices for organizations. In addition to identifying adequate work resources, it was also evident that work demands play a fundamental role in engagement, needing to be a focus of attention by the organization and the PM area, since the right amount of challenging demands, not considered obstacles, can have repercussions on engagement in the search for professional and personal overcoming, whereas very low demands can cause a reduction in worker engagement. In this logic, the importance of the role of management in the engagement of workers is observed, as well punctuated by Prentice et al. (2023), since managers can encourage informal contact and approximation with the team, foster constant feedback, as well as the engagement of management itself contributes to the engagement of the team.

The examples cited here are pointed out as some management and leadership practices that can contribute to promoting engagement, according to data from this research. Furthermore, by constantly monitoring the implementation project, managers can be closer to the team, noticing possible changes in engagement, such as demotivation, frustrations, decreased performance, among other aspects, which is in line with what Andrade and Hervé (2023) state. It is also observed the importance of having organizational support for the project to continue, corroborating Prentice et al. (2023), since the delay in completion, lack of deadlines, non-compliance with agreements, among other issues, had a negative effect on worker engagement.

The main limitation of this research is the fact that there was no complete implementation of the chatbot to assist users. Thus, the research was limited only to the pilot test process with the team, not allowing the monitoring of the implementation of the chatbot for user service. As possibilities for future research, it is suggested: investigating the engagement of workers in relation to the complete implementation of a chatbot, such as this one in operation; conducting comparative studies in order to investigate the impacts of different resources and work demands, in addition to personal resources, for the engagement of workers in other organizational contexts, involving emerging technologies; conducting mixed surveys, which seek to assess the engagement of

workers in a qualitative and quantitative way in the scenario in question; investigating PM practices that may have a more positive impact on worker engagement when carrying out projects.

Finally, it should be noted that this research contributes to studies on the themes in question, separately, and in their intersections. In this way, it enables important knowledge not only for science but also for society, especially in the field of organizational studies in Administration and PM. Lastly, it is worth mentioning the fact that technological advancement is a complex path full of possibilities, which can be used intelligently, if there is constant preparation to understand and improve the engagement of workers in the use of technology, in order to to make this experience increasingly qualified, but without ceasing to be humanized.

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