

Technology In Teaching: Challenges And Opportunities For The Teaching-Learning Process From The Perspective Of Teachers And Students Of A Brazilian Federal University

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Abstract: This research aimed to analyze the main opportunities and challenges of adopting technology in the teaching-learning process at a Brazilian Federal University. To this end, an exploratory research with a qualitative approach was carried out with a sample composed of 15 individuals, 10 students and 5 teachers. As a research instrument, an in-depth interview was applied with students and teachers, and the data were analyzed using the discourse analysis technique. After data collection, the importance of equitable approaches to technology implementation was noted, with the need for equitable access to technological resources, investments in infrastructure and training programs for teachers. Opportunities of technology include personalization of teaching, interactive and stimulating environments, and expanded access to educational materials. However, teachers pointed out challenges, such as constantly adapting to new tools, lack of time to update, and dealing with technical problems. Students, in turn, mentioned difficulty concentrating, accessibility problems and overdependence on technology. Thus, considering these challenges is essential to promote a balanced and effective use of technology in education.

Key Word: Technology; Teaching; Teaching-learning process.

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I. Introduction

Over the past few years, technological evolution in education has been remarkable, bringing with it a series of changes and innovations that significantly impact the way knowledge is acquired and shared. Several emerging technologies have played crucial roles in this transformation, providing new opportunities and improving the educational experience worldwide (CARMO; FRANCO, 2019; TELES et al., 2020).

In this scenario, the adoption of technologies in the classroom can be a powerful tool to improve the quality of education, increase the efficiency of the teaching-learning process and provide a more interactive and engaging learning experience for students. Technological advancement has been profoundly transforming the way people live and communicate, and the field of education is no exception to this reality (LIMA; LOUREIRO, 2016; NERLING; DARROZ, 2021).

As Araújo and Peixoto (2016) point out, the integration of technology in the classroom can potentially improve student engagement, making learning more dynamic and interactive. Resources such as educational videos, simulations and educational games can arouse students' interest, making the learning process more

attractive and effective. Technology also enables the creation of collaborative learning environments, allowing students to work together on projects and activities, promoting the exchange of ideas and the development of social skills.

However, despite the potential benefits, adopting technology in education can also present challenges. Careful planning and investment in training is required to ensure that teachers have the skills needed to integrate technology into their educational practice effectively. In addition, the implementation of technology in education must be equitable, ensuring that all students have access to the same educational opportunities and resources, regardless of their socioeconomic and geographic backgrounds (CAETANO, 2015; BAZHUNI; SILVA, 2020).

Given the existing issues surrounding technology in teaching, the overall objective of this research was to analyze the main contributions and challenges of technology in teaching at a Brazilian Federal University. It is expected that the results of this research will provide valuable insights for the improvement and enhancement of the use of technology in education, both within this specific university and in other educational institutions. By better understanding the contributions and challenges of technology in teaching, it will be possible to develop more efficient strategies to integrate technology effectively into the educational process, maximizing its benefits and overcoming the difficulties presented.

II. Material And Methods

The present research was characterized as exploratory with a qualitative approach, as a combination of research instruments such as observations and interviews were used to obtain an in-depth understanding of the phenomena related to the adoption of technology in teaching at a Brazilian Federal University. As Godoy (1995) points out, the qualitative approach allows us to explore and understand the meanings, perceptions and experiences of the participants, rather than focusing only on quantitative measurements. In this sense, the research sought a holistic and contextualized understanding of the contributions and challenges of technology in teaching.

Thus, a practical study was conducted with students and teachers of a Brazilian University located in the municipality of Três Rios, in the interior of the state of Rio de Janeiro. The University in question was founded in 1910, and the Institute located in the city of Três Rios/RJ began in 1998. The Institute located in Três Rios currently holds four undergraduate courses, which are: Administration, Environmental Management, Economics and Law.

To carry out the practical study at the University Institute in Três Rios, it became necessary to go to the place where the phenomenon is occurring. Thus, data were collected through in-depth interviews, which are characterized as a type of interview that seeks to capture detailed and in-depth information about a particular subject, experience or phenomenon. In this case, the interviews were conducted with a sample consisting of 15 individuals, 10 students and 5 teachers.

In-depth interviews were conducted with the selected students and teachers in order to explore their experiences and perceptions about the use of technological tools in learning. The interviews allowed a more in-depth dialog, where participants were able to express their opinions, emotions and reflections on the topic, corroborating what Silva and Russo (2019) suggest. In order to facilitate the transcription of the speeches, the interviews were audio recorded and later transcribed faithfully, preserving the content and nuances of the participants' responses. This approach allowed a thorough analysis of the information collected, as well as the identification of patterns and recurring themes emerging during the research process.

As Silva and Russo (2019) point out, the use of audio recordings in in-depth interviews is a common practice to ensure the accuracy of information and avoid the loss of important details present in the interviewees' statements. Thus, the recording allowed direct access to the participants' voices, capturing intonation, pauses and emphases that may contain additional meanings to the words spoken. The approach to the recording of the interviews was carried out in a transparent and ethical manner, ensuring the informed consent of the participants. Before starting each interview, the selected students and teachers were duly informed about the recording process and the reasons for its use.

The in-depth interviews were conducted with the aid of a semi-structured questionnaire. The questionnaire consisted of open and closed questions to allow for a more flexible approach to data collection. The open questions in the questionnaire allowed respondents to express their opinions, experiences and perceptions more freely and fully. These questions did not have pre-defined answers, which allowed participants to provide information more spontaneously and in their own words.

Regarding data analysis, the technique of discourse analysis was applied, which is a qualitative analysis method often used in humanities and social sciences research. Discourse analysis seeks to understand the meaning and representations present in the interviewees' statements, as well as the social and cultural discourses that influence their perceptions and experiences (MUSSALIM; BENTES, 2012). In this case, the use of audio recording enabled a precise and detailed transcription of the interviewees' responses, allowing a thorough analysis of the data and a better understanding of the participants' experiences and perceptions about the use of technological tools in learning.

III. Result

The results obtained in this research revealed a variety of perceptions and experiences related to the adoption of technology in teaching at a Brazilian Federal University. The responses indicated a broad acceptance and recognition of the benefits provided by technology in the teaching and learning process. Teachers and students highlighted that technological tools offer resources that facilitate the personalization of teaching, enable the creation of more interactive and stimulating learning environments, and expand access to diversified educational materials, as can be evidenced in the statements transcribed below.

Technology contributes to making the class more dynamic and interactive. When we use technological tools in the classroom, it facilitates the transmission of content to students (E2).

The opportunity to use technology in the classroom is associated with the fact that it expands access to past content. With the internet, students can access various sources to understand about the subject taught in the classroom (E4).

As a student, I believe that technology makes the class less tiring. There are teachers who explain in their mouths and make notes on the board, but this ends up making the class tiring (E7).

Based on the statements of teachers and students, it can be seen that the introduction of technological tools in the teaching environment is seen as a facilitator for the transmission of content to students. With the internet and the use of technological devices, students have the opportunity to access a variety of sources and resources to deepen their understanding of the subjects covered in class. This can encourage independent research and the development of information-seeking and analysis skills. In addition, technology can make lessons less tiring compared to traditional approaches, where the teacher only explains orally and makes notes on the board. In this case, technology is seen as an alternative that can bring more variety and interaction to the learning process, which can contribute to greater student engagement.

When asked about the main applicability of technology in teaching, teachers unanimously responded that the use of slides and digital presentations is one of the most common ways to incorporate technology into their classes. Teachers mentioned that this practice allows organizing the content in a visually attractive and dynamic way, in addition to enabling the insertion of multimedia elements, such as images, videos and audios, which help students understand the concepts.

The most common way in which we apply technology in the classroom is through the presentation of content on slides. I always try to put bright colors and make short texts, to hold the attention of the class (E3).

The main applicability of technology in teaching is, without a doubt, the elaboration of slides. With the slides, I can put images and videos to complement the explanation (E4).

The use of slides is a unanimous trend among the teachers interviewed to incorporate technology into their classes. Teachers emphasize that this practice offers significant advantages for the teaching and learning process. The visual and multimedia aspects of slides contribute to the creation of more dynamic and interesting classes, helping students to better assimilate and retain the information presented. The incorporation of these technologies allows teachers to adapt to the different ways of learning of students, making teaching more personalized and aligned with the needs of the class.

Teachers also pointed out the use of online educational platforms and virtual learning environments as important tools for providing complementary materials, conducting interactive activities, monitoring student progress and promoting interaction and collaboration among students. In the case of the University under study, teachers use the Integrated System for the Management of Academic Activities (SIGAA), which offers resources for managing courses, communicating with students, making materials available and carrying out online activities.

On the SIGAA platform, students can access various information, statements and certificates related to academic monitoring without the need to travel to the university. This convenience provides greater transparency in the institution's internal processes, reduction of paper use and integration of systems and information. In addition, the system allows each student to evaluate classes individually and, at the end of the school term, to make a more effective evaluation of the subject, which can be valuable in combating retention and dropout. As pointed out by a teacher during the interview:

[...] in SIGAA, students can access various information, statements and certificates related to academic monitoring without the need to travel to the university. This convenience provides greater transparency in the institution's internal processes, reduction of paper use and integration of systems and information. In addition, the system allows each student to evaluate the classes individually and, at the end of the school term, make a more effective evaluation of the subject, which can be valuable in combating retention and dropout (E3).

In view of the above, there are advantages provided by SIGAA to the teaching-learning process. The system offers practical access to academic information, promotes transparency in the institution's internal processes, contributes to the reduction of paper use, integrates systems and information, and allows individual evaluation of classes. These benefits point to a more efficient academic management aligned with students' needs, which can result in a more positive and engaging educational experience.

Students, in turn, mentioned the use of mobile devices, such as smartphones and tablets, as a frequent form of access to technology in the classroom. Students emphasized that these devices allow quick access to information, search for related content and participation in interactive activities proposed by teachers. After the Covid-19 pandemic, seven of the ten students also emphasized that they started using mobile devices to take notes in class. In this way, the adoption of technology also began to assist the organization and management of knowledge acquired during the teaching-learning process.

With the use of smartphones and tablets, 70% of the students reported that they started to take pictures of the slides, record audios of the teachers' explanations and even make digital notes in specialized apps. This facilitated the revision process later on, as all important information was stored on a portable device.

However, despite the acceptance and recognition of the benefits of technology, both teachers and students also pointed out challenges and concerns regarding its use. Among the challenges mentioned by teachers are the need to constantly adapt to new tools and technologies, the lack of time to update themselves in relation to technological innovations and the difficulty in dealing with technical problems during classes. The statements below highlight some of the teachers' responses.

The main challenge is around adaptation. It is necessary that we have time and adequate training so that we can effectively use these technologies in the classroom (E3).

I believe it is the lack of time to learn how to use these tools effectively. Teaching life demands a lot from us teachers, so we end up running out of time to improve ourselves in these technological issues (E1).

I am a teacher who started his academic career 30 years ago. Today, times are different. I seek to improve myself, but I came from a time when teaching was done in a more traditional way. My main difficulty is dealing with the problems that arise when I use technology in the classroom. I try to use slides and present videos, but technical problems such as poor internet connection, poor wire contact and bad hardware end up making classes difficult (E5).

It is observed that teachers mentioned the need to constantly adapt to new tools and technologies. This challenge is related to the rapid evolution of technology, which requires teachers to constantly update themselves to keep up to date with technological innovations. The lack of time for this updating is another factor that hinders the full adoption of technology in the educational environment.

Nevertheless, the difficulty in dealing with technical problems during classes is another concern mentioned by teachers. This difficulty can include anything from internet connection problems to issues related to the proper functioning of the technological equipment used in the classroom. These interruptions can negatively impact the flow of the lesson and cause frustration for both teachers and students.

Among the students interviewed, five of them pointed out that the presence of technology is a factor that can contribute to take away focus and concentration during the learning process. Overdependence on technology is a worrying aspect, as it can make students dependent on technological devices to perform academic tasks, such as research and online activities. This dependency can negatively impact students' ability to develop critical thinking skills and to perform tasks autonomously.

When I use technological tools to learn in the classroom, it takes my concentration away a little. I usually take notes on a tablet, but I end up looking at other content on the internet (E11).

I think the main difficulty is being able to pay attention in class with a phone in my hand. Sometimes, I just write down the topic of the class and then try to study on the internet (E12).

Thus, with the increased use of electronic devices, such as smartphones, tablets and laptops, in the classroom, the temptation to be distracted by other activities, such as social networks, games and messages, has become greater. Constant access to the internet and apps also leads to students' focus being distracted, impairing their attention to teachers' explanations and the content presented. In addition, the ease of access to information on the internet decreases students' effort to pay attention during classes, since they know they can find the content later.

The presence of technological devices provides a significant distraction, leading to dispersion of attention and hindering the absorption of educational content. As a consequence, this can negatively affect students' engagement in lessons and their ability to make the most of learning opportunities. This can lead to an attitude of passivity towards learning, as information seems always accessible and available.

In addition to this challenge, three students also cited the difficulty of accessibility to technological tools. These difficulties around accessibility were associated with poor internet connection and bad technological devices, which can affect the teaching-learning process.

The main problem of technology in the classroom is the accessibility of internet access. The internet signal on our campus is terrible, so there is no way to learn properly like this (E12).

Thinking about the adoption of technology in the teaching-learning process requires a focus on accessibility. Not all students have the conditions to have the appropriate tools, and this ends up being a challenge for many students in social vulnerability, like me (E14).

Access to technology and the internet is a fundamental aspect to be considered when thinking about its adoption in the teaching-learning process. The use of technological tools can offer numerous educational advantages, but it is important to recognize that not all students have the same conditions to take full advantage of these resources. Difficulties in accessibility to technological tools can negatively affect learning and become a challenge especially for students in social vulnerability.

The students' opinions highlight the relevance of this theme. As evidenced, three students pointed out the difficulty of accessibility as a real obstacle to the effective use of technology in the classroom. Among the main issues mentioned are the poor internet connection and the lack of adequate technological devices. These limitations can hinder students' active participation in academic activities, make access to study materials more difficult and, consequently, affect the teaching-learning process. The issue of dependency generated by technology in the teaching-learning process is another relevant aspect to be considered when analyzing the impact of technology on education. Two students highlighted this concern, and it deserves attention, as it reflects a debate increasingly present in the modern educational context.

As best practices to ensure that all students have access to the technological resources needed for education, respondents pointed out that investments in technological infrastructure are essential. This includes providing adequate access to devices, such as computers and tablets, and ensuring a stable internet connection. In addition, teachers also highlighted the importance of teacher training programs so that they can effectively use technology in their pedagogical practices.

IV. Conclusion

The present research sought to analyze the main contributions and challenges of technology in teaching at a Brazilian Federal University. Thus, it was possible to verify that technological tools, such as slide presentations and online educational platforms, have been widely used by teachers to enrich their classes and make them more dynamic. These practices allow the insertion of multimedia elements, such as images and videos, and enable students to access a variety of sources and complementary resources to deepen their knowledge.

Technological evolution in education has promoted significant changes in the educational landscape, providing new opportunities and challenges for teachers and students. The adoption of technologies in the classroom can be a powerful tool to improve the quality of education, make teaching more interactive and personalized, and offer a more attractive and effective learning experience for students.

However, the research also highlighted challenges to be overcome for the effective integration of technology in teaching. Teachers pointed out the need for constant adaptation to new tools and technologies, as well as the lack of time and resources to update themselves on these issues. In addition, technical problems during classes were mentioned as a concern, as they can interfere with the progress of pedagogical activities.

Another challenge identified is related to students' over-reliance on technology, which can hinder concentration and active engagement in class. It should also be noted that accessibility to technological tools was also pointed out as an important issue, especially for students in social vulnerability, who may face difficulties in accessing the internet and appropriate technological devices.

To address these challenges, it is essential to invest in technological infrastructure in educational institutions, ensuring adequate access to devices and a stable internet connection. Nevertheless, teacher training and capacity-building programs should be offered so that teachers can effectively use technologies in their pedagogical practices.

By better understanding the contributions and challenges of technology in teaching, it will be possible to develop more efficient strategies to integrate technology effectively into the educational process, maximizing its benefits and overcoming the difficulties presented. The research presented here sought to contribute to the improvement and enhancement of the use of technology in education, providing valuable insights for the academic community and educational managers.

It is hoped that the results of this research can inspire other educational institutions to reflect on the relevance of technology in education and to seek innovative solutions to enhance the educational experience of students. With a conscious and equitable approach, it is possible to use technology as an ally in the teaching-learning process, enhancing the formation of critical, participatory citizens prepared for the challenges of the contemporary world.

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