Tech-Driven Learning in Business Management: Generation Z's Innovative Educational App Proposal

Aprendizagem Impulsionada pela Tecnologia em Gestão de Negócios: Proposta de Aplicativo Educacional Inovador Desenvolvido pela Geração Z

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ABSTRACT

This study aims to observe and describe the teaching and learning processes of 103 Generation Z students as they independently create an educational app for the Business Management course. The construction process was overseen by the professor across three stages: development of the app's initial screens, guidance on building free apps, and consolidation of the educational app. Key motivating factors, as identified by the Generation Z students, include videos, animations, podcasts, and games; interaction and exchange of experiences with other groups; and the implementation of technological tools in the educational environment, particularly on mobile devices. This study holds significant social relevance, considering the evolving teaching and learning processes in the post-COVID-19 digital era, where schools can leverage various technological tools to enhance the learning experience for Generation Z, as well as expand the number of students reached through technology-driven platforms aimed at teaching Business Management. This study marks the first research endeavor focusing on the learning process through a Business Management app constructed by Generation Z students. It highlights the need for teaching staff to adapt classroom methodologies to the unique knowledge base and lifestyles of Generation Z, enabling students to effectively use technological resources to interpret, analyze, and propose solutions for today's market.

Keywords: Business Management. Educational App. Generation Z. Learning. Teaching.

RESUMO

Este estudo tem como objetivo observar e descrever os processos de ensino e aprendizagem de 103 estudantes da Geração Z enquanto eles criam, de forma independente, um aplicativo educacional para o curso de Gestão de Negócios. O processo de construção foi supervisionado pelo professor em três etapas: desenvolvimento das telas iniciais do aplica-

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RESUMO

tivo, orientação sobre a construção de aplicativos gratuitos e consolidação do aplicativo educacional. Os principais fatores motivacionais, identificados pelos estudantes da Geração Z, incluem vídeos, animações, podcasts e jogos; interação e troca de experiências com outros grupos; e a implementação de ferramentas tecnológicas no ambiente educacional, especialmente em dispositivos móveis. Este estudo possui relevância social significativa, considerando os processos de ensino e aprendizagem em evolução na era digital pós-COVID-19, onde as escolas podem aproveitar diversas ferramentas tecnológicas para aprimorar a experiência de aprendizagem da Geração Z, bem como expandir o número de alunos alcançados por meio de plataformas impulsionadas pela tecnologia, com o objetivo de ensinar Gestão de Negócios. Este estudo marca o primeiro esforço de pesquisa focado no processo de aprendizagem por meio de um aplicativo de Gestão de Negócios construído por estudantes da Geração Z. Esta pesquisa destaca a necessidade do corpo docente adaptar metodologias em sala de aula à base de conhecimentos e estilos de vida únicos da Geração Z, capacitando os estudantes a utilizarem eficazmente os recursos tecnológicos para interpretar, analisar e propor soluções para o mercado atual.
Palavras-chave: Gestão de Negócios. Aplicativo Educacional. Geração Z. Aprendizagem. Ensino.

Introduction

In traditional education, school research and the teaching and learning processes of students were conducted through books and encyclopedias. In the digital age, this process is constantly evolving. With computers and smartphones in the classroom, educational technologies have emerged as an innovative pedagogical approach in the educational context.

These technologies have been part of people's lives since childhood in younger generations, such as Generation Z, also known as "Digital Natives" (Arifah et al., 2021; Iorgulescu, 2016; Martini et al., 2017; Mathur & Hameed, 2016; Prensky, 2001a, 2001b). They were born in an era when ICT (Information and Communication Technology) was widespread in their culture (Martini et al., 2017). The individuals of this generation are familiar with and connected to these technologies from birth, using them regularly in their daily lives (Bassiouni & Hackley, 2014; Berkup, 2014; Hermawan et al., 2023; Moreira, 2022)2014; Berkup, 2014; Hermawan et al., 2023; Moreira, 2022.

The implementation of new technological tools in the educational environment, particularly on mobile devices, allows the creation of new learning environments that support classroom practice and facilitate assessment (Moya & Camacho, 2021). Schools are encouraged to support their students in learning experiences that prepare them for an increasingly digitized job market (De Lorenzo et al., 2023). There is a need for innovation in the future of education and digital approaches to support creative thinking (Esteve Mon, 2015), considering that the use of new technologies is quite natural for these students in the new millennium (Prensky, 2001a, 2001b).

Although learning seems to be increasingly digitized, the ability to measure students' creative potential appears to be rooted in tools from the last century, such as paper tests (Guo, 2016). Despite the improvements offered by new technologies, pencils and paper are still widely used, owing to their universal applicability and availability (Kwon et al., 1998; Zabramski et al., 2013). As technology advances, teaching and learning processes have become more robust and technological tools have been employed in individual and group learning to foster cooperation among students (Zheltukhina et al., 2023). Access to the internet and networks can be viewed as foundational for new learning methodologies, serving as important tools that individuals can utilize for business management, decision-making, and skills mapping (Szymkowiak et al., 2021), thereby making education in Business Management more practical.

Ong and Quek (2023) emphasize the need for educators to leverage technological platforms to disseminate knowledge within the classroom, aiming to enhance student motivation and create a more enriching learning experience. By doing so, teachers can empower students to become active participants in their own educational journeys (Fernández-Sánchez et al., 2023), allowing them to engage in enjoyable learning processes. However, there is a pressing need for studies that delve into research directions aimed at comprehensively understanding the dynamic learning environments that are evolving into effective experiences for quality education (Agyekum, 2023).

Moreover, there is a notable scarcity of research that investigates the relationship between online or technological teaching methods and traditional learning methodologies, highlighting the need for a more nuanced comparison between these educational approaches (Szymkowiak et al., 2021). As the demand for innovative teaching solutions increases, it is essential for educators to model the use of tech-

nology for educational purposes, setting an example for students to adopt these tools in their own learning (Szymkowiak et al., 2021). Furthermore, the advent of digital pedagogy has redefined teachers' competencies in integrating Information and Communication Technologies (ICT), presenting unprecedented challenges in the post-pandemic educational landscape (Bozkurt et al., 2022). This underscores the role of teachers and educational institutions as invaluable resources, playing increasingly critical roles in shaping future learning environments (Bozkurt et al., 2022).

This study sets itself apart from previous research on learning through technological tools in Business Management courses (Brautlacht, 2018; Castilla Barroso et al., 2017) by being the first to focus on the learning process driven by a Business Management app developed by Generation Z students themselves. Furthermore, this research distinguishes itself from other recent studies (Gueorguiev & Kostadinova, 2024; Hasan et al., 2024; St. John et al., 2023) that examined Generation Z's involvement in Business Management education by uniquely showcasing the stages of app development carried out by the students in this field, which is designed to facilitate the learning process for their peers. The app was created iteratively during the teaching and learning process, presented in seminars by the students, and subsequently made available for use by other Business Management learners. This approach not only underscores the practical implications of enabling students to effectively use technological resources to interpret, analyze, and propose solutions for modern market challenges but also highlights the social relevance of integrating diverse technological tools into education, thereby enhancing Generation Z's learning experience and shaping future teaching and learning methodologies.

In light of this, the research presented the following question: How can a digital tool assist the teaching and learning processes of Generation Z students in the Business Management course? Based on this research question, this study aims to observe and describe the teaching and learning processes of 103 Generation Z students in creating an app for the Business Management course. This process involved the development of an educational app by the students themselves in the technical Business Management course at the campus of the Federal Institute of Espírito Santo (IFES). Thus, this study sought to address a research gap identified by Carter (2018), where the author observed that blended learning, involving group collaboration, can be effective in the learning process. In other words, the author sug-

gests that small groups can share their findings, engage in discussions, and identify deficiencies, information, and skills among peers. This was one of the aspects explored in this research, where the teacher's monitoring of the students' learning process involved discussions and sharing of knowledge among the groups.

In summary, given the technological context that surrounds Generation Z (Hermawan et al., 2023; Khalid et al., 2023; Moreira, 2022), their distinct digital preferences compared to students from other generations (Sanjeev et al., 2021) and their learning patterns through non-traditional technological platforms (Bagdi et al., 2023; Beltrán-Flandoli et al., 2023; Karabatzaki et al., 2018; Tóth et al., 2022) it becomes evident that a targeted intervention in their education is necessary – one that encourages them to engage with multiple technological learning tools, such as an app, to enhance their educational experience. Additionally, considering that Generation Z – defined as those born between 1995 and 2010 (Bassiouni & Hackley, 2014; Bencsik et al., 2016; Berkup, 2014; Ilin & Shestova, 2014; Koksal, 2019; Pérez-Escoda et al., 2016; Smith, 2019) – is now entering the workforce, either as interns or employees, this study serves as a key reference in the academic literature. This is especially relevant given that these individuals were born into an era where technological platforms were already an integral part of their daily lives.

The remainder of this paper is organized as follows. The next section reviews the literature on the teaching and learning of Generation Z, use of technologies, and job market. In the following section, a preliminary survey is conducted with 274 high school students to identify the digital tools and preferences of Generation Z students. The next section presents the methodological approach. The Results and Discussion section showcases the phases of app development and the teacher's monitoring of teaching and learning processes. The paper wraps up with a conclusion and future studies, followed by the References section.

Literature Review

EDUCATIONAL TECHNOLOGIES AND THE INTEGRATION OF GENERATION Z

Information and Communication Technologies (ICTs) have transformed the educational landscape, turning virtual spaces into a dominant part of modern learning

environments (Tóth et al., 2022). These new technologies have profoundly influenced the methods of instruction and student engagement (Bagdi et al., 2023). In the context of schools, technology has become ubiquitous, permeating not only professional and personal lives but also everyday school interactions (Sales et al., 2021).

A generation that has grown up immersed in this virtual world is known as Generation Z, typically defined as those born between 1995 and 2010 (Bassiouni & Hackley, 2014; Bencsik et al., 2016; Berkup, 2014; Ilin & Shestova, 2014; Koksal, 2019; Pérez-Escoda et al., 2016; Smith, 2019). Their constant exposure to technology has cultivated a distinct set of skills, making digital proficiency a core competency in thriving within the 21st century (De Lorenzo et al., 2023). When compared to previous generations, Generation Z stands out for its deep familiarity with technological platforms, which have been integral to their development from an early age (Iorgulescu, 2016; Schwieger & Ladwig, 2018). This generation actively seeks and navigates information through digital networks (Bagdi et al., 2023), is highly connected to multiple devices (Rodrigues & Zatz, 2016), and often utilizes digital games as educational tool (Prensky, 2001b).

Generation Z represents a significant portion of today's student body, making it crucial for educational institutions to align their teaching practices with the technological preferences and goals of these students (Sanjeev et al., 2021). Institutions must not only cater to Generation Z's expectations but also ensure that government policies support the integration of ICT in learning models (Bagdi et al., 2023). Students from this generation show a marked preference for collaborative technologies in academic settings (Hermawan et al., 2023).

A pioneering study by Prensky (2001a), introduced the concept of "Digital Natives," describing students born into a world dominated by digital technology. These students, according to Prensky, are naturally fluent in digital languages, including computers, video games, and the internet. However, they often face challenges in understanding the language of "Digital Immigrants" —individuals who encountered technology later in life and now serve as their educators.

Moreover, Generation Z students tend to favor mobile applications and video content over traditional instructional methods (Szymkowiak et al., 2021). These students frequently model their technological behavior after teachers who integrate

modern technology into their pedagogical approach, using those tools both inside and outside the classroom for academic purposes (Szymkowiak et al., 2021). Educational tools designed for Generation Z often involve non-traditional technological resources, enabling flexible and innovative learning experiences (Arifah et al., 2021; Moreira, 2022; Pérez-Escoda et al., 2016). In this study, the development of an educational app for the Business Management discipline is an example of such an innovative technological tool.

TEACHING, LEARNING, AND THE JOB MARKET

The educational experiences of Generation Z, particularly through technological resources, have a direct impact on their future performance in the workforce (Fernández-Sánchez et al., 2023; Iorgulescu, 2016). The practical, hands-on learning necessary for disciplines like Business Management plays a critical role in their professional development. For this reason, Learning Objects (LOs)—such as educational games, media, and audiovisual resources—can serve as invaluable tools for bridging the gap between theoretical knowledge and real-world applications, offering students immersive, practical experiences (Fernández-Sánchez et al., 2023).

In fields with a practical focus, such as Business Management, it is essential to adopt teaching methodologies tailored to Generation Z, who will soon be entering the workforce. This generation demonstrates a high level of acceptance of new technologies and is adept at navigating digital platforms (Tóth et al., 2022). The job search strategies of Generation Z are significantly shaped by their lifelong familiarity with technology (Batool et al., 2023; Trang et al., 2024). This generation exhibits a direct relationship with potential employers through digital platforms like LinkedIn, where they leverage social media to express their individuality and professional identity (Trang et al., 2024).

An advent of digital transformation has introduced challenges for technology-driven enterprises, demanding digital readiness from individuals in the job market. Generation Z is expected to comprise the workforce that will lead in shaping workplaces (Hermawan et al., 2023). Consequently, it is necessary to observe the methodologies that teachers are using for the learning of Generation Z students, as individuals of this generation seek new knowledge through various technological

platforms (Susilo et al., 2019). With this demand, it is important to know how to adapt technological resources to market expectations.

The values Generation Z brings to the workplace emphasize flexibility, innovation, and collaboration (Batool et al., 2023). Despite market challenges, many are drawn to entrepreneurial ventures and careers within technology-driven fields, prioritizing personal and professional fulfillment (Batool et al., 2023). This generation is particularly keen on acquiring skills with immediate applications in emerging fields, including startups and technological innovations (Kang, 2023).

In the post-COVID-19 job market, which is characterized by ongoing uncertainties and rapid technological advancements, practical experiences and extracurricular activities are vital for Generation Z's career readiness (Kang, 2023). Educational institutions must prioritize the integration of technology and the development of practical skills to prepare students for jobs that may not have existed a decade ago (Kang, 2023).

DIGITAL EDUCATION OF GENERATION Z STUDENTS

Technological tools such as animations and gamification have proven effective in fostering both knowledge acquisition and motivation among Generation Z students (Inangil et al., 2022). Game-based learning, particularly in mobile formats, offers significant potential for engaging these students (Karabatzaki et al., 2018), as games provide a more motivating educational experience compared to traditional methods (Girard et al., 2013). While educational games have shown promise, there remains a gap in the literature on their most effective use in classrooms (Fernández-Sánchez et al., 2023).

As Generation Z enters classrooms already connected to technology, educators face the challenge of effectively teaching these students, many of whom intuitively use new digital platforms (Pérez-Escoda et al., 2016). Consequently, educators are tasked with adapting their language and methodologies to cater to these tech-savvy learners, often necessitating a rethinking of traditional teaching methods to cultivate the necessary skills for future success (Pérez-Escoda et al., 2016). In this context, it is important to recognize that traditional learning tools, such as physical whiteboards and textbooks, are gradually being replaced by digital alternatives (Green & McCann, 2021). With Generation Z's widespread use

of technology (Bassiouni & Hackley, 2014; Berkup, 2014; Ilin & Shestova, 2014), school-based education must align more closely with their daily experiences (Moreira, 2022).

The COVID-19 pandemic has underscored the growing need for robust technological infrastructure in education. The demand for technology-assisted learning is expected to persist as students seek new opportunities (Fong et al., 2022). Adequate teacher training is crucial for the effective incorporation of technology into teaching, ensuring that pedagogical practices are well-suited to Generation Z's learning needs (Szymkowiak et al., 2021). Additionally, educational models that promote the use of computers and mobile devices in the classroom play a critical role in knowledge acquisition (Szymkowiak et al., 2021).

However, challenges remain, such as the lack of teacher training in digital platforms and insufficient access to high-speed internet (Mulla et al., 2023). Teacher preparation for e-learning platforms is crucial for navigating these challenges and ensuring the effective delivery of education (Inangil et al., 2022). As online education becomes more prevalent, most of today's youth feel comfortable using ICTs in learning environments (Bagdi & Bulsara, 2023). Still, both teachers and students must work together to adopt a shared technological language to enhance communication and learning outcomes.

It is equally important to ensure that students are guided in how to apply technological tools in real-world scenarios. Without this, technology could inadvertently undermine critical thinking and problem-solving skills (Kang, 2023). Moreover, technology has the potential to distract students or diminish the quality of their learning, especially when it negatively impacts human interaction and social skills (Batool et al., 2023). Additionally, disparities in access to technology, such as unequal internet access, can lead to significant inequities in educational outcomes for Generation Z (Batool et al., 2023; Trang et al., 2024).

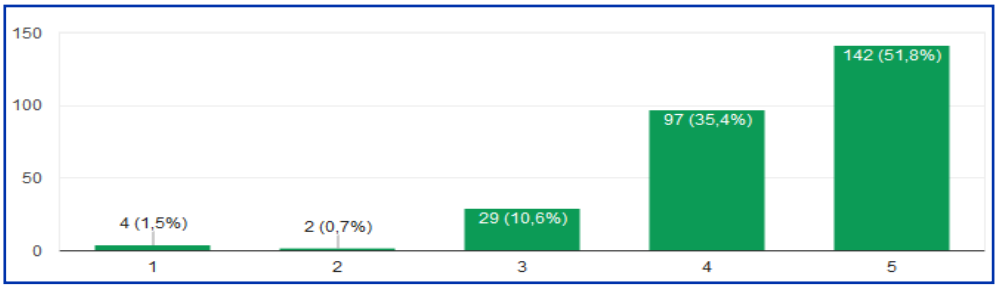
PRELIMINARY SURVEY

A preliminary survey was conducted with 274 high school students in Brazil, born between the years 1998 and 2003. To assess the feasibility of a pedagogical intervention in the teaching and learning processes of these students, a questionnaire was developed, consisting of open-ended and closed-ended questions to

gather the participants' opinions regarding the subject of study. We obtained ethical clearance from Federal Institute of Espírito Santo (IFES), and informed written consent from all participants. This approach aligns with the studies by Creswell and Creswell (2017), employing a qualitative methodology aimed at understanding how the study group expresses their viewpoints regarding the teaching and learning processes.

The survey consisted of a questionnaire based on a Likert scale with a measurement range from 1 to 5, where: 1 - strongly disagree; 2 - disagree; 3 - neither agree nor disagree; 4 - agree; 5 - strongly agree. Several questions were raised, and students selected the option they believed best suited their learning profile. It was observed that over 85% (grades 4 and 5 on the agreement scale) of the students believed that an app, which assists them in studying the subject of Business Management and is easily accessible on their smartphones, would facilitate the assimilation of the subject matter in the classroom (Figure 1).

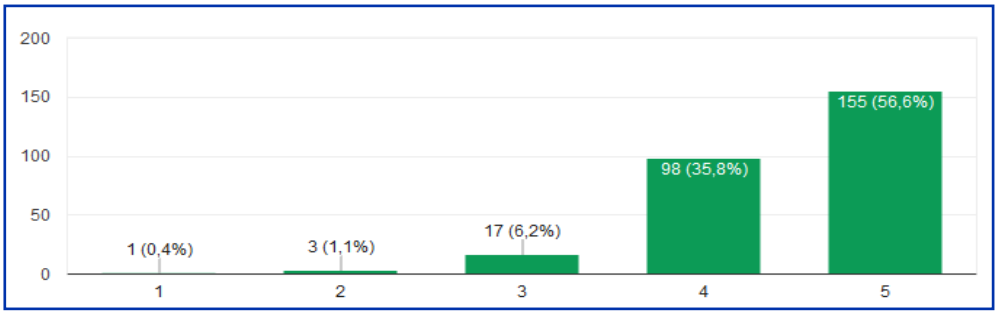
Figure 1. Agreement Scale with the Ease and Assimilation of the Taught Subject in the Classroom through the Use of an App.



Source: Created by the authors.

Furthermore, it was observed that over 90% (grades 4 and 5 on the agreement scale) of the students believed that using videos and animations as facilitators of the teaching and learning processes in the Business Management discipline (Figure 2).

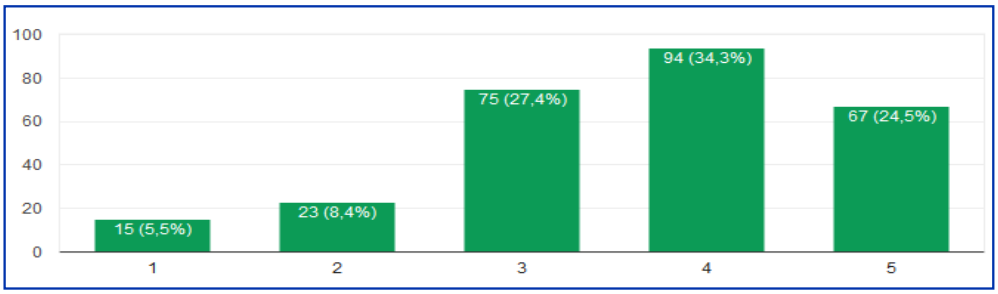
Figure 2. Scale of agreement with the use of videos and animations as facilitators of the teaching and learning processes.



Source: Created by the authors.

In Figure 3, it was observed that almost 60% (grades 4 and 5 on the agreement scale) of the students believed that using podcasts as facilitators of the teaching and learning processes in the Business Management discipline.

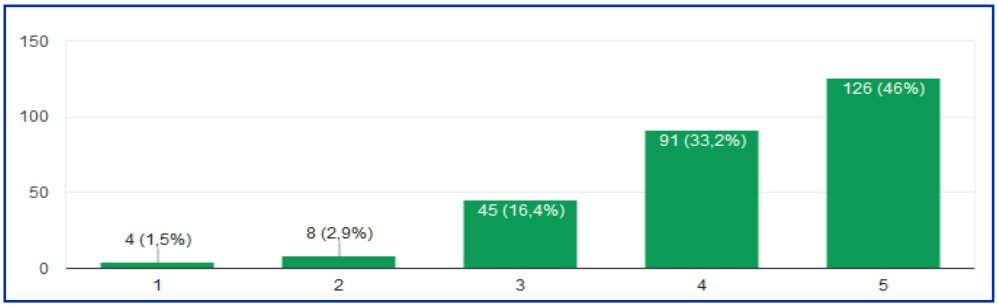
Figure 3. Scale of agreement with the use of podcasts as facilitators of the teaching and learning processes.



Source: Created by the authors.

In Figure 4, it was observed that almost 80% (grades 4 and 5 on the agreement scale) of the students believed that using games as facilitators of the teaching and learning processes in the Business Management discipline. Students consider the use of interactive media and games as effective forms of interaction during online learning, preferring such platforms over solely asynchronous learning materials (Ong & Quek, 2023).

Figure 4. Scale of agreement with the use of games as facilitators of the teaching and learning processes.

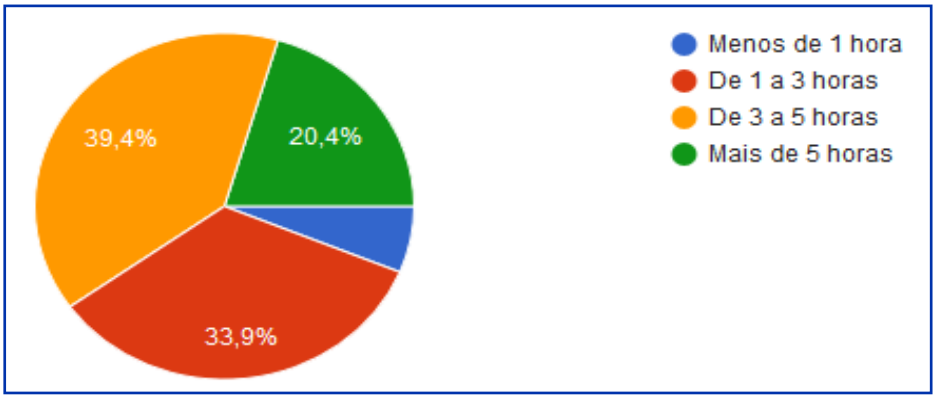


Source: Created by the authors.

The preliminary survey elicited demands from the students regarding the use of technological resources (Figures 1, 2, 3, and 4) to facilitate their own teaching and learning processes in the Business Management discipline. Based on the students' preferences, it was proposed that an app be developed to incorporate videos, animations, podcasts, and games, with the aim of enhancing comprehension of the course. Drawing on student insights regarding the tools that could best support their learning process, and addressing the needs of a generation accustomed to using technology for daily activities, the development of an innovative, tech-driven educational app for Business Management emerged as a solution. This proposal seeks not only to improve learning outcomes but also to implement methodologies appropriate to this generational group.

An interesting point raised by students in the preliminary survey (Fig. 5) is that more than 70% of the students spend 1 to 5 hours per day using social media or some internet technological resource on their smartphones, computers, or tablets (videos, games, animations, podcasts, music), and more than 20% of these students use them for more than 5 hours per day. These data reinforce the research of Babu et al. (2023), wherein 57% of students still rely on smartphones as their only tool to carry out their online classroom activities.

Figure 5. Average Time Spent on social media or Other Technological Resources on Smartphone, Computer, or Tablet.



Source: Created by the authors.

Contemporary educational tools allow students to learn at their own pace through various methods such as games, mobile applications, videos, or even podcasts (Szymkowiak et al., 2021). Regular exposure to diverse learning experiences can enhance students' motivation by offering multiple avenues for acquiring knowledge (D'Souza & Maheshwari, 2010; Palmer, 2007). Thus, motivation emerges as a crucial factor in individual learning, representing a key element in the effective management of the learning process (Szymkowiak et al., 2021).

Prensky (2001b) conducted a survey in his studies that aligns with this research. The author analyzed the fact that a Digital Native today has spent 10,000 hours playing video games, received or sent 200,000 instant messages, spent 10,000 hours talking on cell phones, 20,000 hours watching TV, seen 500,000 commercials before finishing high school, and at most, 5,000 hours reading books. The use of technological educational tools can make learning more dynamic and aligned with students' reality when used correctly by the teacher, thus promoting a benefit in school pedagogical work (Fernández-Sánchez et al., 2023).

Methodological Approach

The research was conducted within a campus of a Federal Institute of Education located in a rural area, which offers a full-time technical course in Business Management integrated with high school education. The students at this campus use a computer lab with internet access for their research; however, outside the lab, Wi-Fi access is impossible for students' smartphones.

Based on the aforementioned **Preliminary Survey**, which identified the digital tools and preferences of Generation Z, the proposal was made to 103 students of high school/technical course in Business Management. The proposal involved the development of an app that would enhance their own teaching and learning processes in the Business Management discipline, making them more dynamic and effective. Thus, the students were divided into groups, with the purpose of developing an App that aimed to enhance and facilitate their studies. The app in question should contain various tools, such as podcasts, videos, games, parodies, diagrams, figures, and texts, which aimed to assist other students in understanding the Business Management discipline using multimedia.

The quantitative phase of this study, referred to as the **Preliminary Survey**, employed a structured questionnaire to gather insights into Generation Z's preferences regarding the learning tools that best meet the needs of this generational group. Responses from 274 students were collected using a Google Forms survey, with a 5-point Likert scale ranging from 1 to 5, where: 1 - strongly disagree; 2 - disagree; 3 - neither agree nor disagree; 4 - agree; and 5 - strongly agree. Based on these findings, a proposal was made to 103 students of the high school/technical course in Business Management, involving the development of an app that would enhance their teaching and learning processes in the Business Management discipline, making them more dynamic and effective.

Thus, the students were divided into groups with the objective of developing an App to enhance and facilitate their studies. The app was to contain various tools, such as podcasts, videos, games, parodies, diagrams, figures, and texts, aimed at assisting other students in understanding the Business Management discipline through multimedia. Following this proposal, a qualitative methodology was designed as a pedagogical intervention strategy. This methodology aimed to monitor the teaching

and learning processes of these students throughout three stages. It focused on analyzing the challenges and difficulties faced and providing support for the students as they developed an educational App focused on Business Management.

In this process, the role of the teacher is crucial in guiding the creation of meaningful content, particularly when students utilize technological tools in the classroom setting, with clear teaching and learning objectives (Chiofi & OLIVEIRA, 2014). Pedagogical intervention research involves structured planning and effective interventions in the teaching and learning process, ensuring that the resulting outcomes of the educational changes can be effectively evaluated (Damiani et al., 2013). This type of research emphasizes practical applicability, aiming to contribute to tangible benefits, while simultaneously encouraging reflective analysis on the topic (Gil, 2010).

Moreover, in interventionist research, the teaching and learning process offers students a deeper and more applicable knowledge in their daily educational activities (Damiani, 2012). T Teachers play a fundamental role in leading students through the construction of meaningful content when employing technological tools in the classroom. Notably, the interventionist nature of this study allowed for a more in-depth qualitative analysis of Generation Z learners, as suggested by Bagdi and Bulsara (2023), with the objective of generating more generalizable insights into the field of education.

This study was grounded in a pedagogical intervention that transitioned from traditional teaching methods to the incorporation of innovative approaches in education. As they navigate a digital environment, Generation Z students think and process information differently compared to previous generations (Poláková & Klímová, 2019). They have a distinct need to receive new information from various sources, favoring digital media over traditional formats (Szymkowiak et al., 2021). Therefore, this study aimed to leverage educational technologies to enhance the teaching and learning processes for these young individuals.

To address these unique learning needs of Generation Z, this study leveraged educational technologies to enhance their teaching and learning processes. To provide structured guidance and ensure effective learning, the groups were given the same guidelines regarding the expected outcomes of the App development process, which, for instructional purposes, was divided into three stages were established to better structure the teaching and learning phases during the App's construction.

The stages included: the students' classroom presentation on the App development process and how they planned to incorporate Learning Objects (LOs) into the final product; the pre-prototype presentation of their App, highlighting the challenges they were facing in integrating essential elements; and the final stage, which demonstrated the App's functionality. At this final stage, the integration of elements such as parodies, videos, and games were crucial to enhancing user navigation. These stages, along with the challenges and difficulties encountered by the students, are discussed in detail in the following section.

Results and Discussions

In-classroom discussions involving students and teachers contribute to a more creative and engaging experience, encouraging students to seek more knowledge from their instructor (Rusticus et al., 2023). It was observed that a school environment with peer support also proved to be positive for learning. The planning for the development of an educational App throughout the academic year was an essential step, in which the teacher guided the students from the beginning of the work period until the outcome that would be delivered by the students at the end of the discipline, using various learning technologies.

STAGE 1

In this stage, the students presented to the classroom how they were developing the App, explaining the process of tool construction and what they intended to include as Learning Objects (LOs) in the *final product.* It was observed that some groups had uncertainties about completing the App. In other words, at the beginning of the process, the students expressed concerns that they might not achieve the proposed final objective. At the same time, the teacher encouraged and instructed them on how to proceed with the next stages so that the students felt empowered in building the App.

This research aligns with the findings presented by Cilliers (2017), as the technological language used by Generation Z students in the classroom contrasts with that of their teachers/speakers from previous generations, who are in an ed-

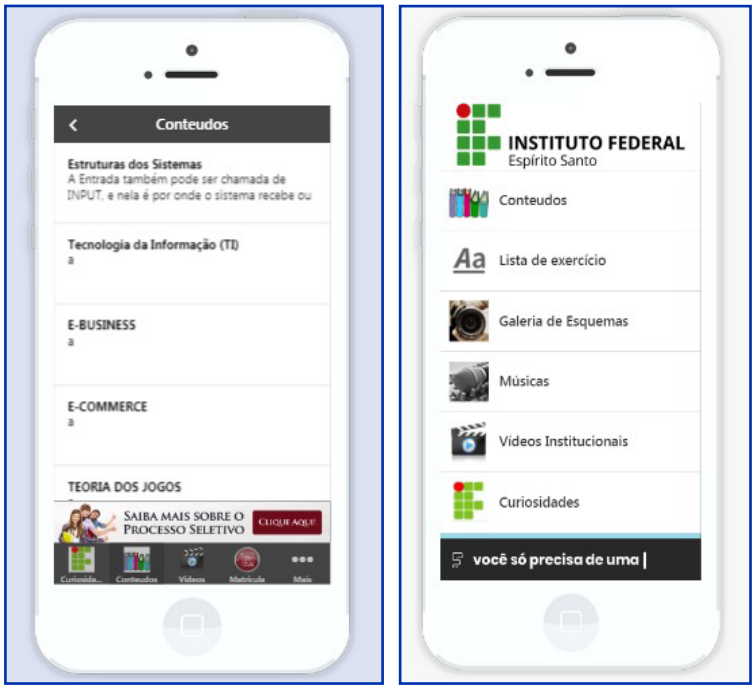
ucational environment with methodologies considered traditional in teaching. The author also believes in teaching and learning strategies that create a bridge to connect these generations.

This initial phase was pivotal for adolescents to engage in dialogue with other groups, as this interaction opened up new opportunities for incorporating distinctive elements into their App and developing ideas that had not been considered when working in isolation. The integration of mobile devices into education enhances learning by facilitating communication and the exchange of information, which, in turn, increases students' creativity and motivation by promoting peer interaction (Norbrook, 2003; Poláková & Klímová, 2019). Consequently, such interaction is essential, as communication, an inherent part of the learning process, plays a fundamental role in knowledge transfer (Kuo et al., 2014). As a result, the interactive learning experiences facilitated new sources of knowledge, proving to be highly significant in the teaching and learning processes within the Business Management discipline.

It is worth highlighting the significant propensity of Generation Z students to use multiple technological devices simultaneously, in addition to being able to engage in other activities during their online learning (Tóth et al., 2022). This is a point raised by this study, suggesting the idea that a technological educational platform could be made accessible to students in the classroom, especially considering that the proposed app was designed for optimal use on smartphones. Some questions that are integral to the educational context of the learning processes for Generation Z include: Is the integration of mobile devices into teachers' classroom planning taking place? Are teachers sufficiently prepared to utilize an educational environment with computerized learning programs? (Carter, 2018). These questions are necessary because the App of technology in the educational environment will become increasingly vital in the learning processes for these students.

To present the initial screens of the apps, each group of students was required to deliver a classroom presentation to discuss the key elements featured on the apps' initial screens (such as podcasts, videos, games, parodies, diagrams, figures, and texts). Each group consisted of an average of six students, forming the six groups from each class of the first year of high school/technical education in Business Management. Figure 6 below presents an example of one of the initial screens of the proposed App.

Figure 6. Example of an initial screen from the developed App.



Source: Created by the authors.

STAGE 2

This phase marked the stage where students should have already 'pre-prototyped' their App. The students demonstrated greater capability and optimism regarding the development of the App. Some doubts had been clarified, and they took the opportunity to discuss situations they had not encountered in the first stage of the process. Once again, the groups showed great willingness to collaborate on the construction of ideas to incorporate into their projects. A synergy among the students was observed as they envisioned different learning objects that could be integrated into their work.

In this stage, a physics teacher was invited to share his experience in constructing and using some free App. The teacher showcased the most suitable interfaces for app development to the students (Fig. 7). He delivered a lecture guiding the students on how to design their projects, emphasizing the importance of clarity,

practicality, and key functionalities that an educational App should have, as Axcell and Ellis (2023) highlighted in the preferred app attributes of Generation Z. The goal was to ensure that users would choose to use the app instead of simply browsing the internet to study the proposed topic.

Figure 7. Instructions for using free App.

Source: Created by the authors.

Students are requesting the use of more technological methodologies in the classroom and placing greater trust in technology know-how in their educational process (Cilliers, 2017). Mospan (2023) observes the divergences between teachers and Generation Z students regarding the future mode of education, as teachers tend to prefer traditional methods due to their experiences with online teaching, while students opt for engaging in online activities in their learning processes. Some universities are already adapting their procedures, curriculum, and training to the digital era, incorporating technological platforms into the teaching and learning processes, such as utilizing YouTube as a tool (Beltrán-Flandoli et al., 2023).

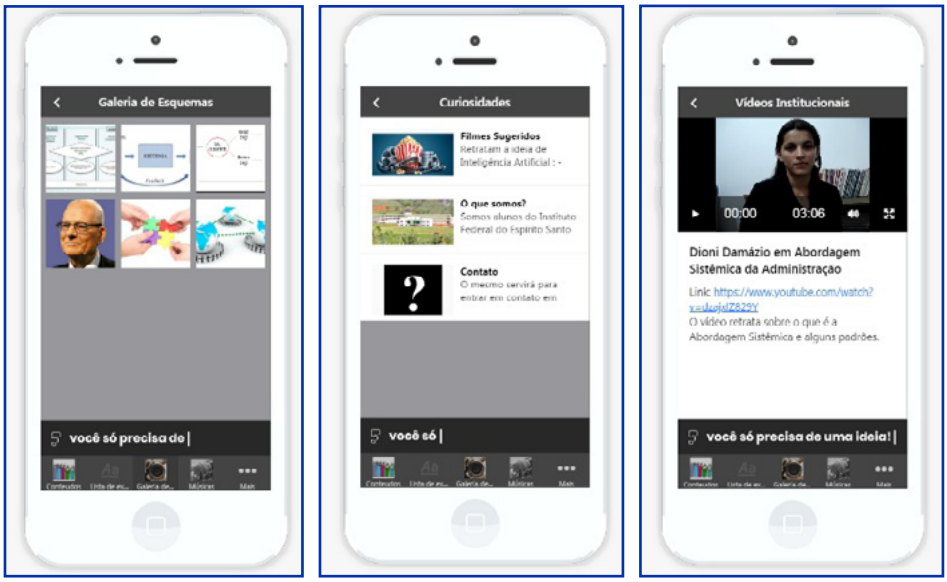
In this stage, the students presented the layout of their App. They designed different tabs covering various topics related to Business Management discipline,

including history, parody, educational games, and videos on the thematic content taught in the App. The students showcased the various tabs that would enhance the learning experience for other students using the proposed App.

STAGE 3

This stage was designed for the final presentations of the seminars, where the App was showcased as the *final product*. At this stage, students were expected to have fully developed their App, making it functional and ready for use. The integration of elements such as parodies, videos, and games within the App was essential to enhance user navigation. To present the final screens of the Apps, each student group was required to deliver a classroom presentation, highlighting the key features incorporated into their App. Despite being just a prototype for an educational App in Business Management, the students in the first year of the high school/technical course were evaluated based on previously established criteria for the final stage of App development. Figure 8 below presents an example of one of the final screens of the proposed App.

Figure 8. Example of a final screen from the developed App.



Source: Created by the authors.

However, it was noted that certain groups needed to make some adjustments to their App. Several cases were identified: a group that struggled to incorporate the parody and game into their App; a group that had excessively lengthy content on the theme, making it impractical for user use; and a group that had a somewhat confusing layout, among other observations.

In this final stage, the students demonstrated great commitment to achieving the proposed objective. A strong dedication was observed among the students to ensure that the App met the minimum requirements and could be made available on the internet for other students in the Business Management course to use. The students were excited about the idea that their App could be effective in the teaching and learning processes of other students, making the Business Management discipline more dynamic and engaging through the use of an educational tool that differed from traditional teaching and met the aspirations and expectations of this new generation.

Technological disruption has transformed the educational process, fostering the development of methodologies that position students as active (Fernández-Sánchez et al., 2023) and autonomous (Trask et al., 2023) participants in their own learning. Students must be prepared to remain flexible and versatile, possessing digital literacy and the ability to navigate the uncertainties of an unknown future (Fernández-Sánchez et al., 2023). In this context, mobile devices and applications are considered effective tools in the current learning process, enabling teachers to motivate their students to expand their knowledge and skills in the classroom (Szymkowiak et al., 2021).

According to Carter (2018), the way Generation Z communicates is quite distinct, as they utilize interactive social platforms much more swiftly than previous generations. Generation Z prefers faster and more concise information, such as short videos on platforms like Instagram (Olejniczak, 2022), and tends to show less interest in daily activities that do not involve the use of digital platforms (Green & McCann, 2021). This generation also prefers using various App for their shopping needs (Udiono & Maryani, 2021).

GENERAL OBSERVATIONS

The students were guided in their teaching and learning processes for a period of 3 months, with individual consultations conducted in the classroom and at

times when the students were available, that is, during non-class hours. The assistance provided to the students' doubts occurred concurrently with the topics covered in the Business Management discipline, as the students took advantage of the presence of the teacher in the classroom to clarify their doubts regarding the development of the App. The process of observing the students' teaching and learning was divided into 3 stages, allowing the students to interact and exchange experiences with other groups regarding the construction of the App.

One of the contributions of this article aligns with Carter's (2018) studies, which highlight that studying generations in a specific educational context can enhance the educational learning processes for individuals. Thus, the insights from Generation Z students presented in this study suggest some non-traditional forms of teaching in the classroom (Beltrán-Flandoli et al., 2023; Mospan, 2023). Young individuals belonging to Generation Z typically enjoy downloading apps that can assist them in their daily tasks, as well as functional and entertaining apps (featuring videos, images, and games) (Axcell & Ellis, 2023), as proposed in this study.

As a result, the student groups that exhibited a more playful and easily distracted behavior during lessons encountered greater challenges in reaching the final objective set by the teacher. Most of the time, the members of these groups appeared disengaged from the learning process in the classroom, and failed to focus on the subject in order to acquire knowledge and engage in team discussions. For this reason, some groups found it more difficult to develop the App.

On the other hand, the groups that remained focused on project development, were willing to share knowledge within the team, showed greater interest in the project, and were attentive to the explanation of the basic educational requirements for the app, demonstrated effectiveness in completing the tasks and successfully presented their Apps. Thus, we can highlight the key elements perceived as motivators by Generation Z students:

1. **Videos, animations, podcasts, and games** are considered facilitators in the teaching and learning processes of the Business Management discipline.
2. **The integration of technological resources in the school environment** can support a more interactive and effective learning experience.

3. **Interaction and exchange of experiences with other groups** expand students' knowledge of various technological tools used for pedagogical purposes.
4. **The implementation of technological tools in educational settings, particularly through mobile devices,** enables a more dynamic learning experience that aligns with the characteristics and preferences of Generation Z.

However, several limitations can be highlighted regarding the app development process:

1. The lack of a specific course that could provide students with foundational knowledge and support for understanding the systems involved in app development.
2. The need for more time within the course for students to explore the technological tools that would be incorporated into their apps.
3. Previous familiarity with certain technologies, which allowed some groups to outperform others.
4. The need for more comprehensive teacher preparation to assist students throughout the app development process.
5. The students' own maturity in understanding the significance of the proposed project and its potential impact on their learning process.

Conclusion and Future Studies

This research observed and described the teaching and learning processes of 103 Generation Z students in creating an app for Business Management discipline. A teaching intervention was conducted in the classroom with discussions between students and the teacher, contributing to the exchange of knowledge and dissemination of learning in the Business Management discipline through an app. In a post-pandemic period since COVID-19, a time that has shaped educational environments, this study demonstrated a strong alignment with Generation Z youth perspectives, using multimedia as a facilitator of their learning process.

The data is limited to a certain number of interviewees to extract concepts about the relationship between Generation Z and educational technologies. This is a factor that should be carefully analyzed, as the aspirations and expectations within the same generation may vary if they do not consider similar factors such as age range, regional differences, socio-cultural diversity, among other aspects (Cappi & Araujo, 2015). Therefore, it was necessary to delimit the sample group in this study, as the participants were students from a specific campus of an institute within the Federal Institutes of Science and Technology networks in Brazil.

It has been observed that there is a need to make an effort to study and raise important questions about a generation that is in the process of learning and has been entering the workforce in recent years. Considering various socio-cultural factors that influence individuals' culture, as well as regional differences, it is not possible to generalize the aspirations and expectations of an entire generation. Nevertheless, we believe that a pedagogical intervention study like this can foster a more robust understanding in the daily teaching and learning processes of the students. Therefore, research involving educational contexts from other countries/cultures and encompassing a larger number of Generation Z respondents should be conducted with the sought to generalizing the results.

It is believed that these young individuals have an interest in advancing their positions in the job market in unique ways, distinguishing themselves from other generations, using resources or platforms that allow them to interpret and analyze data from various business scenarios. Consequently, there is a need for the teaching staff to adapt the methodologies employed in the classroom to the everyday knowledge of Generation Z students, enabling them to use technological resources to interpret, analyze, and propose solutions for the current market.

Future researches are recommended to explore the use of games, videos, and animations as interactive tools that can support a more practical student learning experience. This study calls for researchers to concentrate on the educational reality of Generation Z and future generations, such as Generation Alpha (Arifah et al., 2021; Bagdi et al., 2023) in order to observe which educational resources may prove to be more effective as methodologies in the educational process of future generations. Furthermore, future studies could explore comparative metrics to investigate whether the learning process through digital platforms significantly differs

from traditional teaching methods. Another important area for comparison could be the implementation of technological platforms in urban versus rural school environments, considering that access to technological resources may vary depending on the students' geographical and socio-economic contexts.

This study offers practical implications for school administrators and policy-makers in education, enabling them to develop methodologies and policies that integrate technological tools as complementary to traditional teaching methods. By doing so, they can better align educational practices with the learning needs of future generations. These implications further extend to understanding how both current and future generations are being prepared for the demands of the digital-era workforce, ensuring that education systems evolve to meet the technological and professional challenges of the 21st century.

This research holds significant social relevance, particularly in the context of the evolving teaching and learning processes in the post-COVID-19 digital age. Schools can leverage various technological tools to enhance the educational experience for Generation Z while also expanding their reach to more students through technology-driven platforms designed for teaching Business Management. A key finding of this study lies in the facilitation of exchange of experiences and group learning, where the integration of technology supported a collaborative environment, allowing students to share knowledge more effectively and engage with the subject matter in a meaningful, peer-to-peer dynamic. By fostering these group-based interactions, the study highlights the critical role of technology in promoting experiential learning, ultimately contributing pedagogical insights that further the development of a knowledge-based society in the digital era.

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