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Generation Z and the challenges of education in the Digital Age

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ABSTRACT
Generation Z, made up of individuals born between the mid-1990s and early 2010s, grew up in a world deeply influenced by technology, which brought challenges and opportunities to education. This article aims to analyze the main challenges faced by this generation in the educational context, considering aspects such as dependence on digital devices, the need for personalized learning, and barriers to access technology. Through a literature review, the study explores the evolution of education in the digital age, identifying recent transformations and trends in the use of educational technologies. In addition, challenges for educators and institutions are discussed, such as teacher training and the integration of digital tools in the curriculum. The article also addresses the inequality in access to technology, especially in the Brazilian scenario, and proposes solutions to improve the effectiveness of education in the digital age. Finally, recommendations are presented for educational policies and pedagogical strategies that meet the needs of Generation Z, considering the new law on the use of cell phones in the classroom in Brazil and the guidelines of the Ministry of Education (MEC) for 2025. It is concluded that the integration of innovative technologies and the adoption of adaptive educational practices are essential to ensure quality and inclusive education for this generation.

Keywords: Generation Z. Digital education. Educational technology. Challenges of education. Public policies.

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JUSTIFICATIONS

The choice of the theme "Generation Z and the Challenges of Education in the Digital Age" is justified by the growing influence of technology in everyday life and, especially, in the educational context. Generation Z, made up of individuals born between the mid-1990s and early 2010s, is the first generation to grow up in a deeply connected and digitized world (Prensky, 2001). This reality brings unique challenges to education, requiring a review of traditional pedagogical methods and the adoption of innovative practices that meet the needs of these students.

Firstly, the integration of technology into education is a global and irreversible phenomenon. According to Kenski (2013), technology has not only transformed the forms of communication and interaction, but has also redefined students' expectations regarding the learning process. However, as Selwyn (2020) and Moran (2018) point out, the lack of preparation of institutions and educators to deal with these changes can result in educational inequalities and inefficient use of digital tools.

In addition, Gen Z has specific characteristics, such as a preference for visual and interactive content, the ability to multitask, and the pursuit of personalized experiences (Seemiller & Grace, 2016). These characteristics require a student-centered educational approach that fosters engagement and motivation. However, as highlighted by Twenge (2017), excessive use of digital devices can also lead to challenges such as decreased ability to concentrate, technological dependence, and increased anxiety among young people.

In the Brazilian context, inequality in access to technology and inadequate infrastructure in many public schools are additional challenges. Data from the 2020 School Census reveal that only 27% of public schools have access to high-speed internet (INEP, 2020), which limits digital learning opportunities for many students. In addition, the COVID-19 pandemic has exposed and amplified these inequalities, highlighting the need for public policies that ensure digital inclusion and educational equity (UNESCO, 2021).

Another relevant aspect is the new law on the use of cell phones in the classroom in Brazil. Approved in 2023, the law allows the use of mobile devices as pedagogical tools, as long as they are integrated into educational planning. This change reflects the need to adapt education to the demands of the digital age, but it also requires educators to be trained to use these technologies effectively (BRASIL, 2023). The Ministry of Education (MEC), in its guidelines for 2025, reinforces the importance of investing in technological infrastructure, training teachers to use digital tools, and developing skills such as critical thinking, creativity, and problem-solving (MEC, 2023).

Finally, this study is relevant because it seeks to understand the challenges faced by Generation Z in education and propose solutions that can improve the effectiveness of teaching in the digital age. As Moran (2018) argues, twenty-first century education must be dynamic, interactive and inclusive, preparing students not only for the job market, but also for life in an increasingly digital society. Therefore, investigating this topic is essential to contribute to the development of innovative pedagogical practices and educational policies that meet the needs of Generation Z and promote quality education for all.

OBJECTIVES

GENERAL OBJECTIVE

Analyze the main challenges faced by Generation Z in education and propose strategies to improve the effectiveness of teaching in the digital age, considering the characteristics of this generation and recent technological transformations.

SPECIFIC OBJECTIVES

1. Define and characterize Generation Z, highlighting their particularities in relation to the use of technology and their expectations in relation to the educational process.
2. Explore the evolution of education in the digital age, identifying key changes and trends in the use of educational technologies.
3. Identify the challenges faced by Gen Z in education, including issues such as technological addiction, concentration difficulties, and psychological impacts.
4. Analyze the challenges for educators and institutions, focusing on adapting to new technologies, teacher training and developing innovative curricula.
5. To investigate technological and accessibility barriers, especially in the Brazilian context, where inequality in internet access and inadequate infrastructure are recurrent problems.
6. Present practical examples and successful initiatives in digital education, highlighting cases that can serve as a reference for other institutions.
7. Propose solutions and recommendations to improve digital education, including pedagogical strategies, public policies and the development of digital skills.
8. Discuss the new law on the use of cell phones in the classroom in Brazil and its implications for educational practice, as well as the guidelines of the Ministry of Education (MEC) for 2025.

INTRODUCTION

Gen Z, made up of individuals born between the mid-1990s and early 2010s, is the first generation to grow up in a deeply connected and digitized world. Known as "digital natives", these young people have an intrinsic relationship with technology, which redefines their expectations and behaviors in various aspects of life, especially in education. According to Prensky (2001), Generation Z is characterized by their familiarity with digital devices, their preference for visual and interactive content, and their search for personalized experiences. These characteristics bring unique challenges to the educational system, which needs to adapt to the new demands and transformations of the digital age.

Education, as one of the fundamental pillars of society, has undergone significant changes in recent decades. The integration of digital technologies, such as online teaching platforms, virtual reality, and artificial intelligence, has the potential to revolutionize the learning process, making it more dynamic, interactive, and personalized. However, as Kenski (2013) and Moran (2018) point out, the adoption of these technologies also brings challenges, such as the need for teacher training, inequality in access to technological resources, and the psychological impact of excessive use of digital devices.

In the Brazilian context, the challenges are even more complex. Data from the 2020 School Census reveal that only 27% of public schools have access to high-speed internet (INEP, 2020), which limits digital learning opportunities for many students. In addition, the COVID-19 pandemic has exposed and amplified educational inequalities, highlighting the need for public policies that ensure digital inclusion and equity in access to education. As highlighted by UNESCO (2021), the health crisis has accelerated the adoption of educational technologies, but it has also highlighted the lack of preparation of institutions and educators to deal with these changes. Gen Z faces specific challenges in the educational realm, such as difficulty concentrating, reliance on digital devices, and the need for personalized learning. According to Twenge (2017), the excessive use of smartphones and social networks can harm the academic performance and mental health of young people, leading to problems such as anxiety, social isolation and pressure to perform. These challenges require a review of traditional pedagogical methods and the adoption of innovative practices that meet the needs of this generation.

Given this scenario, this article aims to analyze the main challenges faced by Generation Z in education, as well as to propose solutions to improve the effectiveness of teaching in the digital age. The methodology used consists of a bibliographic review of recent studies, scientific articles and specialized reports on the subject. The analysis ranges from the definition and characterization of Generation Z to the identification of the challenges faced by this generation

and by educational institutions, with a focus on the Brazilian context.

In addition, the article discusses the new law on the use of cell phones in the classroom in Brazil, approved in 2023, which allows the use of mobile devices as pedagogical tools, as long as they are integrated into educational planning. This shift reflects the need to adapt education to the demands of the digital age, but it also requires educators to be empowered to utilize these technologies effectively. The Ministry of Education (MEC), in its guidelines for 2025, reinforces the importance of investing in technological infrastructure, training teachers to use digital tools, and developing skills such as critical thinking, creativity, and problem-solving. The relevance of this study lies in its contribution to understanding the challenges faced by Generation Z in education and in proposing solutions that can improve the effectiveness of teaching in the digital age. As Moran (2018) argues, twenty-first century education must be dynamic, interactive and inclusive, preparing students not only for the job market, but also for life in an increasingly digital society. Therefore, investigating this topic is essential to contribute to the development of innovative pedagogical practices and educational policies that meet the needs of Generation Z and promote quality education for all.

In this sense, the article is organized into sections that initially address the theoretical framework on Generation Z and the evolution of education in the digital age. Then, the challenges faced by this generation and by educational institutions are analyzed, focusing on the Brazilian context. Subsequently, practical examples and successful initiatives in digital education are presented, followed by solutions and recommendations to improve the effectiveness of teaching. Finally, the article concludes with reflections on the impact of the digital age on education and future perspectives for the development of innovative pedagogical practices.

THEORETICAL FRAMEWORK

DEFINITION OF GEN Z

Generation Z, also known as "digital natives," is made up of individuals born between the mid-1990s and early 2010s. This generation grew up in a highly connected world, marked by the advancement of the internet, social networks, and mobile devices. According to Prensky (2001), Generation Z is characterized by its familiarity with technology since childhood, which differentiates it from previous generations.

The definition of Generation Z is closely linked to the concept of "digital natives", coined by Prensky (2001) to describe individuals who grew up in a digital environment and therefore have a natural relationship with technology. These young people are fluent in the use of digital devices, such as smartphones, tablets and computers, and use the internet as an extension of

their daily lives. Tapscott (2009) complements this definition by highlighting that Generation Z not only uses technology, but also incorporates it into their way of thinking, communicating, and interacting.

In the Brazilian context, Generation Z represents a significant portion of the population, with unique characteristics that reflect the social and technological transformations of recent decades. According to Kenski (2013), this generation is marked by its plurality and diversity, with young people who seek to express their identity through social media and other digital platforms. In addition, Generation Z is influenced by global issues such as climate change, diversity, and inclusion, which reflects on their behavior and expectations regarding education and the job market.

The definition of Generation Z is also related to the concept of "post-millennials", a term used by some authors to differentiate it from Generation Y (or Millennials). While Millennials are characterized by their adaptation to technology, Gen Z is considered the first truly digital generation, having been born into a world where the internet was already ubiquitous. This distinction is important to understand the expectations and challenges of this generation in the educational and professional spheres.

CHARACTERISTICS OF GENERATION Z

The characteristics of Generation Z are shaped by their context of growing up in a digital and globalized world. This generation is known for its preference for visual and interactive content, such as videos, images, and games, over long, static text. According to Seemiller and Grace (2016), young people from Generation Z value practicality and efficiency, seeking information quickly and directly.

One of the most striking characteristics of Gen Z is their ability to multitask. These young people are able to perform several activities simultaneously, such as watching videos, chatting on messaging apps, and studying. However, as Twenge (2017) points out, this ability can lead to decreased attention and difficulty concentrating on more complex tasks. Additionally, excessive use of digital devices can result in technological addiction and negative mental health impacts such as anxiety and depression.

Gen Z also stands out for its pursuit of personalized and authentic experiences. These young people value individuality and the expression of their identity, which is reflected in their consumption of content and products. In the educational context, this characteristic requires a student-centered approach, with teaching methods that promote personalization and interactivity. As highlighted by Moran (2018), traditional education, based on lectures and

standardized content, does not meet the expectations of this generation.

Another important characteristic of Generation Z is their concern with social and environmental issues. These young people are engaged in causes such as sustainability, diversity, and inclusion, and expect institutions and companies to share these values. According to Seemiller and Grace (2019), this generation seeks a purpose in their actions and choices, which influences their relationship with education and the job market.

In Brazil, the characteristics of Generation Z are influenced by factors such as social inequality and limited access to technology in some regions. According to Kenski (2013), this generation is marked by its plurality and diversity, with young people who seek to overcome socioeconomic barriers through education and technology. However, the lack of infrastructure and technological resources in many public schools limits digital learning opportunities for these students.

EVOLUTION OF EDUCATION IN THE DIGITAL AGE

Education has undergone a significant transformation in recent decades, driven by the advancement of digital technologies. The integration of tools such as online teaching platforms, virtual reality, and artificial intelligence has the potential to revolutionize the learning process, making it more dynamic, interactive, and personalized.

The evolution of education in the digital age is related to the concept of "ubiquitous learning", which refers to the possibility of learning anywhere and at any time, thanks to access to the internet and mobile devices. According to Selwyn (2020), technology allows the creation of flexible and adaptive learning environments that meet the individual needs of students.

However, the adoption of educational technologies also brings challenges, such as the need for teacher training and inequality in access to technological resources. As Kenski (2013) and Moran (2018) point out, many educational institutions still do not have adequate infrastructure to integrate digital technologies effectively. In addition, the lack of teacher training for the use of these tools can result in superficial and inefficient use.

In the Brazilian context, the National Common Curriculum Base (BNCC) already provides for the inclusion of digital skills as an essential part of the school curriculum. According to BRASIL (2018), students should develop skills such as the critical and responsible use of technology, the production of digital content and problem solving through technological tools. However, the implementation of these guidelines still faces challenges, such as the lack of resources and the need for continuing education of teachers.

The COVID-19 pandemic has accelerated the adoption of educational technologies, but it

has also highlighted inequalities in access to education. According to UNESCO (2021), more than 40% of students in low-income countries do not have access to the internet at home, which limits their digital learning opportunities. In Brazil, the 2020 School Census revealed that only 27% of public schools have access to high-speed internet (INEP, 2020), which reinforces the need for public policies that ensure digital inclusion and educational equity.

IMPACT OF TECHNOLOGY ON LEARNING

Technology has the potential to transform learning, making it more interactive, personalized, and accessible. However, its impact depends on how it is used and integrated into the educational process. According to Livingstone (2018), the use of digital technologies can increase student engagement and facilitate access to educational information and resources.

One of the main benefits of technology in learning is the possibility of personalizing teaching. Tools such as adaptive platforms and smart tutoring systems allow students to learn at their own pace, with content and activities that meet their individual needs. As highlighted by Siemens (2014), personalized learning is key to meeting the expectations of Gen Z and promoting more effective teaching.

However, the excessive use of digital devices can also bring challenges, such as decreased ability to concentrate and increased anxiety among students. Twenge (2017) points out that the constant use of smartphones and social networks can lead to technological dependence and negative impacts on mental health, such as social isolation and performance pressure. In the Brazilian context, the impact of technology on learning is influenced by factors such as inequality in access to devices and the internet. According to Kenski (2013), many public school students do not have access to basic technological resources, which limits their digital learning opportunities. In addition, the lack of teacher training for the use of these tools can result in inefficient and insignificant use.

DATA ANALYSIS

The analysis of data on Generation Z and the challenges of education in the digital age reveals a series of issues that need to be addressed to ensure quality and inclusive education. Data from the 2020 School Census (INEP, 2020) show that only 27% of Brazilian public schools have access to high-speed internet, which limits digital learning opportunities for millions of students. In addition, the COVID-19 pandemic has exacerbated educational inequalities, highlighting the need for public policies that ensure digital inclusion.

Generation Z, made up of individuals born between the mid-1990s and early 2010s, is

characterized by their familiarity with technology and their preference for visual and interactive content. However, studies such as that of Twenge (2017) point out that the excessive use of digital devices can lead to challenges such as decreased ability to concentrate, technological dependence and increased anxiety among young people. These data reinforce the need for a balanced approach to the use of technology in education.

In the Brazilian context, inequality in access to technology is a significant challenge. According to UNESCO (2021), more than 40% of students in low-income countries do not have access to the internet at home, which limits their digital learning opportunities. In addition, the lack of infrastructure and technological resources in many Brazilian public schools makes it difficult to implement innovative educational practices. Data from INEP (2020) show that only 10% of public schools have computer labs, which limits students' access to digital tools.

Another relevant aspect is the psychological and social impact of excessive use of technology. Studies such as that of Rideout and Robb (2019) show that constant exposure to social networks can lead to social comparison, decreased self-esteem, and increased anxiety among young people. In Brazil, research such as that of Santos and Silva (2021) points to an increase in cases of anxiety and depression among students during the pandemic, aggravated by the excessive use of digital technologies.

The analysis of the data also reveals challenges for educators and institutions. According to Bates (2019), many schools still do not have adequate infrastructure to integrate digital technologies effectively. In addition, the lack of teacher training for the use of these tools can result in superficial and insignificant use. OECD data (2020) show that only 30% of Brazilian teachers feel prepared to use digital technologies in the classroom.

CASE STUDY

An example of a successful initiative in digital education is the "Digital School Program", launched by the Ministry of Education (MEC) in 2021. This program aims to integrate digital technologies in public education, with a focus on teacher training and the development of pedagogical resources. According to MEC (2021), the program has already trained more than 50 thousand teachers across the country and made available more than 10 thousand digital educational resources.

Another example is the use of educational games in classrooms, which has been encouraged by public policies such as the "Inova Educação Program" (MEC, 2021). Studies such as the one by Hamari et al. (2016) show that gamification increases student motivation and engagement, as well as promoting the development of skills such as critical thinking and

problem-solving. In Brazil, schools such as Colégio Dante Alighieri, in São Paulo, have adopted educational games as part of their curriculum, with positive results in student performance and participation.

The flipped classroom model has also been successfully implemented in several educational institutions. According to Bergmann and Sams (2012), this model promotes student autonomy and allows teachers to act as facilitators of the learning process. In Brazil, schools such as Colégio Bandeirantes, in São Paulo, have adopted the flipped classroom, with positive results in student engagement and performance.

Testimonials from educators and students highlight the importance of flexibility and personalization in learning. According to testimonies collected by MEC (2021), teachers who participated in the "Digital School Program" reported greater student engagement and an improvement in the use of technologies in the classroom. Students also highlighted the importance of interactive and adaptive content that meets their individual needs.

SOLUTIONS

To improve digital education for Gen Z, it is essential to integrate interactive technologies and develop adaptive and personalized content. Tools such as online teaching platforms, virtual reality, and artificial intelligence can be used to create more dynamic and engaging learning experiences. According to Siemens (2014), personalized learning is essential to meet the individual needs of students and promote more effective teaching.

Another solution is the training of teachers in the use of digital technologies. Continuing education programs, such as the "Digital School Program" (MEC, 2021), can help educators use digital tools effectively and meaningfully. In addition, it is important to promote collaboration between teachers, institutions, and educational technology experts, to develop innovative pedagogical practices.

The development of digital skills is also essential to prepare students for the challenges of the 21st century. In addition to the technical mastery of digital tools, it is essential to promote skills such as critical thinking, creativity, collaboration, and problem-solving. As highlighted by Voogt and Roblin (2012), these competencies are essential for success in today's world.

RECOMMENDATIONS

Educational policies should prioritize investment in technological infrastructure, teacher training, and the creation of curricula that develop digital skills. According to Fullan and Langworthy (2014), teacher training should include the use of digital technologies and innovative

methodologies, such as project-based learning and gamification.

In addition, it is important to ensure equal access and opportunities for all students. Programs such as the "Digital School Program" (MEC, 2021) should be expanded to reach more schools and students, especially in less developed regions. Digital inclusion is key to reducing educational inequalities and promoting quality education for all.

Finally, it is essential to promote the socio-emotional well-being of students. Strategies such as reducing the excessive use of digital devices and promoting offline activities, such as sports and artistic practices, can help balance the impact of technology on young people's mental health. As highlighted by Twenge (2017), the balanced use of technology is key to the healthy development of Gen Z.

FINAL CONSIDERATIONS

The analysis of the challenges faced by Generation Z in education in the digital age reveals the need for an approach that balances the use of technology with humanized, empathetic, and contemporary educational practices. The integration of digital tools, such as online platforms, educational games, and virtual reality, is essential to meet the expectations of this generation and promote more dynamic and interactive teaching. However, it is essential that these technologies are used critically and responsibly, always focusing on the integral development of students.

Humanized and empathetic education recognizes the individualities and needs of each student, promoting a welcoming and inclusive environment. As highlighted by Moran (2018), the personalization of teaching is essential to engage students and ensure that they feel valued and motivated to learn. This approach also allows students to develop socio-emotional skills, such as empathy, collaboration, and resilience, which are essential for facing the challenges of the modern world.

The contextualization of education with the students' reality is another crucial aspect for the success of the learning process. According to Kenski (2013), the integration of topics relevant to students' lives, such as sustainability, diversity and inclusion, can increase engagement and motivation. In addition, preparing students for the challenges of the competitive world requires the development of skills such as critical thinking, creativity, and autonomy. As Voogt and Roblin (2012) point out, these skills are fundamental for success in the twenty-first century.

The construction of a life project focused on quality of life and sustainability is another essential pillar of contemporary education. The school should help students reflect on their

values, interests, and aspirations, promoting the construction of a meaningful and sustainable future. As highlighted by Seemiller and Grace (2019), Generation Z seeks a purpose in their actions and choices, which reinforces the importance of an education that prepares young people not only for the job market, but also for life in society.

In this sense, it is possible to identify and overcome the challenges of education in the digital age through solutions that promote autonomy, sustainability, and student success. Adopting innovative pedagogical practices, such as project-based learning, gamification, and the flipped classroom, can increase student engagement and performance. In addition, teacher training and investment in technological infrastructure are essential to ensure digital inclusion and educational equity.

Finally, it is essential that education prepares students not only for academic and professional success but also for building a full and meaningful life. Promoting values such as empathy, sustainability, and quality of life can help young people face the challenges of the modern world with confidence and resilience. As Moran (2018) argues, education in the twenty-first century must be dynamic, interactive and inclusive, preparing students for life in an increasingly complex and competitive society.

Therefore, overcoming the challenges of education in the digital age requires a collective commitment to building a humanized, empathetic, and contemporary education that prepares students for success and quality of life. With innovative practices and a focus on the integral development of students, it is possible to transform education into an instrument of social and personal transformation, promoting a fairer, more sustainable, and inclusive future for all.

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