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The Role of the use of Digital Technologies in the Teaching and Learning Process: The Case of Marracuene District at Michafutene Secondary School (2021–2024)

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ABSTRACT: This study aims to understand the role of digital technologies in the teaching and learning process at Michafutene Secondary School, located in Marracuene District, during the period from 2021 to 2024. The research seeks to explore how digital tools have been integrated into pedagogical practices, promoting greater engagement and efficiency in the educational process. The methodology adopted combines bibliographic review and qualitative data analysis collected through interviews and questionnaires administered to teachers and students. Results indicate that the incorporation of digital technologies contributes to diversifying teaching strategies, fostering student autonomy, and facilitating access to information. However, challenges related to infrastructure and teacher training affect the effectiveness of using these technologies. Thus, the study underscores the importance of educational policies that promote digital inclusion and continuous professional development for education professionals, aiming to maximize the benefits of technologies in the school context.

KEYWORDS: digital technologies, teaching, learning, education, digital inclusion.

INTRODUCTION

The growing presence of digital technologies in everyday life has caused significant transformations in various areas of society, including education. In the school context, integrating these technologies into the teaching and learning process is seen as an opportunity to innovate pedagogical practices and improve the quality of education. Michafutene Secondary School, situated in Marracuene District, represent

ts, from 2021 to 2024, a relevant scenario for analyzing the impact of digital technologies in education, especially in a developing country such as Mozambique.

Digital technologies range from computers and tablets to online teaching platforms and educational apps, possessing the potential to enrich the learning environment, making it more interactive and accessible. According to Prensky (2001), adopting digital tools can facilitate personalized learning, allowing students to progress at their own pace and style. Mayer (2005) argues that the use of multimedia resources can stimulate students' interest and promote more meaningful learning.

However, effective implementation of these technologies faces challenges such as a lack of adequate infrastructure, insufficient teacher training, and resistance to change from some members of the school community. Silva and Almeida (2018) emphasize that continuous teacher training is essential for educators to effectively integrate digital technologies into their pedagogical practices. Therefore, it is crucial to investigate how Michafutene Secondary School is addressing these challenges and what strategies are being adopted to maximize the benefits of digital technologies in the educational process.

It is important to acknowledge that the integration of digital technologies into the teaching and learning process has become an urgent necessity in contemporary educational institutions, especially in developing countries like Mozambique. However, Michafutene Secondary School still faces significant challenges in effectively implementing these technologies. Understanding the role of digital technologies in education is critical for developing pedagogical practices that meet students' needs and prepare them for 21st-century challenges.

One of the main problems identified is the lack of adequate infrastructure, which limits access to digital tools by students and teachers. According to Silva and Almeida (2018), the absence of technological resources and connectivity can compromise teaching effectiveness and hinder the adoption of innovative methodologies that use these technologies. Moreover, teacher training is a determining factor for the successful integration of digital technologies. Lima and Costa (2020) point out that many teachers lack specific training to use these tools effectively, which can lead to resistance to change and the perpetuation of traditional pedagogical practices.

Another relevant aspect is cultural resistance and unfamiliarity with digital technologies by students and educators. Prensky (2001) highlights that although students are considered "digital natives," this does not necessarily imply that they can use technologies pedagogically. Thus, the lack of a structured approach to training and continuous support may limit the potential of digital technologies in the teaching and learning process.

Given the scenario above, the central question this study seeks to answer is: **What role do digital technologies play in the teaching and learning process at Michafutene Secondary School, and in what ways can these technologies influence teaching effectiveness?**

The study aims to understand the role of digital technologies in teaching and learning at Michafutene Secondary School by analyzing current practices, challenges faced, and opportunities arising from adopting these tools. To this end, the following specific objectives were established: to identify the digital technologies currently used at Michafutene Secondary School and evaluate their integration into the school curriculum; to discuss teachers' and students' perceptions of the effectiveness of digital technologies in teaching and learning; to identify barriers and challenges faced by the school in implementing digital technologies in the educational environment; to assess the impact of digital technologies on the academic performance of students at Michafutene Secondary School; and finally, to propose strategies to optimize the use of digital technologies aimed at improving teaching and learning quality.

The study was conducted in Marracuene District, specifically at Michafutene Secondary School. This delimitation allowed for a closer focus on the local reality of the school community and an in-depth understanding of the use of digital technologies in this specific context. The period of study covered 2021 to 2024, which enabled analyzing changes and impacts of digital technology use in the teaching and learning process over recent years, including possible recent transformations due to the COVID-19 pandemic and the growing adoption of technological tools in the educational environment.

To understand the subject, descriptive qualitative research was employed to explore the perceptions, experiences, and meanings attributed by teachers, students, and school administrators regarding the use of digital technologies in education. Data collection techniques and instruments included bibliographic and documentary research, interviews, and administration of interview guides. The study objectives were operationalized through a case study involving participants, and data obtained were analyzed via content analysis techniques.

This research seeks to contribute to a deeper understanding of the ongoing educational transformation and its implications for the future of learning in Mozambique and beyond

THEORETICAL FRAMEWORK

Definition of Concepts

For a better understanding of the researched phenomenon, it was considered essential to define the concepts below, as they relate to the theoretical and conceptual assumptions of the topic.

Digital Technologies in Education

According to Graham (2013), digital technologies refer to tools and resources that use information and communication technology (ICT) to facilitate the teaching and learning process. This includes computers, tablets, educational software, e-learning platforms, and multimedia resources.

Teaching and Learning

Teaching is the intentional and systematic process of organizing and mediating situations so that the student learns, considering their characteristics, needs, and contexts, aiming to promote behavioral changes and cognitive development (Libâneo, 2013). Learning, in turn, is an internal and continuous process of change within the individual's cognitive structures, which can occur formally or informally, resulting in the construction and reconstruction of knowledge from the interaction between the subject and the environment (Libâneo, 2013; Brasil Escola, 2022).

Hybrid Teaching

Hybrid teaching combines traditional teaching methods with digital approaches. This methodology allows students to access online content, promoting more flexible and personalized learning (Graham, 2013).

Active Learning

Active learning is a method that involves students in a more dynamic way, encouraging participation and collaboration. Digital technologies can facilitate this approach, enabling students to interact with content more engagingly (Bonwell & Eison, 1991).

Digital Inclusion

Digital inclusion is the process of ensuring that all individuals have access to digital technologies and the necessary skills to use them. This is fundamental for all students to benefit from the opportunities offered by technologies in the school environment (Moran, 2015).

The Role of the use of Digital Technologies in the Teaching and Learning Process: The Case of Marracuene District at Michafutene Secondary School (2021–2024)

The integration of digital technologies in the educational environment has proven to be a powerful tool to enhance teaching and learning. According to Moran (2015), digital technologies not only facilitate access to information but also promote new forms of interaction and collaboration between students and teachers. This transformation is especially relevant in contexts like Michafutene Secondary School, where adopting technological resources can help overcome educational challenges.

Learning mediated by digital technologies is grounded in constructivist learning theory, which emphasizes the importance of active knowledge construction by the student. Vygotsky (1998) highlights that social interaction and the use of mediating tools are essential for cognitive development. In this sense, digital technologies can serve as mediators that facilitate knowledge construction, allowing students to become protagonists of their own learning.

Moreover, the use of digital platforms and multimedia resources can cater to different learning styles, as pointed out by Gardner (1994) in his theory of multiple intelligences. This is particularly important in a school like Michafutene, where student diversity may require varied pedagogical approaches.

However, in the specific context of Michafutene Secondary School, the implementation of digital technologies must be accompanied by continuous training for educators to ensure they feel empowered to integrate these tools into their pedagogical practices. From Silva's (2020) perspective, teacher training is a crucial factor for the successful inclusion of technologies in teaching, as well-prepared teachers are more likely to use these tools effectively.

THEORETICAL FRAMEWORK

The use of digital technologies in the teaching and learning process has been a transformative element in contemporary education, promoting a more dynamic, interactive, and personalized environment. According to Silva et al. (2024), the incorporation of Digital Technologies (DTs) in secondary education enables more active, creative, and critical learning, as digital tools facilitate both the innovative presentation of content and student engagement in knowledge construction (SILVA et al., 2024).

The adoption of digital technologies goes beyond the mere use of equipment, directly impacting pedagogical methodology and the interaction between teachers and students. As highlighted by Nhantumbo (2022), this technological integration in the educational context fosters a shift from teacher-centered to student-centered teaching, valuing student protagonism and autonomy in learning (NHANTUMBO, 2022).

Moreover, digital technologies expand access to knowledge by enabling access to diverse educational resources regardless of geographic location, which is crucial for contexts like the Marracuene District. However, this process also faces challenges such as inequality in access to technologies and the need for adequate teacher training to effectively use these tools (SANTOS; OLIVEIRA; XAVIER et al., 2024; SOUZA; LIMA, 2024).

In the Mozambican context, studies indicate that the COVID-19 pandemic highlighted the urgency of incorporating DTs into hybrid teaching models, reinforcing the need for teacher training and adequate infrastructure to ensure the effectiveness of the technology-mediated teaching and learning process (NHANTUMBO, 2022).

ANALYSIS AND DISCUSSION OF STUDY RESULTS

RESULTS

Presentation of the Object of Study

The object of this research is the use of Digital Technologies in the teaching and learning process, with a specific focus on Michafutene Secondary School, located in Marracuene District, Mozambique. This investigation seeks to understand how digital tools are being incorporated into pedagogical practices and the impact of this incorporation on student performance and motivation between 2021 and 2024.

Michafutene Secondary School was chosen because it is situated in a context where access to digital technologies still faces challenges such as limited infrastructure, insufficient teacher training, and socioeconomic inequalities that may influence the effective use of these tools. Therefore, it is relevant to analyze how the school environment is responding to the demands of the digital age to provide a more inclusive, dynamic, and efficient educational process.

The study focused on the role that digital technologies play in the daily school routine, not only as support instruments but also as elements capable of transforming methodologies, stimulating active student participation, and promoting knowledge construction in line with contemporary educational demands. In a scenario marked by rapid technological changes, understanding how Michafutene Secondary School integrates these technologies can contribute to the creation of more appropriate strategies and educational policies that enhance the quality of education in the region.

The research was conducted at Michafutene Secondary School, where data were collected through semi-structured interviews with teachers, students, and school administrators, in addition to classroom observations and analysis of institutional documents.

By conducting the study at this location, it was possible to understand the internal dynamics, available resources, and conditions that either facilitate or hinder the use of digital technologies, thus contributing to the development of more effective management strategies and motivation for the digital transition of the student community.

For triangulation between data collected from bibliographic research and interviews, 16 participants were selected from the total school population: 9 men and 7 women. The main criterion for selection was a minimum of 5 years of service at the school, considering they were present during the study period (2021–2024) and could provide reliable and credible data based on their professional experience.

Participants were coded according to their categories or roles as follows: **Group A** – School Management (3); **Group B** – School Teachers, including two from the Information and Communication Technologies (ICT) discipline (5); **Group C** – Students (8), totaling sixteen participants. Besides coding, enumeration was used to protect the integrity of interview participants by designating each respondent with a number.

Presentation and Discussion of Results

Once the information was gathered using the aforementioned instruments and techniques, it was presented, analyzed, and interpreted. Therefore, the data analysis and processing plan was developed based on the triangulation of data obtained from different sources, aiming to fulfill the specific study objectives and answer the initial research question.

Accordingly, in line with the study's objective, four (04) significant units were identified to address the outlined objectives, which are described below.

Digital Technologies Currently Used at Michafutene Secondary School, as well as the Evaluation of Their Integration into the School Curriculum

When questioned about the digital technologies currently used and the evaluation of their integration into the school curriculum, the school management unanimously stated that the school has been using various digital technologies that have been incorporated into the teaching and learning process, although there are still structural challenges to overcome. Among the digital technologies used, the presence of computers in digital classrooms stands out, which allows the training of students in basic and advanced computer skills. This infrastructure has been strengthened by recent donations, such as digital classrooms equipped with computers provided by partner organizations, contributing to students' digital literacy. Computer courses have been offered, providing students with skills ranging from basic computer use to the ability to process data and information, which has broadened their educational and professional opportunities.

Meanwhile, the teachers stated that the use of computers and the integration of digital technologies into the school curriculum has involved a gradual transition towards methodologies that value the use of Information and Communication Technologies (ICTs) as pedagogical tools to support learning. The school has sought to introduce these technologies not only as technical instruments but also as elements that favor active methodologies, student participation, and collaborative knowledge construction. However, the curriculum integration is still assessed as a work in progress, facing limitations such as insufficient technological infrastructure in some areas, the need for continuous teacher training, and inequalities in students' access to technological resources.

Additionally, the interviewees reported that in the broader context of the Marracuene District, government initiatives and partnerships have been investing in strengthening connectivity and providing equipment, aiming at broader digital inclusion, which benefits the school. Such actions include computer distribution programs as well as investments in digital infrastructure and teacher training, which contribute to improving technology integration into the curriculum and raising students' preparedness for contemporary demands.

Therefore, the evaluation of the integration of digital technologies in the curriculum at Michafutene Secondary School reveals significant progress in resource availability and capacity building but also highlights challenges in equalizing access, adapting pedagogical practices, and fully aligning with digital curricular requirements. This scenario points to the need for ongoing educational policies and constant technical and pedagogical support to ensure that the use of digital technologies effectively contributes to improving the teaching and learning process at the school.

Perception of Teachers and Students on the Effectiveness of Digital Technologies in the Teaching and Learning Process

The perception of teachers and students regarding the effectiveness of digital technologies in the teaching and learning process at Michafutene Secondary School, Marracuene District, reveals that digital technologies play a significant role in supporting the continuity and improvement of education, especially between 2021 and 2024.

In a comparative study with other schools in the Marracuene district under similar contexts (for example, Gwaza Muthini Secondary School), teachers and students acknowledged that the use of Information and Communication Technologies (ICTs) enabled the continuation of teaching during the Covid-19 pandemic, especially through remote and hybrid learning with digital resources and internet access. Teachers emphasized that digital technologies contributed to higher-quality classes and more dynamic pedagogical practices, while students were able to maintain the learning process despite limited access to in-person teaching.

The results indicate that despite access difficulties for some students, the majority of teachers and students perceived digital technologies as an effective means to promote more active, creative, and critical learning. The school administration reported

improvements in academic performance between 2021 and 2024, with achievement rates exceeding 80% in many cases, highlighting the value of incorporating technologies into teaching.

Thus, the findings emphasize that the use of digital technologies not only enables remote access but also motivates and stimulates students, enhancing the quality of teaching. Teachers affirm that such tools support innovative teaching methodologies adapted to the new digital reality, reinforcing educational practices and continuous professional development.

In summary, the perception of both teachers and students at Michafutene Secondary School points to the effectiveness of digital technologies as essential instruments for the improvement and continuity of the teaching and learning process, especially in a context where face-to-face teaching faced restrictions, reflecting positive pedagogical results during the period from 2021 to 2024.

Barriers and Challenges Faced by the School in the Implementation of Digital Technologies in the Educational Environment

When asked about the barriers and challenges faced by the school in implementing digital technologies in the educational environment, members of the school management stated that the implementation of digital technologies at Michafutene Secondary School, from 2021 to 2024, encountered various challenges and barriers reflecting structural, cultural, and financial issues common to the Mozambican context. The main obstacles identified in the schools and the local educational system are:

- **Deficient Infrastructure:** The school, like many institutions in Mozambique, suffers from limited and unstable access to electricity, with frequent power fluctuations and outages that compromise the continuous use of technological equipment.
- **Poor Internet Connectivity:** Internet connection is slow, unstable, and expensive, with technical failures especially in areas outside major urban centers, which restricts real-time access to digital resources and limits remote and hybrid teaching.
- **Insufficient Technological Resources:** The lack of adequate equipment such as computers, tablets, projectors, and other digital resources limits students' access and the full application of digital methodologies in the classroom.
- **Inadequate Teacher Training:** Many teachers lack proper training in digital technologies, reducing the effectiveness of using these tools in the pedagogical process and hindering the full integration of ICTs in teaching practices.
- **Limited Funding:** The low allocation of funds for acquiring and maintaining educational technologies compromises the continuity and quality of ICT use in the school.
- **Cultural and Social Aspects:** There are difficulties related to initial digital literacy, resistance to change, and low familiarity of students and teachers with digital technologies, resulting in less effective and reduced use of the available resources.

These challenges are significant in the context of Marracuene District and particularly at Michafutene Secondary School, where despite progress and positive perception regarding the effectiveness of technologies in teaching, infrastructural, training, access, and funding barriers still limit the full potential of these digital tools to improve the teaching-learning process between 2021 and 2024.

These limitations highlight the need for more robust public policies with greater investment, continuous teacher training, improvements in infrastructure, and reduction of internet costs to expand and consolidate the effective use of digital technologies in the local educational environment.

Evaluation of the Impact of Digital Technologies on the Academic Performance of Students at Michafutene Secondary School

Evaluating the impact of digital technologies on the academic performance of students at Michafutene Secondary School, in the Marracuene District (2021-2024), the results indicate that the use of these technologies has contributed positively to improvements in school performance and student motivation. Digital literacy, as an integral part of the process of integrating technologies in education, has been identified as fundamental to strengthening educational development and increasing learning effectiveness, promoting more inclusive, interactive, and personalized teaching, which in turn favors improved academic performance.

Data from research in various educational institutions in Mozambique show that the digital transformation in education has led to the emergence of new teaching and learning models, such as hybrid and personalized learning. These models offer greater flexibility and the possibility to adapt to the individual needs of students, increasing their participation and engagement in the educational process. Furthermore, teachers report that digital technologies have facilitated the delivery of higher quality and more interactive content during lessons, aspects which directly reflect in better academic results among the students involved.

Despite these improvements, it is important to recognize that the full impact of digital technologies on academic performance still depends on overcoming significant challenges such as poor infrastructure, insufficient teacher training, and limited connectivity, which remain barriers at Michafutene Secondary School.

Therefore, in the specific context of Michafutene Secondary School and the Marracuene District, the impact of digital technologies on student academic performance between 2021 and 2024 has been positive, with notable gains in terms of teaching quality, student motivation, and engagement, although limited by structural constraints that still need to be addressed to maximize these benefits.

Strategies to Optimize the Use of Digital Technologies to Improve the Quality of Teaching and Student Learning

Based on the results obtained from document analysis as well as interviews conducted, it can be stated that to optimize the use of digital technologies aiming to improve the quality of teaching and student learning at Michafutene Secondary School, in Marracuene

District, various strategies can be adopted based on public policies and studies on digital education in Mozambique and similar contexts. These strategies include:

- **Continuous Teacher Training:** Invest in training teachers to acquire competencies in the pedagogical use of digital technologies, enabling them to effectively and innovatively integrate these tools into their teaching practices.
- **Improvement of Technological Infrastructure:** Ensure stable access to electricity, quality internet connectivity, and adequate equipment (computers, tablets, projectors) for students and teachers, allowing uninterrupted use and facilitating interactive learning.
- **Public Incentive Policies and Specific Programs:** Implement strategic plans such as the "Strategic Plan for the Education System (PESE)" and programs like "One Computer per Teacher (UCP)," which aim to equip teachers and students and facilitate access to digital technologies in the classroom.
- **Promotion of Digital Inclusion**: Develop actions for the digital literacy of students and teachers, combating cultural and social resistance to technology use and expanding the conscious and responsible use of these educational tools.
- **Integration of Innovative Methodologies:** Encourage the use of digital platforms, multimedia resources, and hybrid or personalized methodologies that increase student engagement and participation, providing a more dynamic, interactive, and student-centered education.
- **Community Support and Public-Private Partnerships:** Foster collaboration among government, private sector, and civil society to provide equipment, develop appropriate digital content, and offer technical support.

These strategies align with Mozambican public policies focused on inclusion and digital innovation in basic education, and with studies highlighting the fundamental role of access, training, and technical support for digital technologies to effectively improve the teaching and learning process.

Implementing these actions at Michafutene Secondary School could maximize the benefits already perceived from technology use between 2021 and 2024, overcoming infrastructure and training limitations and contributing to more qualified and sustainable academic performance.

FINAL CONSIDERATIONS AND SUGGESTIONS

CONCLUSIONS:

- The use of digital technologies (DTs) in the teaching and learning process has significantly contributed to promoting more active, creative, and critical learning among students, according to teachers' perceptions.
- During the Covid-19 pandemic, Information and Communication Technologies (ICTs) enabled the continuation of remote and hybrid teaching in the Marracuene region, ensuring that pedagogical activities were maintained despite the limitations of in-person instruction.
- The results indicate that despite difficulties related to unequal access to technologies and the internet, the use of DTs improved the quality of teaching and students' academic outcomes, with significant increases in academic performance indicators between 2020 and 2024.
- Active methodologies supported by virtual learning environments foster a more dynamic and personalized education but require constant teacher training and improved technological infrastructure in schools.

Suggestions:

- Invest in the technological infrastructure of Michafutene Secondary School, ensuring stable internet access and adequate equipment for all students and teachers.
- Promote continuous training and capacity-building for teachers to effectively use digital technologies, strengthening innovative and inclusive pedagogical practices.
- Develop local policies to encourage the use of digital technologies, ensuring equity of access and benefiting all layers of the school community.
- Implement hybrid educational models and active methodologies incorporating digital tools to stimulate student protagonism in the learning process.
- Conduct periodic local empirical research to evaluate the impact of digital technologies and adjust pedagogical strategies according to the specific needs of the Marracuene context.

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