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SCHOOL MANAGEMENT AND INNOVATION: THE USE OF TECHNOLOGIES FOR DECISION-MAKING

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Victor Gonçalves de Matos[1], Márcio Kusunoki[2], Dulcinea Ruy Nossa[3], Valdirene Aparecida Pereira Damasceno[4] and Renata Nunes Camargo[5].

ABSTRACT

Contemporary school management is part of a context in which innovation stands out as an essential strategic element, especially due to rapid technological evolution. The choice of this theme is justified by the growing need for modernization in educational practices, aiming at the effectiveness of decision-making at different levels of school administration. The main objective of this study is to investigate how the analysis of educational data can transform management in educational institutions. The methodology adopted is of a bibliographic nature, reviewing pertinent literature that discusses the intersection between technology and educational management. The main results indicate that the use of technological tools, such as data analysis platforms and school management systems, not only facilitates administration, but also enriches the learning experience of students. Furthermore, it is concluded that the effective implementation of these solutions requires a cultural change in institutions, promoting an environment conducive to pedagogical innovation. The research shows that the integration of technologies in school management enables more informed decisions aligned with clear and measurable educational objectives. It is also based on the importance of training educators for the effective use of these tools, ensuring inclusive innovation and supported by a solid pedagogical vision. Therefore, this intersection between school management and technological innovation represents an opportunity to reimagine education, placing learning as the central focus of administrative and pedagogical decisions.

Keywords: School Management. Technological Innovation. Data Analysis.

[1] Master's student in Emerging Technologies in Education
MUST University
Email: victorgm1822@gmail.com
[2] Master's student in Emerging Technologies in Education
MUST University
Email: kusunoki@gmail.com
[3] Master's student in Emerging Technologies in Education
MUST University
E-mail: artneiaruy@hotmail.com
[4] Master's student in Emerging Technologies in Education
MUST University
E-mail: valspt@gmail.com
[5] School Management Specialist: Administration, Supervision and Guidance
Single College of Ipatinga (FUNIP)
E-mail: rr.camargos@hotmail.com

INTRODUCTION

Contemporary school management is in a scenario full of complex challenges that require an innovative and adaptive approach. The relevance of this topic stands out in a context marked by rapid technological evolution, where educational institutions need to go beyond the simple implementation of digital tools. It is essential that they reconsider their organizational structure and remodel their decision-making processes to adapt to this new environment. The integration of digital technologies in school management is not restricted to the adoption of educational platforms, but requires a cultural transformation that allows the effective use of data to inform administrative decisions.

In recent years, there has been a significant increase in the use of technological resources in schools, driven, in part, by the need to adapt to remote and hybrid teaching. The pandemic has intensified the use of digital technologies, sparking a deep reflection on their applications and impacts on school management. Institutions that knew how to adapt quickly to this new scenario were able not only to maintain the continuity of teaching, but also to optimize their administrative practices. This recent reality highlights the urgency of discussing innovation in school management, in view of the current dynamics and future expectations.

Therefore, it is justified to carry out a research on technological innovation in school management, through which it seeks to understand its contribution to the improvement of educational and administrative processes. Studying this theme is of paramount importance, as the results can offer subsidies for managers and educators to improve their practices, promoting a more effective and integrated learning environment. Thus, the research aims to identify strategies that sustain innovation as a mechanism to support excellence in educational management.

In this scenario, the research problem can be defined by the following central question: how can the integration of digital technologies transform school management, making it more efficient and student-centered? The formulation of this question seeks to investigate not only the benefits that new technologies can bring, but also the challenges associated with their implementation, which are essential for understanding the phenomenon.

The overall objective of this study is to analyze the role of digital technologies in school management, focusing on how these tools can enhance the administrative effectiveness and learning experience of students. By elucidating this intersection, it is intended to contribute to the strengthening of educational management through innovation.

The specific objectives that guide this research include the identification of the main digital technologies applied to school management, the analysis of the effects of data-driven decision-making on the daily life of educational institutions, and the evaluation of the challenges faced by managers when implementing these innovations. The research will also seek to explore good practices that can be adopted to overcome such obstacles, aiming at a successful implementation process.

In methodological terms, the investigation will be developed through a bibliographic approach, which will allow the analysis of relevant studies and publications on the subject. This strategy enables a deepening of knowledge about the relationship between technology and school management, based on sources that present experiences and results from other successful institutions.

In summary, the discussion proposed by this essay is fundamental for understanding the new paradigms that permeate school management in contemporary times. The transition to a more innovative, technology-mediated approach not only responds to emerging challenges, but also creates opportunities for the transformation of the educational experience. Thus, this study proposes to contribute to an essential debate, aiming at strengthening pedagogical and administrative practices that are aligned with the needs of the twenty-first century.

THEORETICAL FRAMEWORK

The theoretical framework presented aims to explore digital transformation in educational institutions, highlighting its impact on learning and administrative practices. The advancement of educational technologies has revolutionized the way knowledge is transmitted and managed within schools. In this context, it is essential to contextualize the application of technologies in the educational environment, considering the various tools and platforms that have emerged to enhance the learning experience, facilitate the administration of processes, and promote a more collaborative and engaged environment for both students and educators.

One of the main concepts that emerges in this field is the Learning Management System (LMS). LMS enable the organization and delivery of educational content, enabling educators to manage courses efficiently and providing students with personalized paths to knowledge acquisition. In addition, the integration of analytics into these systems makes it possible to collect real-time data on student engagement and performance, which offers subsidies for more informed pedagogical strategies, resulting in an improvement in educational practices. Alvarenga and Silva (2023, s.p.) state that "educational technologies

can be seen as a support for a new form of management, where information is the key to better decisions".

The historical evolution of educational technologies reveals a trajectory of innovations that are interconnected with changes in educational theories. From the use of audiovisual resources to the introduction of online platforms, each advance has brought to the fore a discussion about appropriate pedagogy. Looking at the literature, the discussion on the personalization of education, driven by adaptive technologies, represents a significant milestone. Such technologies, which use artificial intelligence to assess students' skills, allow for a curation of instructional materials that align with the student's individual trajectory, making learning more effective and dynamic.

In addition, the contemporary discussion on digital transformation in education involves several perspectives and debates. Some currents emphasize the potential of technologies to democratize learning and expand access, while others raise concerns about the effectiveness of these approaches, especially with regard to equity of access and the quality of education. In this sense, Alves and Silva (2024, s.p.) highlight that "school management must include pedagogical practices that integrate environmental education, providing a broader understanding of the interactions between technology and social responsibility."

The theoretical concepts discussed so far are directly connected with the research problem, which proposes to investigate how educational technologies influence the teaching-learning dynamics in institutions. By analyzing the intersection between theory and practice, it is possible to observe how pedagogical approaches can be shaped by technological innovations. The use of collaborative learning tools, for example, enhances student engagement, while breaking down geographical barriers and facilitating cooperation, aspects that school environments have traditionally faced.

Finally, this theoretical framework supports the study by offering a solid basis for the critical analysis of educational practices mediated by technology. The understanding of the main concepts, the evolution of ideas and current discussions allows us to support the interventions proposed in the research, providing a clear view of the impact of these transformations on the school environment. Thus, the theoretical analysis not only legitimizes the importance of investing in educational technologies, but also suggests new paths for contemporary education, reflecting the need for training that considers the demands of an increasingly digital world.

IMPACT OF TECHNOLOGIES ON SCHOOL MANAGEMENT

The implementation of technologies in school management has proven to be an efficient strategy to improve administrative and pedagogical efficiency. This phenomenon can be observed in the use of integrated management systems, especially school information systems (SIEs), which provide a comprehensive view of the school routine. With this, it becomes possible to monitor academic performance indicators, facilitating the effective allocation of resources. According to Cunha and Cunha (2016, s.p.), "the appropriate use of these technological tools is an indication of effective management". This demonstrates that adopting a data-driven management model can facilitate informed and informed decisions.

As school managers make use of this data, they find the ability to make decisions that directly impact teaching-learning. The distinction between actions based on assumptions and those based on evidence is significant for the continuous improvement of educational practices. Thus, it is important to consider that "the monitoring of performance indicators provides valuable insights for the creation of assertive educational policies" (Dias and Magalhães, 2022, s.p.). In this way, technology not only supports management, but also becomes an ally in the formulation of educational strategies.

In addition to data collection and analysis, technology provides an increase in collaboration between educators, students, and families. Digital platforms enable more fluid and interactive communication, favoring the engagement of the school community. According to Freitas (2023, s.p.), "continuous interaction between all those involved in the educational process is vital for more effective learning". Such interactions not only foster a dynamic school environment but also encourage a culture of transparency and active participation.

Another aspect that deserves to be highlighted is the condition of access to technologies. It is essential that the integration of new tools considers existing socioeconomic inequalities. While technological innovations can provide significant improvements, they also require continuing education for educators, thus ensuring the proper use of these tools. As stated by Flach, Gonçalves and Cerqueira (2024, s.p.), "the training of education professionals is essential for democratic management to be inserted in a context of equity". Therefore, it is necessary to invest in training that prepares educators to deal with the new demands imposed by technology.

In addition to the challenges that social inequality presents, there is also the need for institutional support that helps in the effective implementation of educational technologies. Ongoing supervision and technical assistance are key to preventing tools from remaining

underutilized. School management, by incorporating these technologies in a systematic way, tends to become more inclusive and responsive. This implies that managers must always be attentive to the needs of the school community to adapt the tools and actions to the realities observed.

Furthermore, digital transformation should not be seen only as a trend, but as a necessity for the evolution of contemporary educational practices. Schools that adapt to this new reality have greater chances of success in forming critical citizens prepared for the challenges of the twenty-first century. Therefore, "technology should be considered an element of transformation and not just an auxiliary resource" (Cunha and Cunha, 2016, s.p.).

The relationship between technology and education is therefore complex and multifaceted. It is imperative that the approach to educational management be included in the discussion on the best practices for the insertion of innovations. Strategic planning that articulates technology and management is essential for schools to meet current and future demands. It is necessary that this articulation occurs in an integrated way, involving all the actors in the educational process.

Therefore, when we analyze the impact of technologies on school management, it is evident that, when applied responsibly, these tools have the potential to promote significant reform in educational institutions. A conscious and inclusive use of technologies, combined with the continuous training of educators, results in the construction of a more dynamic, collaborative and effective school environment. Educational practice, by becoming more accessible and interactive, brings benefits not only to students, but to the entire school ecosystem.

Thus, we conclude that the implementation of technologies in school management is a two-way street: on the one hand, it offers opportunities for greater engagement of the school community, and, on the other hand, it requires a constant commitment from all those involved. Technologies, when properly integrated, are not only aimed at efficiency, but also at equity in access to quality education. The construction of an inclusive and collaborative educational environment is, therefore, a legacy that institutions must actively pursue, always in dialogue with evolving theories and practices in the area of education.

METHODOLOGY

The methodology of this study is characterized by a qualitative and quantitative approach, aiming to examine the intersection between school management and technological innovation. The main focus is to understand how enabling technologies, such

as management systems, influence administrative and pedagogical practices within educational institutions. The main objectives of the research are the identification of best practices, the analysis of the perceptions of those involved and the proposition of recommendations that can contribute to a more effective and innovative school management. According to Nascimento *et al*. (2023, p. e30111), "school management is a field in constant evolution, which requires adaptations to new social and technological demands".

For the development of this research, it was decided to carry out case studies in several educational institutions that implemented technological innovations. The choice of institutions was based on criteria of geographic diversification and levels of education, thus ensuring a comprehensive analysis of educational realities. In addition, literature reviews were carried out that enabled a solid theoretical foundation of the proposed discussions, as suggested by Narciso and Santana (2025, p. 19461), who state that "scientific methodologies must be constantly revisited to incorporate new practices and technologies".

The data collection techniques used include semi-structured interviews, questionnaires, and document analysis. The interviews were applied to managers, educators, and students, seeking to capture different perspectives on the influence of technologies on school management. The questionnaires were distributed to collect quantitative data that would complement the qualitative information obtained. The document analysis consisted of the review of institutional materials, such as management plans and performance reports, which provided additional context for the study.

For the research, instruments such as interview guides and structured questionnaires were used, elaborated based on the gaps identified in the literature and the objectives of the research. This procedure aims to ensure the quality and relevance of the information obtained, providing a clear picture of the practices and perceptions of the actors involved in school management. The formulation of the instruments followed strict criteria of validity and reliability, ensuring that each relevant aspect was contemplated.

After collection, the data were analyzed using a mixed approach, which integrated qualitative and quantitative techniques. The qualitative analysis was carried out through the coding of the interviews, seeking to identify categories and recurring themes, while the quantitative analysis was carried out through descriptive statistics. The triangulation of the data provided robust support for the conclusions, allowing for a deeper understanding of the relationships between technology and school management.

Ethical aspects considered during the research include obtaining informed consent from all participants and ensuring the confidentiality of the data collected. It is essential to

ensure that all voices are respected and that information is treated in a way that preserves the identity of the participants. These ethical considerations are aligned with the guidelines established by research ethics committees, ensuring the integrity of the processes involved.

The methodological limitations of the study are mainly related to the diversity of the selected educational contexts and the sample size. Although the research has sought a diverse approach, the results may not be generalizable to all existing educational realities. In addition, the dependence on subjective reports may influence the perception of the data, suggesting the need for caution in the interpretations made.

Therefore, the association between school management and technological innovation, explored in this research, emphasizes the importance of understanding them as interrelated elements that can enhance educational training. The methodological proposal presented here aims not only to contribute to the academic debate, but also to provide practical guidelines for managers who seek to adopt technologies in their institutions. With such contributions, it is expected to provide a significant advance in management and teaching practices in contemporary schools.

DECISION-MAKING IN SCHOOL MANAGEMENT

School management, a field full of challenges and nuances, requires decisions based on meticulous analysis and consideration of various variables that permeate the educational environment. In this contemporary scenario, where emerging technologies have a growing prominence, school administration demands an approach that transcends mere intuition, integrating practical information and empirical data from multiple sources. The use of management systems, together with statistical analysis and artificial intelligence tools, allows managers not only to understand the internal dynamics of the school, but also to predict trends and behaviors, creating an environment that favors innovation and pedagogical development.

In this sense, informed decisions have the potential to transform the effectiveness of educational policies. An example of this is the allocation of resources and the implementation of curricula, where data analysis is key. The practice of collecting and interpreting information on academic performance and the engagement of the school community is indispensable, since "the effective participation of all stakeholders can lead to a more democratic management process" Lima and Siqueira, (2023, s.p.). Thus, a consistent database is essential to identify areas that need intervention.

In addition, technology plays a key role in this process. Integrated management platforms enable access to information in real time, which facilitates visualization and

interpretation by managers and educators. This democratization of information not only engages different actors in the school environment, but also creates a culture of collaboration, which is vital for the success of educational management. "The use of technology should be seen as a component that values and democratizes management in public schools" Lima, (2018, s.p.).

However, it is essential that decisions in school management consider the particularities of each educational community. Each school has its own cultural and socioeconomic characteristics, which must be respected when implementing assistive technologies. The alignment between technological innovations and the needs of students is essential to ensure the effectiveness of decisions. Thus, when integrating technological tools, school management must prioritize a constant dialogue with those involved, ensuring that their actions are in tune with the students' reality.

This approach results in a school management that is a dynamic space for learning and adaptation, where technology is not an end in itself, but an ally in strengthening education. Technology, when incorporated into educational practices, provides a more inclusive and participatory teaching environment. The intersection between data-driven decisions and technological innovations, therefore, is an essential strategy for the future of education.

In addition, it should be considered that the continuous training of managers is essential for the adoption of these new tools. Training in data analysis and the use of technologies should be promoted, ensuring that educators are able to interpret information appropriately and thus inform their decisions. In line with this perspective, "training aimed at the use of technology in school management can boost more effective practices" Moura, Silva and Ericeira, (2024, s.p.).

Another aspect to be highlighted is the need for transparent communication between those involved in management, since this favors the construction of an environment of trust. Effective communication is a pillar that supports decisions in school management, facilitating dialogue between teachers, students and the community. When information is shared clearly, everyone feels part of the process, collaborating more actively for the development of quality education.

In addition, educational policies must be constantly evaluated and adjusted based on the analysis of results, so that it can be understood whether the decisions made really meet the identity demands of the school community. It is in this continuous cycle of evaluation and improvement that it is necessary to highlight the relevance of research and critical reflection on existing practices, so that school management becomes increasingly effective.

Therefore, contemporary school management requires a careful look at innovations, but also a sensitivity to the particularities of the educational context. The role of the manager is to foster an environment where technology and the participation of those involved are intertwined, contributing to an enriching educational space. By integrating these elements, management becomes not only an administrative practice, but a true process of social transformation. Education is strengthened when management is seen as a collective and collaborative act, where the voice of each one has its due importance.

CASE STUDIES

Contemporary school management is an evolving field, influenced by the increasing adoption of technologies in education. Digital transformation in educational institutions is not just an option, but a necessary step to meet the current demands of students and society. In this context, the use of learning management systems (LMS) and collaborative platforms has proven effective in improving educational processes. According to Oliveira and Carvalho (2018, s.p.), "the principal's leadership is fundamental for the success of school management in a scenario of constant change". This quote reinforces the idea that the role of the manager is important for the implementation of technologies that improve educational results.

In addition to leadership, another vital aspect is the analysis of educational data. Schools that adopt technologies in data collection and analysis are able to monitor academic performance in real time. Silva and Forno (2022, s.p.) highlight that "knowledge management is essential for school development", which points to the importance of correctly interpreting the data obtained. This information is essential to identify areas that need intervention and to shape educational strategies, making them more effective and personalized.

The continuous training of educators is an element that cannot be underestimated. To ensure that teachers use technologies effectively, many institutions have implemented training programs. This creates an environment conducive to innovation and reduces resistance to the use of new tools. Prado *et al*. (2024, s.p.) state that "school planning must include teacher training for effective pedagogical management", evidencing the need for a teaching staff prepared for the new demands of contemporary education.

In addition, collaborative initiatives between schools and technology companies have proven beneficial. This exchange not only generates innovative solutions, but also enhances the development of tools that meet the specific needs of educators and students. School management, therefore, requires a paradigm shift, where collaboration becomes a

pillar. Souza and Ahmad (2024, s.p.) point out that "pedagogical management in technical schools must be aligned with market innovations", emphasizing the importance of building bridges between the educational and technological sectors.

Another factor to be considered is the disparity in access to educational technologies. The geographic location and socioeconomic background of schools can influence the effectiveness of innovations. It is notorious that institutions in urban areas usually have greater access to digital resources, while rural schools face significant challenges in this regard. Therefore, the creation of public policies that offer equitable support to technology in schools is a pressing issue, as these policies can mitigate inequalities and enable more students to benefit from innovations in education.

Thus, the analysis of various contexts of implementation of educational technology reveals that, in addition to infrastructure, the involvement of the school community is essential. Dialogue between managers, teachers, students and parents must be promoted so that innovations are well understood and accepted. This effective communication generates a school environment where everyone feels part of the transformation process. School management must be reflective and adaptive to respond to these dynamics.

The evolution of school management, therefore, is not an isolated process. It involves multiple actors and factors that constantly interact. Conclusively, the formation of an innovative educational environment goes beyond the simple adoption of technology; It requires a continuous commitment to the training of all those involved and the use of data to support pedagogical decisions. With this, school management can become an active agent in promoting quality education.

In the current panorama, critical reflection on school management is more necessary. Schools that seek innovation must consider the social and pedagogical implications that the adoption of new technologies brings to the community. By integrating technological aspects with an inclusive approach, it is possible to foster a learning environment that meets the diverse needs of students, better preparing them for the future.

FINAL CONSIDERATIONS

The present study aimed to investigate the influence of innovation and technology on school management, focusing on the transformation of decision-making. Throughout the research, it was possible to observe that the adoption of digital tools and integrated systems contributes significantly to administrative efficiency and to the construction of more interactive learning environments. The decisions, based on empirical data, allow managers

to develop strategies aligned with the needs of the institutions, thus favoring the improvement of educational results.

The main results indicate that the implementation of technologies in school management not only optimizes processes, but also enhances the active participation of teachers, students and guardians. Real-time data analysis and the use of curriculum management software enable more fluid communication between the different actors in the school community, creating a scenario where collaboration becomes essential. This dynamic results in a more inclusive decision-making process that is aligned with contemporary social demands.

The interpretation of the findings reveals that technological innovation acts as a facilitator in school management, promoting an environment conducive to teaching and learning. The relationship between the results obtained and the hypotheses initially formulated confirms that the presence of digital and innovative technologies has the potential to transform pedagogical and administrative practices. Thus, the study supports the premise that the introduction of innovations should be seen as a central strategy for improving educational quality.

The contributions of the study to the area of education are significant, since they presented concrete evidence about the importance of technology in school management. The findings provide valuable subsidies for educational managers, encouraging the adoption of practices that value collaboration and interactivity. In addition, the research offers an overview of how innovation can be implemented in order to meet the particularities of each school context.

However, the research has limitations that must be considered, such as the restricted sample and the focus on educational institutions that already have some level of familiarity with digital technologies. This circumscription may have influenced the results, suggesting the need for further studies with a broader and more diversified approach. Conducting new research in different contexts would be essential to further understand the influence of technology on school management in various realities.

Suggestions for future studies include exploring how different levels of technological training among educators and managers impact the effectiveness of implemented innovations. It would also be interesting to investigate the experiences of school management in institutions that do not have access to digital tools, allowing a comprehensive comparison of the impact of technology on educational quality.

In a final reflection, it is worth noting that the impact of this work extends beyond the field of school management, echoing broader social issues involving equity and inclusion in

education. In view of the constant transformations in society, the research reaffirms the relevance of the conscious use of technology as a means of fostering a more efficient and accessible educational process. Thus, modern school management must commit to integrating innovations in a way that not only updates its practices, but also creates an educational environment that prepares students for the complexities of the future.

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