

**TECHNOLOGY IN BASIC EDUCATION MANAGEMENT: PREPARING
EDUCATIONAL LEADERS FOR THE IMPLEMENTATION OF DIGITAL TOOLS**

**TECNOLOGIA NA GESTÃO DA EDUCAÇÃO BÁSICA: O PREPARO DA LIDERANÇA
NA APLICAÇÃO DAS FERRAMENTAS DIGITAIS**

**TECNOLOGÍA EN LA GESTIÓN DE LA EDUCACIÓN BÁSICA: LA PREPARACIÓN
DEL LIDERAZGO PARA LA APLICACIÓN DE LAS HERRAMIENTAS DIGITALES**



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How to reference this paper:

Vargas, T. B., Ramos, A. C. P., & Quadros, S. C. O. (2026). Technology in basic education management: preparing educational leaders for the implementation of digital tools. *Revista on line de Política e Gestão Educacional*, 30, e026093. <https://doi.org/10.22633/rpge.v30i00.21423>



| Submitted: 23/06/2026
| Revisions required: 12/07/2026
| Approved: 07/08/2026
| Published: 19/08/2026

Editor: Prof. Dr. Sebastião de Souza Lemes

Deputy Executive Editor: Prof. Dr. José Anderson Santos Cruz

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ABSTRACT: Digital transformation has redefined management, leadership, and organizational culture in educational institutions. This study analyzes the integration of technologies into digital and leadership capabilities, the level of digital transformation maturity, and the use of data in decision-making within a private faith-based educational network comprising 92 schools across nine regional campuses in São Paulo, Brazil. The research adopts a mixed-methods approach, employing a questionnaire based on the model proposed by Westerman et al. (2016), completed by 47 leaders, and semi-structured interviews based on the McKinsey Assessment and Digital Quotient (A&DQ) framework, conducted with 10 regional leaders. Quantitative findings indicate high digital capability (58.54/70) but developing digital leadership (38.75/70). Qualitative analysis identified three regions as digital leaders, four as emerging digital leaders, and two as digitally developing. The study concludes that successful digital transformation depends on strategic leadership, a data-driven culture, and institutional capacity to convert technology into innovation and educational improvement.

KEYWORDS: Digital transformation. Basic education. Digital leadership. Digital maturity. Educational management.

RESUMO: A transformação digital tem redefinido a gestão, a liderança e a cultura organizacional nas instituições educacionais. Esta pesquisa analisa a incorporação de tecnologias às capacidades digitais e de liderança, o nível de maturidade da transformação digital e o uso de dados nas decisões em uma rede privada confessional com 92 escolas, distribuídas em nove sedes regionais em São Paulo. A pesquisa adota abordagem quanti-qualitativa, utilizando questionário no modelo de Westerman et al. (2016), respondido por 47 líderes, e entrevistas semiestruturadas no modelo McKinsey (A&DQ), realizada com 10 líderes regionais. Os resultados quantitativos indicam elevada capacidade digital (58,54/70), porém liderança digital em desenvolvimento (38,75/70). A análise qualitativa identificou três regiões como líderes digitais, quatro como líderes digitais ascendentes e duas como emergentes. Conclui-se que o sucesso da transformação digital depende da liderança estratégica, da cultura orientada por dados e da capacidade institucional de converter tecnologia em inovação e melhoria educacional.

PALAVRAS-CHAVE: Transformação digital. Educação básica. Liderança digital. Maturidade digital. Gestão educacional.

RESUMEN: La transformación digital ha redefinido la gestión, el liderazgo y la cultura organizacional en las instituciones educativas. Esta investigación analiza la incorporación de tecnologías a las capacidades digitales y de liderazgo, el nivel de madurez de la transformación digital y el uso de datos en la toma de decisiones en una red privada confesional con 92 escuelas, distribuidas en nueve sedes regionales del estado de São Paulo. El estudio adopta un enfoque cuantitativo-cualitativo, utilizando un cuestionario basado en el modelo de Westerman et al. (2016), respondido por 47 líderes, y entrevistas semiestruturadas con 10 líderes regionales. Los resultados evidencian elevada capacidad digital (58,54/70), aunque un liderazgo digital aún en desarrollo (38,75/70). Se concluye que el éxito de la transformación digital depende del liderazgo estratégico, una cultura orientada por datos y la capacidad institucional para convertir la tecnología en innovación y mejora educativa.

PALABRAS CLAVE: Transformación digital. Educación básica. Liderazgo digital. Madurez digital. Gestión educativa.

INTRODUCTION

Advanced technological advances have profoundly transformed the management of educational institutions and have had significant impacts on organizational models, pointing to important strategic revisions, new process pathways, and different forms of leadership that address diverse contexts characterized by uncertainty and continuous innovation.

In the pedagogical and administrative fields, digital transformation has brought about profound changes in school management, simultaneously impacting internal processes and institutional strategies (Araújo et al., 2025; Santos et al., 2025). In this context, Digital Information and Communication Technologies (DICT) have been incorporated with the aim of modernizing routines, automating tasks, increasing organizational efficiency, and strengthening communication between schools, families, and the community (Silva & Coutinho, 2025).

The consolidation of tools such as Academic Management Systems, distance learning platforms, and artificial intelligence-based solutions has begun to provide analytical support for data-driven decision-making, contributing directly to strategic planning and the customization of educational processes (Santos et al., 2025). However, the implementation of this transformation faces challenges, particularly regarding the need to balance technical innovation with the development of critical and socio-emotional skills, ensuring that digital learning promotes the holistic development of students. Excessive or decontextualized use of digital resources can lead to superficiality and technological dependence; conversely, conscious pedagogical use and essential teacher mediation foster reflection, empathy, student agency, and a truly humanizing learning experience.

Beyond pedagogical considerations, the implementation of digital transformation faces severe structural and training-related limitations. In many contexts, school infrastructure and teacher training remain insufficient or inadequate to support this transition, as a lack of equipment, unstable connectivity, and the absence of ongoing technical support hinder the integration of technologies into the curriculum (Araújo et al., 2025; Lima et al., 2025). Furthermore, the lack of continuing education programs that develop critical digital competencies in teachers limits the creative use of these tools (Silva & Coutinho, 2025), and this vulnerable situation was drastically intensified and brought to light by the covid-19 pandemic, which required rapid adaptation to the digital world.

In the specific context of private, faith-based elementary and secondary schools, these structural, human, and pedagogical challenges take on even more complex dimensions. The integration of digital technologies must be directly aligned with the institution's identity,

ensuring that technological innovation is strictly at the service of the educational mission and the values that underpin the school community.

Given this scenario, this study aimed to investigate how technology is being integrated into digital and leadership capabilities, what stage of maturity the digital transformation has reached, and how the use of data guides decision-making in basic education institutions within the religious network, which comprises nine regional campuses, 92 school units, and more than 100,000 students in the state of São Paulo.

The relevance of this study lies in the need to broaden the academic debate on digital transformation in basic education—a segment still largely unexplored in the literature—especially with regard to the interplay between technology, leadership, and denominational institutional identity.

DIGITAL TRANSFORMATION AND EDUCATION

Digital transformation represents a strategic and cultural process that redefines organizational practices, decision-making processes, and leadership styles, going beyond the mere adoption of technological tools (Mendonça & Zaidan, 2019). According to Furr et al. (2022), the process involves three central dimensions: products versus platforms, companies versus ecosystems, and people versus tools, indicating that transformation should not be understood as a final state but as a strategic choice guided by leadership.

In basic education, digital transformation promotes structural changes in teaching practices, requiring a shift in pedagogical approach from that of a transmitter to that of a mediator. Sena et al. (2024) note that digital technologies offer new possibilities for personalization and collaboration, contributing to a more inclusive and effective education.

However, the benefits of digital transformation are only fully realized when there is adequate infrastructure, coherent educational policies, and ongoing teacher training. Gradim (2025) warns that successful implementation still faces significant structural challenges, such as unequal access to technology, connectivity limitations, and a lack of digital resources in many schools.

The transition to the digital ecosystem in the educational environment has established itself as one of the most striking and multifaceted trends of our time, reshaping the architecture of educational networks, teaching methodologies, and institutional management guidelines. However, deciphering this landscape requires moving beyond purely instrumental perspectives

or those dazzled by the technological apparatus. Educational digitization is fraught with friction, infrastructure constraints, and ethical dilemmas that directly challenge the actions of leaders, teachers, and schools.

Digital evolution does not proceed in a linear or uniform manner; on the contrary, it is shaped by institutional particularities, cultural legacies, pedagogical demands, and socioeconomic disparities. From this perspective, it is essential to critically assess the barriers that emerge during the implementation of these tools, the factors that define their actual impact on learning, and the scenarios that unfold when innovation is driven by pedagogical intent, critical thinking, and fidelity to the educational essence of each institution.

The obstacles surrounding the digital transition in education transcend the mere operationalization of software or hardware, extending to structural, cultural, pedagogical, and organizational dimensions. This is a complex movement that demands profound shifts in school culture, teaching methodologies, and management structures, refuting the notion that simply acquiring devices is sufficient for innovation (Sena et al., 2024).

Among the most persistent obstacles, infrastructure disparities and socioeconomic barriers stand out. The unreliability of network connections, the lack of up-to-date equipment, and tight budgets undermine the efficiency of digital projects—a glaring issue in basic education that tends to widen the existing educational gap (Almeida, 2025; Gelsleichter & Santos, 2025). As indicated in the literature, the mere distribution of technological resources is insufficient to promote true inclusion; rather, it requires the convergence of robust technical support, coordinated government guidelines, and pedagogical practices committed to social justice (Almeida, 2025).

Another critical issue lies in the preparation of teachers and administrators, given that integration into the digital environment requires competencies that go beyond the technical handling of tools; it demands critical discernment to incorporate such media reflectively into the teaching routine, so that they are assimilated into teachers' daily pedagogical practice. To address this situation and maximize the potential of these resources, it is urgent to allocate investments in ongoing professional development and to design public policies that safeguard both working conditions and the promotion of innovation (Gelsleichter & Santos, 2025).

The strictly pedagogical use of technology poses a substantial challenge in and of itself. Gatto (2016) emphasizes that, although technological resources hold significant potential for injecting dynamism and customization into teaching, their success depends on an analytical, conscious, and purposeful approach. Devices introduced without being tied to instructional

goals run the risk of merely reproducing old, traditional habits or taking on a purely ornamental role, running up against limitations such as teachers' inadequate preparation and a lack of adherence to institutional routines.

In light of this, technological advancement also redefines the dynamics of teaching and learning. Teixeira et al. (2024) draw attention to the fact that digital tools profoundly reorganize pedagogical practice, requiring the teaching profession to position itself as a bastion of resistance against the rationality of algorithmic productivity. This reconfiguration presupposes viewing the act of mediating knowledge as an ethical and aesthetic stance, in which the educator does not capitulate to corporate automation but rather reframes technology in the interest of emancipatory learning.

There are also obstacles associated with instructional design itself. Santos et al. (2024) argue that the architecture of meaningful learning journeys in the virtual environment depends on a coherent instructional design capable of aligning objectives, methods, digital resources, and assessment processes. In practice, however, this approach faces cultural resistance, disparities in internet access, and a lack of targeted training, which undermine the quality of screen-mediated learning experiences.

Cultural resistance to change presents itself as a cross-cutting obstacle. Digital advancement disrupts long-established routines, challenges professionals' identities, and imposes new workflows in both administrative and teaching roles. Without strategic leadership grounded in change management, active listening, and collective decision-making, the process risks being labeled as a top-down imposition disconnected from the school community (Sena et al., 2024).

The challenges associated with digital transformation highlight that this process depends on multiple organizational and institutional factors. Its implementation involves medium- and long-term planning, investments in infrastructure and skills development, leadership action, and alignment with the institution's educational objectives. Identifying these factors helps us understand the conditions that influence the adoption of digital technologies and their effects on the quality of educational and management processes.

Although digitization is present in various educational contexts, its outcomes vary depending on institutional characteristics, available resources, and the strategies adopted. The adoption of technologies, in and of itself, does not determine changes in teaching, learning, or management processes; rather, it must be integrated with pedagogical practices, management models, and institutional policies. In this context, analyzing their limitations and potential

fosters a broader understanding of the conditions that influence digital transformation processes in educational institutions.

The most insurmountable barrier lies in the impossibility of emulating or replacing the purely human dimension of the school experience. The educational process is essentially relational, ethical, and subjective, drawing on emotions, intentions, and bonds of otherness that cannot be automated, despite advances in artificial intelligence or immersive simulations (Santos et al., 2025). The central role of the educator and the administrator remains an inalienable pillar, regardless of the platforms used to facilitate learning.

Digital integration also challenges the foundations of pedagogical authority. According to Zuin and Zuin (2019), a critical examination is needed of the erosion of teachers' prestige in favor of algorithmic sovereignty, in which pedagogical decisions and the value of the school come to be guided by automated data and productivity rankings. This scenario requires that both teachers and students assert their agency in the knowledge-building process, rejecting the subjugation of pedagogy to the instrumental logic of computer systems.

Another limitation concerns the unintended consequences of the excessive and thoughtless use of digital devices. Boufleuer et al. (2024) sound the alarm about the harm caused by excessive screen time, especially when this practice lacks the support of solid curriculum guidelines and qualified pedagogical supervision. The lack of clear guidelines can stifle students' critical thinking, confining them to passive consumption of information and undermining the depth of their educational journeys.

Furthermore, the digital transformation faces structural and political-institutional barriers. There are serious chronic problems, such as inadequate physical networks, a shortage of ongoing professional development, and the purely cosmetic or superficial use of tools—all of which demonstrate that the isolated act of equipping schools with technology does not in itself foster innovation. These bottlenecks reveal that digitization requires strategic governance and sustained action; otherwise, there is a risk of creating isolated, short-lived, and ineffective projects.

From a strictly educational perspective, a recurring mistake is the mere transposition of traditional methodologies onto virtual interfaces. Using platforms merely to upload text files or to bureaucratize procedures causes the resource to lose its disruptive potential. It is clear that the true limit of digital advancement does not lie in hardware. Schlemmer et al. (2020) shed light on this issue by advocating the concept of reticular epistemologies, understanding the

digital turn as a set of profound shifts in living ecosystems of innovation, which requires new frameworks for conceiving knowledge, cognition, and the design of institutions.

The teacher's own mediation faces constraints when subjected to the logic of automated curation. Medeiros et al. (2024) reveal that digital learning objects often operate under statistical parameters and recommendation mechanisms that are detached from broader pedagogical horizons. This dynamic can stifle teachers' autonomy of choice, drain their creativity, and reduce the complexity of teaching to cold efficiency metrics.

From the perspective of psychological and social development, Silva and Felício (2022) draw on the assumptions of the Historical-Cultural Theory to reiterate that learning mediated by digital resources must safeguard the individual's intersubjective, historical, and cultural dimensions. Technology reaches its limits when it ignores the centrality of social exchanges, language development, and symbolic mediation in the subject's psychological constitution.

Ethical and civilizational impasses also arise. Freire et al. (2025) highlight the threats related to privacy and data protection, the spread of misinformation, and the precarious nature of teaching employment relationships, suggesting that education for digital citizenship be made a mandatory cross-cutting theme. The state's inaction and the lack of community engagement increase students' vulnerability, distancing technology from its potential as a safe and emancipatory tool.

In the realm of faith-based educational institutions, these limits become even more clearly defined. The adoption of new media must be in harmony with religious values, ethical imperatives, and the ideal of the holistic development of the human person. Technology must never take precedence over the refinement of character, the lived experience of spirituality, and the moral maturation of students. There are spheres of human development—linked to care, existential discernment, and the acceptance of others—that reject any attempt at automation.

The limits of the digital revolution in education demonstrate that technological resources, though powerful, are neither neutral nor unlimited. Mapping these barriers does not mean adopting a technophobic stance (resistance or fear regarding the adoption of new technologies), but rather establishing safeguards that ensure technology serves an education that fosters awareness, democracy, and inclusion. This mapping is what makes it possible to move toward mature pedagogical approaches that are aligned with the true role of the school as an institution.

Projections for the future of digital transformation in education suggest a definitive shift away from approaches focused strictly on technology, toward a model of integration that is

critical, sustainable, and ethically responsible. A true digital transformation requires a nuanced understanding of the complex interactions between technology, pedagogy, curriculum organization, and institutional culture, moving beyond simplistic narratives that reduce innovation to the mere consumption of new gadgets (Santos et al., 2024).

One of the central paths points toward the organic integration of technology, pedagogy, and curriculum design. Santos et al. (2024) argue that the sustainability of this transition presupposes a holistic perspective, capable of unifying infrastructure conditions, pedagogical arrangements, and curricular proposals, establishing the continuous professional development of education professionals as an indispensable condition for the success of institutional policies. Without this alignment, technological tools tend to exist as isolated props with no impact on student learning.

In this context, educational intent and ethical responsibility serve as the pillars supporting the contemporary school. Araújo et al. (2025) assert that the adoption of technologies must be subordinate to ethical values and the creation of a truly inclusive school, dedicated to developing multiliteracies (the ability to understand, produce, and communicate information using different languages, media, and technologies in diverse social and cultural contexts) and critical digital competencies. This stance shifts the focus away from managerial efficiency and highlights the holistic development of students in their multiple dimensions—cognitive, emotional, and sociocultural.

Another indispensable aspect involves strategic governance combined with an assessment of the social impacts generated by digitization. Ernandes et al. (2024) draw attention to the fact that the integration of these ecosystems must be subject to critical scrutiny, weighing their repercussions on human relationships, teachers' working conditions, and the reproduction of class inequalities. A lack of strategic planning can widen divides and deepen segregation, whereas well-designed policies pave the way for a more equitable transition.

From an organizational perspective, macrorends point to the maturation of a systemic approach to school management, one capable of integrating technological advances with the institution's culture and the development of human capital. The digital maturity of an educational institution is now measured by its flexibility to learn from its own mistakes, evaluate its strategies, and fine-tune its internal processes, ensuring alignment between technological modernization, the school's mission, and its social responsibility.

In the realm of private religious institutions, these challenges demand redoubled diligence in reconciling technological progress with the network's distinctive identity. Digital

advancement must become a tool geared toward holistic education, focusing not only on academic performance metrics but also on the ethical, civic, and transcendental formation of students. The sustainability of innovation rests on the ability to blend tools and values, preserving the centrality of the individual and the sacred and humanistic dimension of the educational act.

Consequently, the path toward a balanced and sustainable digital transformation points to the development of a model that strikes the right balance between innovation and critical thinking, productivity and empathy, and technology and purpose.

LEADERSHIP AND DIGITAL TRANSFORMATION

Digital transformation requires leaders to possess the knowledge and competence to connect technology and people based on personal and organizational purpose. Educational leaders are now expected not only to manage resources but also to serve as strategic facilitators of digital innovation, cultural mediators, and those responsible for integrating technology, people, and institutional values (Iansiti & Lakhani, 2021).

Digital leadership emerges as a crucial factor in using technology to carry out activities effectively, extending beyond merely changing processes or creating new products to the development of novel practices through digital transformation (El Sawy et al., 2016). Among the emerging competencies, adaptability, social-emotional intelligence, data-driven strategic vision, and ethical sensitivity stand out (Santos et al., 2025).

The interaction between digital vision (leadership) and digital capability (technological initiatives) results in what Westerman et al. (2016) refer to as the digital maturity indicator, which represents the state of an organization's digital transformation. The levels of mastery defined by Westerman et al. (2016) are divided into: Beginners, Fashionistas, Conservatives, and Digital Masters, defined as follows: Beginners: these are individuals or organizations that are at the beginning of their digital journey; typically, they conduct benchmarking tests before adopting any measures to validate their actions; in other words, they tend to be resistant to change; Trend-Followers: these are organizations that invest in technology and implement it but do not modify their internal processes, governance, or leadership capabilities; such organizations or leaders often face losses on their investments and tend to act impulsively; Conservatives: In contrast to the Fashionistas, these organizations or leaders have a track record of capacity-building, but their extreme caution prevents them from investing in and developing

reliable digital resources; while many governance rules help maintain order, they can also hinder progress. Digital Masters: these organizations or leaders have overcome challenges and have a clear understanding of where it is important to invest to support their businesses, as well as an understanding of the sequence for implementing technologies and the problems that may arise. They align their investments with digital transformation plans, creating new products and services through the use of technology.

To measure the digital capabilities of organizations based on Westerman et al. (2016)—which were subsequently validated in the Brazilian context by Luna and Breternitz (2021) in private higher education institutions—the assessment model was structured around two dimensions: digital capabilities (what technology can do) and leadership capabilities (how to lead change). The model uses a Likert scale from 1 to 7, with scores ranging from 10 to 70 for each dimension.

DIGITAL MATURITY MEASUREMENT MODELS

The McKinsey model, used by Martins et al. (2019) to assess the digital maturity of 124 Brazilian companies using the Analytics & Digital Quotient (A&DQ) tool, organizes 22 essential management practices into four dimensions: strategy, capabilities, organization, and culture. This model was adapted in this study to guide the qualitative interviews and classify the institutions into digital leaders, rising stars, emerging players, and beginners.

The McKinsey model (Martins et al., 2009) was originally designed to measure digital maturity in the Brazilian corporate sector. Applying this framework to the school ecosystem made it possible to correlate the interviewees' statements with five structural analytical axes: transformation of the management model, leadership capabilities, data-driven culture, collaborative institutional integration, and the use of artificial intelligence (AI). The categorization resulting from these dimensions reduced the bias of subjectivity in the content analysis, enabling the precise classification of the institutions under investigation into four distinct levels of technological evolution: digital leaders, rising stars, emerging players, and beginners.

At the top end of this spectrum, institutions characterized as digital leaders incorporate technology organically and holistically into their governance. At this highest level, digital tools and AI systems transcend the role of mere operational support, becoming strategic assets for financial, administrative, and pedagogical decision-making, which reduces reliance on purely

empirical judgment in favor of data-driven predictive analytics. This maturity is reflected in intentional leadership, which drives innovation in a planned manner, and in a fully connected infrastructure capable of breaking down organizational silos by unifying information flows and fostering fluid, dynamic cross-sector collaboration.

At an intermediate stage of consolidation, institutions labeled as rising stars show consistent progress in digitizing their routines, although they proceed with caution and remain attached to traditional hierarchical structures. In these scenarios, the adoption of analytical platforms and reports serves as a complementary management tool, but does not negate the influence of individual experience and strict regulatory control within decision-making bodies. At the same time, organizations classified as emerging reveal a landscape marked by fragmentation. Although they make significant investments in specific automation initiatives, security, educational marketing, and initial experiments with AI, these tools operate in isolation and without the support of a comprehensive strategic plan, leading to overlapping platforms and difficulties in converting the volume of collected data into effective organizational knowledge.

The group of institutions categorized as beginners is defined by an eminently conventional and reactive management model, in which information technology serves only basic bureaucratic functions. At these campuses, school units tend to exhibit a culture rooted in empiricism and subjective judgment, characterized by a strong aversion to risk, a lack of testing routines, and a severe dependence on external partners due to a shortage of in-house technical talent. The barriers are structural and leadership-related: key data lacks organization, and departments operate in isolation, generating chronic communication breakdowns and keeping artificial intelligence entirely absent from tactical and operational planning.

RESEARCH METHODOLOGY

This study adopts a descriptive approach based on a mixed-methods (quantitative-qualitative) design, conducted during the first half of 2025. For the quantitative component, the sampling design was non-probabilistic, as the selection of participants was based on the researcher's intentional judgment with the aim of identifying strategic leadership within the organization. The methodological choice of a closed-ended questionnaire is justified because, according to Cervo and Bervian (2002), this tool is particularly effective in scientific research as it facilitates the collection of precise information. Furthermore, Richardson (1999) points out

that questionnaires are essential for describing and measuring variables in groups of subjects, as well as for standardizing data collection by avoiding repetitive questions and clarifying the characteristics of the phenomenon under study.

In practice, the electronic survey was set up as a single link on the Google Forms platform and distributed via email and digital messages. The questions were based on the constructs of “Digital Competence” and “Leadership Competence,” originally proposed by Westerman et al. (2016) and validated for the national context by Luna and Breternitz (2021), using a 1- to 7-point Likert scale. The instrument was completed by 47 participants, including principals and treasurers from school units, representing 39% of a total of 121 senior administrators working in the nine regional campuses of the religious educational network in the State of São Paulo, constituting a highly representative sample for the sector.

To explore the subjective nuances of the phenomenon in greater depth, the qualitative component employed a purposive sample consisting of semistructured interviews with the ten leaders who head the regional offices in the state. The interview guide followed the McKinsey Performance and Qualification Assessment (A&DQ) model, a tool related to the framework used by Martins et al. (2019) to map organizational maturity. The process of outreach and engagement was conducted in person by the researcher, who delivered the official invitation and methodological guidelines directly to the managers; the interview scripts with the participants’ reflective responses were subsequently returned by the participants via email and the WhatsApp app.

From an ethical and legal standpoint, the project was submitted to and approved by the accredited Research Ethics Committee in Brazil and by the Institutional Review Board (IRB) at Andrews University. Managers’ access to the questionnaire and interviews was strictly contingent upon their reading and formal acceptance of the Informed Consent Form (ICF), with 100% agreement among participants, both in digital and physical formats. After data collection was completed, the numerical data from the questionnaire were compiled and analyzed using descriptive statistics (calculating metrics such as mean, median, and standard deviation) and a one-way Analysis of Variance (ANOVA) to verify the existence of significant differences in digital capabilities among the nine regional campuses. At the same time, the interview material underwent a content analysis of the discourse, organizing the findings into five thematic areas and classifying regional leaders according to the levels of digital maturity in the McKinsey model. Finally, the quantitative and qualitative analyses were triangulated and compared with

theoretical foundations and bibliographic sources, providing the necessary depth to answer the research questions initially proposed.

RESEARCH RESULTS

The quantitative analysis revealed that the private and religious school network in the state of São Paulo exhibits an advanced level of digital capacity, with an overall average of 58.54 points (on a scale of 10 to 70), while leadership capacity averaged 38.75, placing all school campuses in the fashionista quadrant, according to the classification by Westerman et al. (2016). This profile indicates that the institutions invest in technology and implement it, but have not yet fully developed the strategic leadership, governance, and digital culture capabilities needed to drive transformation in an integrated manner, linking the pedagogical and managerial digital transformation of these Basic Education schools, as shown in Table 1.

Table 1.

Averages for digital and leadership capabilities by regional campus

Association	Digital Competence	Leadership Competence
Campus 1	61.60	38.60
Campus 2	57.60	40.80
Campus 3	62.80	38.60
Campus 4	53.20	39.40
Campus 5	55.80	34.00
Campus 6	60.20	40.20
Campus 7	61.60	42.80
Campus 8	57.60	39.00
Campus 9	60.00	40.60
State Campus	55.00	33.50
Mean	58.54	38.75

Note. Prepared by the author, based on survey data (2025).

The overall mean scores for the constructs ranged from 5.2 to 6.4 on the seven-point Likert scale, indicating a predominantly positive perception among managers regarding the presence and relevance of digital transformation. The analysis of variance (ANOVA) did not identify statistically significant differences between the locations for most questions ($p = 0.338$), indicating homogeneity in overall perceptions. The only exception occurred in Question 13, regarding opportunities for everyone to participate in the conversation about digital

transformation, which showed a significant difference between Campus 2 and the state campus, reinforcing the importance of leadership as a distinguishing factor.

The qualitative analysis, structured around five thematic axes based on the interview transcripts and grounded in the theoretical framework, classified the ten institutional units into three categories of digital maturity; no cases were identified in the “beginner” profile, as shown in Table 2.

Table 2.

Classification of units by thematic area and level of digital maturity

Thematic Area	Category	Units
Axis 1 – Digital Transformation in the Management Model	Digital Leaders	Campus 1, Campus 5, State Campus, Campus 9
	Rising	Campus 2, Campus 3, Campus 7, Campus 4
	Emerging	Campus 6, Campus 8
Axis 2 – Leadership Skills in the Digital Age	Digital Leaders	Campus 1, Campus 5, State Campus, Campus 9
	Rising	Campus 2, Campus 3, Campus 7, Campus 4
	Emerging	Campus 6, Campus 8
Axis 3 – Data-Driven Organizational Culture	Digital Leaders	Campus 1, Campus 5, State Campus, Campus 9
	Rising	Campus 2, Campus 3, Campus 7, Campus 4
	Emerging	Campus 6, Campus 8
Axis 4 – Institutional Integration and Internal Collaboration	Digital Leaders	Campus 1, Campus 5, State Campus, Campus 9
	Rising	Campus 2, Campus 3, Campus 7, Campus 4
	Emerging	Campus 6, Campus 8
Axis 5 – Artificial Intelligence and the Future of Educational Management	Digital Leaders	Campus 1, Campus 5, State Campus, Campus 9
	Rising	Campus 2, Campus 3, Campus 7, Campus 4
	Emerging	Campus 6, Campus 8

Note. Prepared by the author, based on survey data (2025).

As described in Table 2, each axis characterizes the institutions analyzed and their actors. The results were analyzed in greater depth, as follows:

Axis 1 – Digital Transformation in the Management Model

Institutions classified as digital leaders (Campus 1, Campus 5, and Campus 9) demonstrate that digital transformation is structurally integrated into their management models. Technology no longer plays a purely operational role but has become a strategic element of educational administration, guiding decision-making processes and redefining management practices. This is evident in the words of one administrator: “Technology is part of management. Decisions are no longer made solely based on experience, but rather on data derived from pedagogical, financial, and family relationship sources” (Campus 1).

The ascending institutions (Campus 2, Campus 3, Campus 7, and Campus 4) consistently adopt digital systems but proceed more cautiously, prioritizing organizational stability and compliance with rigorous governance structures. In contrast, the emerging institutions (Campus 6 and Campus 8) show investments in digital tools focused on communication and the automation of specific processes, but without structural changes to internal processes or institutional governance. Santos et al. (2025) emphasize that digital tools not only automate processes but also expand organizations’ analytical capabilities, corroborating the findings regarding the more mature profiles.

Axis 2 – Leadership Skills in the Digital Age

In digitally leading institutions, leadership acts strategically and intentionally in driving digital transformation. Leaders demonstrate the ability to use technologies as tools to support decision-making and institutional planning. As reported: “Today’s leader needs to understand technology, but above all, know how to use data to make decisions. There’s no point in having a system if leadership doesn’t know how to interpret what it shows” (State Campus). Similarly: “If leadership doesn’t drive digital transformation, the school may use technology, but it doesn’t truly change. Change begins with the leader” (Campus 1).

In the rising profiles, leadership recognizes the importance of digital transformation but exercises this role more cautiously, mediated by traditional management structures and institutional norms. In the emerging profiles, leadership demonstrates openness to digital technologies but faces difficulties in converting investments into structural changes in leadership practices. Dillenburger et al. (2024) emphasize that digital leadership involves the

ability to integrate technology, strategy, and people management at different organizational levels—a perspective aligned with the findings of this study.

Axis 3 – Data-Driven Organizational Culture

In digitally leading institutions, data is viewed as a strategic asset, integrated into pedagogical, administrative, and financial decision-making processes. The organizational culture reflects a shift from judgment based exclusively on individual experience to decisions grounded in metrics: “The conversation has changed a lot. Today we discuss planning and results by looking at the data, not just guesswork” (State Campus). Andrade et al. (2025) found that digital maturity in educational institutions is directly related to the systematic use of data in decision-making processes.

In rising institutions, data tends to complement, rather than replace, traditional decision-making practices. In emerging organizations, data use occurs in an ad hoc and fragmented manner, with difficulties in transforming data into organizational knowledge. Assis et al. (2024) highlight that the adoption of a data-driven culture faces significant barriers, requiring deliberate awareness-raising efforts and investments in data literacy.

Axis 4 – Institutional Integration and Internal Collaboration

In digitally leading institutions, technology serves as a structural element of institutional integration. Integrated academic and administrative management systems, internal communication platforms, and analytical tools facilitate information sharing across departments: “Today, the academic, financial, and administrative departments all work with the same system. This has greatly facilitated communication and collaboration between departments” (Campus 5). Fernandes and Diirr (2025) emphasize that technology-mediated collaborative practices can overcome cultural and organizational barriers.

In rising organizations, integration occurs in a more functional and controlled manner, preserving hierarchical structures. In emerging organizations, however, the multiplicity of platforms that are not integrated with one another can lead to information overlap and hinder effective collaboration: “Today we have several tools, but they don’t always communicate with one another. Sometimes this hinders rather than helps integration” (Campus 8).

Axis 5 – Artificial Intelligence and the Future of Educational Management

In leading digital institutions, Artificial Intelligence (AI) is already integrated into pedagogical and administrative processes. It is viewed as a tool to support decision-making, personalize learning, and optimize management processes: “We already use artificial intelligence in some pedagogical processes, such as in children’s report cards and in monitoring students with special needs” (Campus 1). Vasconcelos et al. (2025) emphasize the importance of algorithmic governance models that ensure transparency and compliance with current legal frameworks.

In rising institutions, AI is viewed as a promising technology, but one approached with caution regarding the reliability of the systems and ethical implications. In emerging institutions, AI appears in an incipient and experimental form, without integration into a clear institutional strategy. Cruz et al. (2025) emphasize that the adoption of AI should not occur in isolation but should be linked to continuing education processes, especially with regard to leadership and faculty.

Analysis of Data-Driven Decision Making

Regarding the use of data in the decision-making process, the quantitative results of the questions related to data use and an integrated view of strategic information indicated that Campuses 1, 7, and 3 demonstrate the highest adherence to this approach. The other locations showed moderate alignment (scores between 5 and 6 on the Likert scale). The institutions’ state administrative campus had the lowest scores on these questions, suggesting a lesser impact of data use on decision-making at a more strategic level.

Qualitative data confirm and elaborate on these findings. Among digital leaders, there is an explicit shift in the decision-making pattern, moving from subjective judgment to evidence-based planning. Among rising leaders, data complement accumulated experience. Among emerging leaders, the difficulty persists in transforming available information into consistent strategic decisions.

FINAL CONSIDERATIONS

This study examined digital transformation within a private, religious school system that comprises nine regional offices, 92 school campuses, and more than 100,000 students in basic education in the state of São Paulo, addressing three central questions: the integration of technology with digital and leadership skills, the maturity stage of digital transformation, and the use of data in the decision-making process.

By delving deeper into the theoretical framework, we can understand that digital transformation in education is a complex and nonlinear process, the effectiveness of which goes beyond the mere acquisition of equipment or the automation of processes. Merely making technological resources and infrastructure available is insufficient to guarantee innovation or social inclusion, especially when faced with socioeconomic disparities, budgetary constraints, and gaps in technical support from institutions. Without strategic and structural alignment, there is a risk of reducing innovation to a merely instrumental or ornamental role, merely reproducing old practices under a new digital guise.

In this scenario, the true turning point lies in the human factor and the pedagogical intent that guides administration and teaching. The success of the digital transition requires strengthening leadership, providing ongoing professional development, and fostering critical thinking that integrates interactive media into instructional planning. Only by moving beyond exclusively technical rationality and the logic of algorithmic efficiency is it possible to redefine the purpose of technology, transforming data, systems, and devices into vehicles for emancipatory, ethical learning that is deeply aligned with the essence of each educational community.

Regarding the integration of technology with digital and leadership skills, the results reveal that the network exhibits advanced digital capabilities (average 58.54) but has a pressing need to develop technological leadership (average 38.75), placing all associations in the “fashionista” profile. This indicates that the institutions make extensive use of technological resources but lack more robust strategic coordination, a comprehensive vision of digital transformation, and a consolidated digital culture.

Regarding the maturity of digital transformation, the qualitative analysis identified three regional campuses and the state campus as digital leaders, with transformation integrated into their structure and management model; four regional campuses were classified as rising, with significant progress at a gradual pace; and two regional campuses as emerging, with investments in technology not accompanied by structural changes. The absence of beginners

indicates that all organizations have already moved beyond the initial phase of digitizing educational and management processes.

Regarding the use of data in the decision-making process, the results confirm the adoption of this practice across all profiles, though with varying degrees of cultural internalization. Among digital leaders, there is an effective shift in decision-making patterns. Among rising organizations, data complements experience. Among emerging organizations, the difficulty in transforming information into strategic intelligence persists.

Based on qualitative criteria and an analysis of decision-making, the study demonstrates that the maturity of digital transformation within the educational network is uneven and reflects different stages of institutional development. In institutions classified as digital leaders, technology plays a cross-cutting and structuring role: the management model and decisions are based on integrated evidence and data (pedagogical, financial, and administrative), supported by intentional strategic leadership, the use of Artificial Intelligence (AI), and integrated systems that promote collaboration and move beyond the purely subjective use of experience.

On the other hand, rising and emerging organizations reveal significant barriers to the consolidation of this digital culture. While rising organizations adopt a cautious stance, maintaining strict standards and using data and AI only as complements to traditional management, emerging organizations grapple with fragmented and disjointed tools that often lead to information overlap and hinder strategic intelligence. This disparity highlights that the transition from operational use to truly data-driven management depends not only on acquiring platforms, but also on strengthening digital leadership and data literacy at all levels of the organization.

Based on the study's findings, the digital transformation within the analyzed network reveals significant progress in operational tools; however, it faces structural bottlenecks in strategic direction and organizational culture. This scenario is reflected in the variation in digital maturity among regional offices, demonstrating that infrastructure alone does not standardize institutional development.

Regarding the decision-making process, the use of data is a reality across the entire network, though with varying degrees of cultural maturity. While the offices classified as digital leaders use data analysis to effectively transform their decision-making processes, emerging offices still face difficulties in converting information into strategic intelligence.

In response to the research question "analysis of the integration of technologies into digital and leadership capabilities, the level of maturity of digital transformation, and the use of

data in decision-making in educational institutions,” it is concluded that digital transformation in pedagogical and administrative educational management is not a predominantly technology-centric process. The mere acquisition of technology does not guarantee progress in management, given that the success of digital transformation in this religious school network depends primarily on strengthening leadership, intentionally aligning strategy, and the ability to convert data into educational value and innovation.

One of the main contributions of this research lies in its counterpoint to technocentric approaches to digital transformation: the mere adoption of technologies does not, in and of itself, guarantee effective improvements in pedagogical or administrative educational management. The effectiveness of digital transformation depends less on technological sophistication and more on the quality of leadership, strategic intent, and the institutional capacity to transform data into decisions and innovation into educational value.

REFERENCES

- Almeida, A. T. S. (2025). Tecnologias na educação: Desafios no processo de inclusão e desigualdades em contextos digitais de aprendizagem. *Educação & Inovação*, 2, 1–14. <https://doi.org/10.64326/educacao.v1i2.19>
- Andrade, L. S., Correia, M. S., Prado, H. A., & Ferneda, E. M. (2025). Maturidade em orientação a dados: Proposta de boas práticas para instituições de ensino superior. *Revista de Gestão e Avaliação Educacional*, 14(23), e89778. <https://doi.org/10.5902/2318133889778>
- Araújo, A. R. R., Marçal, J., & Souza, A. M. M. (2025). O impacto das tecnologias digitais na gestão educacional: Desafios e oportunidades para os gestores escolares. *Cuadernos de Educación y Desarrollo*, 17(7), e8842. <https://doi.org/10.55905/cuadv17n7-028>
- Assis, R. S. A., Portella, F. J., Paiva, L. F. R., Pereira, L. L., Ribeiro, H. P. L., & Lima, A. D. (2024). Dados no DNA das empresas: Sua revitalização com ciência de dados. *Revista de Engenharia, TI e Inovação*, 1(1), 1–12. <https://doi.org/10.31496/retii.v1i1.1712>
- Boufleuer, J. P., Ruschel, G. E. S., & Rigodanzo, S. (2024). A educação no contexto das inovações digitais. *Espaço Pedagógico*, 31, e16405. <https://doi.org/10.5335/rep.v31.16405>
- Cervo, A. L., & Bervian, P. A. (2002). *Metodologia científica* (5ª ed.). Prentice Hall.
- Cruz, H. N., Dias, M. A. O., Lima, M. F., Marques, A. Z., & Sousa, F. P. (2025). Inteligência artificial e educação: Tecnologia como aliada, professor como essencial. *Educação & Inovação*, 1(7), 1–20. <https://doi.org/10.64326/educacao.v1i7.86>
- Dillenburg, C. J., Froehlich, C., & Bohnenberger, M. C. (2024). Competências multiníveis dos líderes para transformação digital: Uma revisão sistemática da literatura. *Reunir*, 13(5), 174–195. <https://doi.org/10.18696/reunir.v13i5.1651>
- El Sawy, O. A., Kræmmergaard, P., Amsinck, H., & Vinther, A. L. (2016). How LEGO built the foundations and enterprise capabilities for digital leadership. *MIS Quarterly Executive*, 15, 141–166.
- Ernandes, I., Almeida, B. L. O. S., Carlos, J. S. C., Silva, A. C., Corrêa, A. M., & França, E. F. (2024). O papel das tecnologias na educação: Tendências, desafios e oportunidades. *Aracê*, 6(2), 1431–1446. <https://doi.org/10.56238/arev6n2-059>
- Fernandes, J., & Diirr, B. (2025). Colaboração na transformação digital: Estruturando um modelo para alinhamento estratégico entre TI e negócios. In Sociedade Brasileira de Computação (Org.), *Anais do 20º Simpósio Brasileiro de Sistemas Colaborativos* (pp. 45–52). SBC. https://doi.org/10.5753/sbsc_estendido.2025.6595
- Freire, M. A., Bastos, A. B., Menezes, C. A., Hainocz, J. A. F., Silva, J. P. L. R., Luiz, M. R., Cabral, V. C. C., & Silva, V. R. (2025). Limites e possibilidades das práticas escolares online na educação digital e seus riscos emergentes. *Revista Ibero-Americana de*

Humanidades, Ciências e Educação, 11(8), 465–472.
<https://doi.org/10.51891/rease.v11i8.20586>

- Furr, N., Ozcan, P., & Eisenhardt, K. M. (2022). What is digital transformation? Core tensions facing established companies on the global stage. *Journal of Sustainable Competitive Intelligence*, 12(1), e0410.
- Gatto, M. D. A. (2016). A tecnologia como ferramenta pedagógica que atua como transformadora nos processos do ensino e da aprendizagem. *Journal of Media Critiques*, 2(4), e227. <https://doi.org/10.17349/jmcv2n4-001>
- Gelsleichter, G. F., & Santos, M. P. M. (2025). Transformação digital na educação brasileira: Desafios, possibilidades e novos paradigmas pedagógicos. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, 11(5), 3351–3365. <https://doi.org/10.51891/rease.v11i5.19140>
- Gradim, S. M. T. (2025). Recursos digitais na educação básica e aprendizagem baseada em competências. *Revista Científica FESA*, 1(1), 163–179. <https://doi.org/10.56069/2676-0428.2021.596>
- Iansiti, M., & Lakhani, M. R. (2021). *A era da inteligência artificial* (C. Yamagami, Trad.). AlfaCon.
- Luna, F. D. S., & Breternitz, V. J. (2021). Transformação digital em instituições de ensino superior privadas brasileiras: Linha de base pré-coronavírus. *Revista de Administração Mackenzie*, 22(6), eRAMD210127. <https://doi.org/10.1590/1678-6971/eRAMD210127>
- Martins, H., Dias, Y., Castilho, P., & Leite, D. (2019). *Transformações digitais no Brasil: Insights sobre o nível de maturidade digital das empresas no país*. McKinsey & Company. <https://www.mckinsey.com.br/our-insights/transformacoes-digitais-no-brasil>
- Medeiros, A. P. C., Costa, C. M. B., Morais, B. F., Guerra, J. D. A., & Santos, C. F. (2024). A curadoria algorítmica nos objetos digitais de aprendizagem: Critérios técnico-pedagógicos e efeitos sobre a autonomia docente. *Missioneira*, 26(1), 3–11. <https://doi.org/10.46550/z8wz9s56>
- Mendonça, F. M., & Zaidan, F. H. (2019). Ontologias para organização da informação em processos de transformação digital. *Em Questão*, 25(1), 295–320. <https://doi.org/10.19132/1808-5245251.295-320>
- Richardson, R. J. (1999). *Pesquisa social: Métodos e técnicas* (3ª ed.). Atlas.
- Santos, L. C. B., Santos, J. L. D. M., Nascimento, I. J. B. M. F., Souza, J. D., Souza, L. G., & Dezem, L. T. (2025). Transformação digital na gestão educacional: Ferramentas tecnológicas, práticas inovadoras e desafios. *Lumen et Virtus*, 16(44), 510–526. <https://doi.org/10.56238/levv16n44-040>
- Santos, L. G. P., Oliveira, R. T. S., Freitas, V., & Paula, V. A. F. (2024). Modelos de maturidade em transformação digital: Análise de propostas para pequenas e médias empresas do setor manufatureiro. *P2P & Inovação*, 11(1), e-7073.

- Schlemmer, E., Morgado, L. C., & Moreira, J. A. M. (2020). Educação e transformação digital: O habitar do ensinar e do aprender, epistemologias reticulares e ecossistemas de inovação. *Interfaces da Educação*, 11(32), 764–790. <https://doi.org/10.26514/INTER.V11I32.4029>
- Sena, K. R., Lima, A. G., & Silva, F. S. (2024). A transformação digital na educação: Desafios e oportunidades para o século XXI. *Revista Educação Contemporânea*, 1(2), 137–142. <https://doi.org/10.18378/rec.v1i2.11003>
- Silva, I. F., & Felicio, C. M. (2022). Mediação de práticas educativas na educação profissional com tecnologias digitais da informação e comunicação: Considerações a partir da teoria histórico-cultural. *Educitec*, 8, e191222. <https://doi.org/10.31417/educitec.v8.1912>
- Silva, P. C., & Coutinho, D. J. G. (2025). Tecnologias na gestão escolar: Inovações e desafios no contexto educacional contemporâneo. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, 11(3), 2134–2151. <https://doi.org/10.51891/rease.v11i3.18546>
- Teixeira, M. A. S., Medeiros, A. P. C., Bavaresco, J. B., Ludoino, C. C., & Costa, C. M. B. (2024). O impacto das tecnologias digitais na prática docente: Desafios e possibilidades. *Missioneira*, 26(1), 71–82. <https://doi.org/10.46550/kjzm0j14>
- Vasconcelos, E. S., Silva, L. A., Justino, R., Silva, D. H., Silva, A. C. R. A., & Amorim, L. R. (2025). Inteligência artificial na gestão pública educacional: Governança algorítmica, desafios ético-jurídicos e estratégias para a transformação digital nas instituições federais de ensino. *Caderno Pedagógico*, 22(9), e17798. <https://doi.org/10.54033/cadpedv22n9-024>
- Westerman, G., Bonnet, D., & McAfee, A. (2016). *Liderando na era digital: Como utilizar tecnologia para transformação de seus negócios* (A. Griesi, Trad.). M.Books.
- Zuin, A. Á. S., & Zuin, V. G. (2019). A autoridade do professor no contexto da autoridade algorítmica digital. *Pro-Posições*, 30, e20180038. <https://doi.org/10.1590/1980-6248-2018-0038>

CRediT Author Statement

- ☐ **Acknowledgments:** The authors thank the private religious educational network, Andrews University, and the Adventist University Center of São Paulo, as well as the leaders of the schools and regional campuses who participated as respondents in the questionnaire and interviews.
 - ☐ **Funding:** No specific funding was provided by the institutions.
 - ☐ **Conflicts of interest:** There are no conflicts of interest.
 - ☐ **Ethical approval:** This study adhered to ethical standards throughout the research process and was submitted to the IRB ethics committees at Andrews University and the Research Ethics Committee at the Adventist University Center, where it was approved by both.
 - ☐ **Data and materials availability:** The data and materials used in this study are available for access, subject to ethical guidelines.
 - ☐ **Authors' contributions:** Telson Bombassaro Vargas for conducting in-depth research on the topic. Anna Cristina Pascual Ramos for supervising the research. Silvia Cristina de Oliveira Quadros for her thorough review of the article.
-

Processing and editing: Editora Ibero-Americana de Educação
Proofreading, formatting, standardization and translation

