

## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

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**ABSTRACT:** This study analyzes the digital academic management platforms of the state universities of Paraná, investigating their challenges, potential, and impacts on university management in a context of digital transformation. Its main objective is to develop a critical and forward-looking diagnosis of the systems in use, identifying their limitations in terms of usability, accessibility, integration, transparency, innovation management, and support for e-learning, as well as their contributions to administrative efficiency and the democratization of information. The research adopts an exploratory and descriptive methodology with a qualitative approach, grounded in a literature review, document analysis, and direct observation of institutional platforms, articulating analytical categories such as innovation management, academic quality, and digital governance. The analyses reveal heterogeneity in the universities' digitalization trajectories, while also highlighting gaps, opportunities, and recommendations for improving public academic management. It is concluded that digital transformation should not be reduced to the mere computerization of processes, but rather understood as an institutional reconfiguration that requires technological integration, cultural change, and the strengthening of public innovation policies. The relevance of the study therefore lies in supporting reflections and practices aimed at improving university management, contributing to the advancement of public higher education in a democratic, efficient, and socially responsible manner. The reading of this work helps to clarify the pathways and dilemmas of digitalization in higher education, providing critical and constructive insights for managers, researchers, and public policy makers.

**KEYWORDS:** SiSAV-UEM; ACADEMUS-UNIOESTE; Portal Docente-UEL; Professor Online/Kairos (UEPG); SUAP-UENP; SIGES-UNESPAR; Lyceum-UNICENTRO.

### 1. INTRODUCTION: context of the investigated reality

The digitalization of public services has ceased to be merely a technological innovation and has become a contemporary requirement, aligned with global digital government trends that seek administrative efficiency, debureaucratization, transparency, and expanded access through integrated platforms (Isidoro, 2018; Unioeste, 2021). In the field of public higher education, this movement takes on a strategic character: universities, as institutions responsible for education and knowledge production, must align themselves with innovative management practices capable of responding to the demands of an academic environment permeated by digital information and communication technologies. In this context, the state universities of Paraná constitute a privileged field of observation, as although they have consolidated the digitalization of their systems, they present distinct trajectories in terms of accessibility, integration, technology, and transparency. This heterogeneity represents not only a methodological challenge but also the starting point for analyzing the potentialities and limits of digital academic management in state higher education.

Digital transformation, consolidated as an imperative of the twenty-first century, is not limited to administrative modernization; it implies a redefinition of the relationship between the State and society. In higher education, it encompasses pedagogical, academic, and administrative processes that require efficiency, accessibility, integration, and transparency, as well as dialogue with contemporary teaching and learning practices, such as e-learning. Digital academic systems thus become central to university management by automating processes, reducing bureaucratic procedures, providing real-time data, and strengthening institutional accountability.

The universities of Paraná have followed distinct paths, adopting different solutions: SiSAV (UEM, 2018), ACADEMUS (UNIOESTE, 2012), Portal Docente (UEL), Professor Online/Kairos (UEPG), SUAP (UENP, 2018–2020), SIGES (UNESPAR,

# Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

2018), and Lyceum (UNICENTRO, 2022/2025). Although this process is consolidated, it reveals gaps and ongoing challenges. The case of UNICENTRO, the last institution to implement its platform, highlights both institutional obstacles and opportunities for learning from previous experiences. The central research problem is therefore: what are the potentialities and limitations of the digital academic management platforms of the state universities of Paraná, and how can a comparative analysis support recommendations for public university management? The study is based on the hypothesis that, despite significant advances, gaps persist in terms of usability, accessibility, data integration, and transparency, which may compromise management effectiveness and limit the pedagogical potential of digital systems.

The adopted methodology is exploratory and descriptive (Fachin, 2006; Fontana, 2018; Fontana & Rosa, 2021), with a qualitative approach (Bogdan & Biklen, 1994), based on documentary research using official sources—regulations, resolutions, academic portals, and institutional guides—complemented by direct analysis of the platforms. Data organization into comparative categories enabled a qualitative and exploratory<sup>1</sup> analysis, with no intention of statistical generalization (Gil, 1999), following the methodological procedures proposed by Mello (2006). Finally, the justification for this research lies in the need to strengthen innovation in public management in higher education. By critically mapping the digitalization of Paraná's state universities, this study seeks to contribute to the improvement of university governance and to provide support for the formulation of more integrated, democratic, and transparent public policies, in line with the broader digital government movement in Brazil.

## 2 SCIENTIFIC BACKGROUND

Technological development has accompanied humanity since its earliest beginnings, constituting an indispensable element for survival and social organization. Although it is often associated with digital devices, its concept is broader and includes rudimentary tools, such as the hoe, which represented a significant advance for agriculture and sedentary life (Isidoro, 2018). Technology can be understood as the application of scientific knowledge aimed at facilitating human experiences and work across multiple social, cultural, political, educational, and economic dimensions (Isidoro, 2018). Today, it simplifies everyday actions and shortens distances, although it may also limit human potential, as illustrated by examples such as calculators or audiobooks, which speed up processes but reduce the need to exercise logic, concentration, and critical interpretation (Dorow et al., 2020). Technologies therefore have a paradoxical character: they offer comfort and efficiency, yet may restrict creativity, imagination, and critical thinking (Isidoro, 2018).

### 2.1 Public Management, Innovation, and Technological Transformations in Brazil

In higher education, faculty members face challenges in incorporating Information and Communication Technologies (ICTs) into management and pedagogical practices (Paiva, 2021), while students tend to perceive these resources as facilitators of learning. ICTs optimize educational dynamics, expand access, and strengthen administrative transparency (Codes; Araújo; Turchi, 2024), but the challenge lies in balancing efficiency with critical education. Academic management in Brazilian universities also faces structural obstacles—such as inadequate infrastructure, high acquisition and maintenance costs of equipment, and insufficient technological training—which require both investments in infrastructure and policies for continuous education and digital literacy (Paiva, 2021). In this sense, institutions are responsible for articulating the democratization of access to technologies with the training of faculty, students, and technical staff, treating ICTs both as supportive tools and as structuring elements of academic management.

In Brazil, this debate is embedded in the transformations of public administration since the State Reform of the 1990s, which shifted the bureaucratic logic toward a managerial approach (Bresser-Pereira, 1997). However, these advances were fragmented and failed to consolidate an integrated model (Abrucio, 2007). In higher education, this reality is reflected in the multiplicity of non-interoperable digital systems, which fragment processes and hinder academic governance.

Innovation in public services is identified as a key driver of transformation. According to Lima and Vargas (2012), it is characterized by intangible processes oriented toward citizens as users, breaking with bureaucratic logic and proposing the redesign of digital services in terms of usability, accessibility, and transparency. In this context, design thinking places the citizen at the center, proposing to view the student as a whole subject rather than merely as a set of fragmented administrative records (Cerezini; Silva, 2017). This perspective requires consistent science, technology, and innovation policies (Silva, 2012), articulated with the Legal Framework for Science, Technology, and Innovation (Garcia; Lacerda; Zanotti, 2022), the Technological Innovation Law (Kruglianskas; Matias-Pereira, 2005), and the actions of Technological Innovation Centers (Souza Neto et al., 2019), which demonstrate that innovation depends on (i) technological resources and (ii) organizational and cultural factors.

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<sup>1</sup> Dependent variables (administrative efficiency, user satisfaction, and management transparency) and independent variables (usability and interface design, accessibility, integration, reports and indicators, support for e-learning, and technical/institutional support) were defined. The analysis of the interaction among these variables made it possible to identify patterns, differences, and potentialities in the institutional experiences.

## **Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities**

However, innovation in the public sector is constrained by policy fragmentation and a lack of institutional integration (Arbix, 2017). In universities, this is expressed in platforms that, rather than innovating, reproduce bureaucratic procedures. Thus, Brandão and Bruno-Faria (2017) emphasize that innovation requires overcoming cultural resistance, while Cavalcante and Camões (2017) note that it may occur at the process, service, or organizational levels—dimensions that are all present in academic systems. Furthermore, the impact of innovation should be measured by the quality perceived by users (Oliveira; Santos Júnior, 2017). In this regard, failures in usability, accessibility, and integration reduce the emancipatory potential of platforms, making criteria such as transparency and support for e-learning ethical and political dimensions of evaluation. Tironi (2017) highlights the need for reliable and continuous technological services, while Turchi and Morais (2017) point to the absence of integrated channels within the National Innovation System, reflected in the fragmented coexistence of academic systems. Conceição (2020), in turn, criticizes the risk of “spaghetti systems” when digitalization is not accompanied by organizational reconfiguration, and Loureiro (2020) identifies interoperability as a condition for smart government. Beyond technology, the human factor is decisive: appropriation by academic communities requires training and engagement (Diogo, 2020). Ramos and Cruz (2020) further emphasize that clarity of purpose and institutional support sustain transformation, while Costa (2020) underscores the need for a digital culture oriented toward innovation and transparency.

### **2.2 Innovation in Academic Management in Brazilian Universities**

Contemporary university management articulates two dimensions in tension: on the one hand, the university as an organization pressured by efficiency, measurement, and sustainability; on the other, as a social institution committed to educational, scientific, and ethical purposes (Colossi; Baade, 2016; Santos, 2010). This ambivalence requires management to ensure both continuity and the capacity for transformation, turning crises into opportunities for innovation (Gomes et al., 2013). In this context, innovation is not restricted to technology alone but encompasses pedagogical, administrative, and institutional dimensions, such as: (i) sources and types of innovation, (ii) institutional capacities, (iii) actors’ competencies, and (iv) evaluative criteria that integrate social impact and sustainability (Franco; Afonso; Bordignon, 2012). Its effectiveness depends on the institutionalization of learning and diffusion routines (Senhoras, 2012), as well as on the ethical and political sensitivity of managers (Gomes et al., 2013).

The university–industry–government triple helix constitutes a central analytical category, expanding collaborative governance and requiring university management to develop new capacities for articulation (Chais et al., 2013). Internally, digital administrative processes (such as electronic diploma certification) reduce bureaucratic procedures but demand cultural change and continuous training (Pereira et al., 2017). However, uncritical adoption may lead to the commodification of education and to the emergence of the “microwave university,” subordinated to market logic (Santos, 2010). Innovation also affects the subjectivity of managers, who experience gains in leadership but also overloads and personal impacts (Gomes et al., 2013). Permanent innovation management structures, such as centers and councils, should function as articulating and strategic hubs for science, technology, and innovation (ST&I) (Senhoras, 2012). Within this horizon emerges the notion of the entrepreneurial university, characterized by flexibility, creativity, and openness to controlled risk, balancing external pressures with its educational mission (Souza; Santos, 2013).

The literature systematizes interdependent categories for analyzing innovation and university management: (i) academic quality, (ii) educational and technological innovation, (iii) university–industry–government interaction, (iv) digital administrative processes, (v) quality of human formation, (vi) managers’ subjectivity, (vii) innovation management structures, and (viii) the entrepreneurial university (Franco; Afonso; Bordignon, 2012; Chais et al., 2013; Colossi; Baade, 2016; Gomes et al., 2013; Pereira et al., 2017; Santos, 2010; Senhoras, 2012; Souza; Santos, 2013). Complementarily, historical and conceptual categories such as the university as a social institution, the university as an organization, crisis and change, quality management, meanings of management, educational policy and the market, scientific research, and academic labor help to understand the tensions between public function and market pressures (Santos, 2010; Colossi; Baade, 2016; Franco; Afonso; Bordignon, 2012; Gomes et al., 2013).

When articulated with management, innovation becomes strategic for strengthening universities in the face of contemporary challenges. For Bernardes and Abreu (2004), informational fragmentation constitutes a central obstacle, requiring integrated systems and more transparent decision-making processes. However, management is also shaped by political and cultural factors (Ribeiro, 2017). The incorporation of ST&I can overcome institutional inertia (Marcovitch, 1999), as demonstrated by experiences of decentralization and networking within Innovation Centers (Sartori; Spinosa; Nogas, 2017). Nevertheless, university autonomy, integration with the productive sector, and consistent public policies remain ongoing challenges (Toledo, 2015). Thus, university innovation must go beyond mere computerization; it involves profound cultural and organizational change (Bernardes; Abreu, 2004). Strengthening innovation requires integration, the democratization of processes, and the valorization of applied research, paving the way for the definition of analytical categories and methodological justification.

Therefore, synthetically, the consulted literature shows that digital transformation in academic management is technical and, above all, cultural, institutional, and political. The analysis of the state universities of Paraná undertaken in this study will be guided by six analytical categories, constructed from the bibliographic review presented above: usability, accessibility, integration, transparency, innovation management, and support for digital teaching and learning (Nielsen, 1993; Colossi; Baade, 2016; Franco; Afonso; Bordignon, 2012; Gomes et al., 2013; Santos, 2010; Pereira et al., 2017; Kruglianskas; Matias-Pereira, 2005; Senhoras,

# Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

2012; Sartori; Spinosa; Nogas, 2017; Chais et al., 2013; Souza; Santos, 2013). These categories make it possible to evaluate not only the technical aspects but also the pedagogical and functional dimensions of these platforms.

**Table 1 – Analytical categories for the evaluation of digital academic management platforms.**

| <i>Category</i>              | <i>Definition Analytical Meaning</i>                                                                                                                                     | <i>Reference Authors</i>                                                              | <i>Central Tensions</i>                                                                                | <i>Synthetic Definition</i>                                                               | <i>Methodological Justification</i>                                                                                              | <i>Analytical Potential</i>                                                                                                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usability</b>             | Ease of use of digital platforms, involving clarity of navigation, intuitive design, and efficiency in task execution.                                                   | Nielsen (1993); Gomes et al. (2013)                                                   | Simplicity × technological complexity.                                                                 | Ease and efficiency of user interaction with academic systems.                            | Allows the assessment of everyday barriers to use; operationalizable through interface heuristics and user reports.              | To assess whether systems allow fast and intuitive access to academic information.                                                                                                               |
| <b>Accessibility</b>         | Possibility of platform use by all audiences, including people with disabilities or with different levels of digital literacy.                                           | W3C (2008); Franco; Afonso; Bordignon (2012)                                          | Digital inclusion × digital exclusion.                                                                 | Conditions for universal access to platforms by people with different needs and contexts. | Essential for equity and the social function of the university; verifiable through accessibility standards and inclusive design. | To analyze whether platforms comply with universal accessibility criteria.                                                                                                                       |
| <b>Integration</b>           | Capacity of platforms to articulate different institutional systems (teaching, research, extension, finance, and human resources).                                       | Colossi; Baade (2016); Senhoras (2012)                                                | Systemic integration × administrative fragmentation.                                                   | Ability of systems to exchange information and consolidate institutional data.            | Fundamental to overcoming informational fragmentation; verifiable through documented architectures and workflows.                | To identify whether universities are able to integrate data and reduce process redundancies.                                                                                                     |
| <b>Transparency</b>          | Clear and open provision of academic and administrative information, ensuring social control and public access.                                                          | Santos (2010); Pereira et al. (2017)                                                  | Democratization of information × institutional opacity.                                                | Clear, reliable, and accessible availability of academic and administrative information.  | Related to university accountability; assessable through portals, reports, and access policies.                                  | To verify whether platforms promote accountability and social participation.                                                                                                                     |
| <b>Innovation management</b> | Institutional structures, practices, and policies that guide the incorporation and diffusion of digital technologies, fostering organizational transformation processes. | Kruglianskas & Matias-Pereira (2005); Senhoras (2012); Sartori; Spinosa; Nogas (2017) | Institutional innovation × reproduction of bureaucracy; cultural openness × organizational resistance. | Institutional practices and structures that sustain innovation processes.                 | Crucial for connecting technical dimensions to strategic decisions; verifiable in statutes, plans, and organizational charts.    | Enables analysis of the extent to which universities articulate governance mechanisms and innovation strategies (NITs, councils, policies) to sustain the digitalization of academic management. |
| <b>Support for digital</b>   | Resources that enhance                                                                                                                                                   | Chais et al. (2013);                                                                  | Critical pedagogical                                                                                   | System infrastructure                                                                     | Necessary to assess whether                                                                                                      | To evaluate whether                                                                                                                                                                              |

Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

|                       |                                                                               |                      |                                        |                                                      |                                                                                                            |                                                                                   |
|-----------------------|-------------------------------------------------------------------------------|----------------------|----------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| teaching and learning | innovative methodologies, active learning, and digital pedagogical mediation. | Souza; Santos (2013) | support × mere information repository. | to support digital and hybrid pedagogical practices. | digitalization strengthens pedagogical innovation; operationalizable through analysis of teaching modules. | systems foster pedagogical innovation or merely digitalize traditional practices. |
|-----------------------|-------------------------------------------------------------------------------|----------------------|----------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|

**Source:** Based on Nielsen (1993); W3C (2008); Colossi and Baade (2016); Franco, Afonso, and Bordignon (2012); Gomes et al. (2013); Santos (2010); Pereira et al. (2017); Senhoras (2012); Chais et al. (2013); Souza and Santos (2013); Bernardes and Abreu (2004); Marcovitch (1999); Ribeiro (2017); Sartori, Spinosa, and Nogas (2017); and Toledo (2015).

**Note:** This table organizes the central categories of the research specifically aimed at evaluating digital academic management platforms. These categories will guide the analysis of the systems investigated.

Table 1 synthesizes the six analytical categories that structure the evaluation of digital academic management platforms: usability, accessibility, integration, transparency, innovation management, and support for digital teaching and learning. These dimensions are organized so as to highlight their conceptual definitions, central tensions, methodological justifications, and analytical potential, thereby constituting a solid framework for comparative analysis. The proposed systematization not only organizes the consulted literature but also delineates criteria that guide the critical observation of the platforms used by the state universities of Paraná. On this basis, the following section—dedicated to the diagnosis of the problem situation—applies these categories to the documentary examination of the systems, revealing contradictions, limitations, and potentialities within each institutional experience.

3. DIAGNOSIS OF THE PROBLEM SITUATION

The documentary analysis conducted in this study made it possible to gain an in-depth understanding of how the state universities of Paraná structure and conduct their academic routines within the context of digitalization. The examined materials—manuals, regulations, tutorials, and official communications—go beyond a merely instrumental character, as they express administrative and pedagogical conceptions specific to each institution. In this process, not only advances and potentialities of computerization emerge, such as the standardization of workflows and the expansion of access to real-time information, but also structural contradictions that expose latent tensions in academic management. On the one hand, there is a search for innovation and administrative efficiency; on the other, the persistence of bureaucratic logics that limit usability, accessibility, and pedagogical integration. These ambiguities reveal that digitalization, far from being a neutral or purely technical process, constitutes a field of dispute in which different conceptions of the university confront one another: one oriented toward administrative control and rationalization, and another aimed at democratization, inclusion, and the strengthening of the social function of higher education.

3.1 SiSAV/UEM<sup>2</sup>

The Virtual Academic Secretariat System (SiSAV/UEM) is supported by official manuals (2018), community-produced tutorials (Porto et al., 2024), and historical documents. These materials present heterogeneous formats and target audiences, but they reveal limitations such as the absence of information on integration with Virtual Learning Environments (VLEs) and digital accessibility, as well as low intuitiveness, which requires extensive manuals. Its potentialities include democratization through tutorials available on open platforms and the standardization of academic processes. The diagnosis highlights problems related to usability, integration, and transparency, confirming that the system remains focused on bureaucratic-administrative functions, with limited support and attention to e-learning.

3.2 Lyceum/UNICENTRO<sup>3</sup>

At UNICENTRO, the Lyceum system is documented through manuals, academic portals, and the WikiUNICENTRO platform. The system centralizes administrative routines—such as enrollment, grades, attendance, and document management—into specific modules for students, faculty, and managers. The materials are instructional and technical in nature and do not address issues of accessibility, usability, or pedagogical innovation in depth. As a potentiality, the system offers integration and real-time

<sup>2</sup> The state universities of Paraná employ different digital academic management platforms, each with its own development and implementation trajectory. The State University of Maringá (UEM) adopts SiSAV – *Secretaria Acadêmica Virtual*, implemented in 2018 and developed internally by the institution (version 2.0-20250901 in Grails 6.2.1). The system is responsible for recording grades/marks, attendance, enrollment, and related academic services, and is available at npd.uem.br/sav.

<sup>3</sup> The State University of the Center-West (UNICENTRO) implemented, as of 2022, the Lyceum system, an integrated academic management platform that centralizes enrollment, grades, attendance, and online requests. The system was developed by Techne Engenharia e Sistemas and can be accessed through the institutional portal (portalacademico.unicentro.br).



## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

centralization of information. The documentation contributes to understanding computerization primarily as an administrative strategy and as a means of standardizing internal workflows.

### 3.3 Academus/UNIOESTE<sup>4</sup>

Academus, used at UNIOESTE, has robust documentation since its implementation in 2012, including manuals, FAQs, flowcharts, and training materials. Structured into modules (academic, administrative, and documentary), the system decentralizes tasks previously concentrated in academic secretariats, enabling greater responsibility among faculty members and program coordinators. Nevertheless, it lacks accessibility features and integration with VLEs, in addition to requiring continuous training due to limited usability. Its potentialities include decentralization, process standardization, and transparency. In the diagnostic assessment, it is characterized as a model of administrative computerization with limited pedagogical and inclusive support.

### 3.4 Academic Portal/UEL<sup>5</sup>

At UEL, the digital system is documented through manuals and tutorials, including the Electronic Gradebook and the Academic Activity Program (UEL, 2021). Modular and integrated, the system organizes attendance records, assessments, course syllabi, and academic transcripts, and it interfaces with Moodle and Google Classroom. However, its usability is constrained by bureaucratic procedures—such as mandatory daily entries and automatic system blocks—and by the absence of references to accessibility standards. Its potentialities lie in the centralization of the academic cycle, integration with VLEs, and the generation of reports. The diagnosis reveals a tension between functional robustness and bureaucratization, with an emphasis on administrative control and security.

### 3.5 Academic Portal/UEPG<sup>6</sup>

UEPG consolidates Student Guides (2021–2024), Resolution CA No. 114/2018 (SEI/UEPG), and materials related to the Kairos portal. These documents, normative and informational in nature, indicate administrative modernization and institutional welcoming practices, including translations into Guarani and Kaingang. However, they lack information regarding system integration (SEI, VLEs, Kairos), usability, and accessibility. Potentialities include debureaucratization, cultural inclusion, and student assistance policies (PRAE). The diagnosis points to normative and communicational advances, alongside gaps in evaluation and transparency.

### 3.6 SUAP/UENP<sup>7</sup>

At UENP, SUAP is documented through manuals (2021), the Student Guide (2025), SUAP-EDU tutorials, and institutional webpages. The normative and instructional materials guide routines such as enrollment, class registration, attendance tracking, and the inclusion of instructional materials. However, the documentation is fragmented and lacks centralization, as well as information on digital accessibility and system governance. Potentialities include democratization through updated tutorials and administrative integration. The diagnosis indicates progress in bureaucratic rationalization, but also evident weaknesses in transparency, accessibility, and pedagogical support.

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<sup>4</sup> At the State University of Western Paraná (UNIOESTE), the system in use is ACADEMUS, in operation since 2012 and developed internally by the Information Technology Center (*Núcleo de Tecnologia da Informação – NTI*). The platform allows students and faculty to monitor grades, absences, justifications, requests, academic records, and administrative processes, and is accessed via [midas.unioeste.br](https://midas.unioeste.br).

<sup>5</sup> The State University of Londrina (UEL) uses the *Portal do Docente*, which concentrates academic services such as grades, attendance, enrollment, academic records, and certificates. Although the system is active and available at [sistemas.uel.br/portaldodocente](https://sistemas.uel.br/portaldodocente), information regarding its year of implementation was not identified. Its development is attributed to the institution's Information Technology Advisory Office.

<sup>6</sup> In the case of the State University of Ponta Grossa (UEPG), the current system is *Acadêmico Online/Professor Online (Kairos)*, which provides access to grade reports, attendance records, justifications, online enrollment, academic histories, and official documents. The platform was developed by the institution's Information Technology Center (NTI) in partnership with the Communication Coordination Office (CCOM), although the year of implementation was not identified. Access is available at [kairos.apps.uepg.br](https://kairos.apps.uepg.br).

<sup>7</sup> The State University of Northern Paraná (UENP) adopted SUAP – *Sistema Unificado de Administração Pública*, initially implemented in 2018 through gradual stages and reaching full coverage of undergraduate students in 2020. Originally developed at the Federal Institute of Rio Grande do Norte (IFRN), the system was adapted by UENP's IT team and operates as open-source software. It integrates academic functions such as grades, attendance, reports, certificates, and digital pedagogical activities, and is accessed via [suap.uenp.edu.br](https://suap.uenp.edu.br).

## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

### 3.7 SIGES/UNESPAR<sup>8</sup>

Finally, SIGES, used by UNESPAR, is documented through manuals (2017–2024), student guides (2023), official communications, and institutional news. The materials are instructional and normative, regulating tasks such as grade entry, attendance records, and enrollment. Among its limitations are the lack of information regarding technical architecture, system integration, and digital accessibility. Its potentialities include process standardization, the incorporation of inclusion policies (such as gender identity recognition in 2024 and tutorials in Brazilian Sign Language), and informational democratization. It can therefore be observed that SIGES functions primarily as a normative and administrative instrument, with advances in diversity policies but restricted in terms of (i) pedagogical innovation and (ii) technological interoperability.

## 4 ANALYSIS OF THE SITUATION

The comparative analysis of the digital academic systems of the state universities of Paraná, based on the categories of usability, accessibility, integration, transparency, support for e-learning, and innovation management, reveals both advances and limitations in each platform. More than merely technical tools, these systems reflect underlying conceptions of the university and of public management.

### 4.1 SiSAV/UEM

SiSAV/UEM exhibits low usability, requiring extensive manuals and video tutorials to compensate for functional gaps (Porto et al., 2024; UEM, 2018). Regarding accessibility, the availability of videos broadens access; however, no adaptations aligned with WCAG standards or full compatibility with screen readers were identified. In terms of integration, fragmented workflows persist, including the use of Word attachments, external fee payments, and the absence of connections with virtual learning environments (VLEs). Concerning transparency, the system provides access to grades and academic records, although these are not considered official documents and depend on the Academic Affairs Office (DAA) for corrections. Support for e-learning is nonexistent, as the system is strictly administrative. In innovation management, SiSAV centralizes and digitalizes processes but remains limited to a bureaucratic perspective.

### 4.2 Lyceum/UNICENTRO

Lyceum/UNICENTRO presents segmented usability through specific portals and still requires technical guides. Accessibility remains limited, with no universal design features identified. In terms of integration, the system centralizes academic, administrative, and financial routines, strengthening institutional governance, although it remains vulnerable to centralized failures. Regarding transparency, it enables individual monitoring of academic data but does not provide aggregated institutional indicators. Support for e-learning is absent, as pedagogical functions depend on external platforms such as Moodle and Google Classroom. In innovation management, Lyceum modernizes administrative processes but has limited pedagogical impact.

### 4.3 Academus/UNIOESTE

Academus/UNIOESTE is the most extensively documented system, offering manuals, flowcharts, and FAQs (UNIOESTE, 2012/2025). In terms of usability, it decentralizes functions but requires mandatory training. Accessibility is limited, with no references to screen readers or visual contrast standards. Regarding integration, the system connects with the Human Resources Management System (SGRH) and internal modules but not with VLEs. Transparency is strengthened through decentralization and reporting tools, although it depends on timely updates by faculty members. Support for e-learning is indirect and restricted to administrative records. In innovation management, Academus represented a significant administrative milestone in 2012 but continues to prioritize bureaucratic functions with limited pedagogical impact.

### 4.4 Academic Portal/UEL

At UEL, the Electronic Gradebook (*Pauta Eletrônica*) and the Academic Activity Program (UEL, 2021) ensure broad usability, although characterized by complexity and bureaucratic rigidity, including automated restrictions. Accessibility remains fragile, with no references to WCAG standards. In terms of integration, the system connects with academic records and VLEs (Moodle and Google Classroom), albeit with administrative constraints. Transparency is ensured through the availability of reports and academic programs, although access is restricted to authenticated users. Regarding e-learning support, integration with VLEs is a positive aspect but largely depends on individual faculty initiative. Innovation management reflects centralized governance, prioritizing standardization over institutional autonomy.

### 4.5 Academic Portal/UEPG

At UEPG, the Student Guides (2021–2024) and Resolution CA No. 114/2018 indicate advances in usability, although these are constrained by static materials and the absence of user experience evaluation. Normative integration with the Electronic Information

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<sup>8</sup> The State University of Paraná (UNESPAR) has used, since 2018, the SIGES – *Sistema de Gestão do Ensino Superior*, developed by CELEPAR, the information technology company of the Government of Paraná. The system centralizes academic and administrative information and is available at [siges.pr.gov.br](http://siges.pr.gov.br).

## **Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities**

System (SEI) foresees unification of processes, but practical evidence remains limited. In terms of transparency, there are channels for institutional dialogue and public consultation of administrative processes, but academic and financial data remain unavailable. Support for e-learning emerged as an emergency response during the COVID-19 pandemic, through the provision of laptops and data packages, but was not consolidated institutionally. Innovation management is evident in the creation of the Office of Student Affairs (PRAE) and the adoption of SEI, yet lacks impact assessment metrics. Regarding accessibility, the translation of guides into Guarani and Kaingang represents a cultural advance, although digital accessibility measures are absent.

### **4.6 SUAP/UENP**

SUAP/UENP organizes detailed modules for students and faculty (Academic Manual, 2021), but its usability is not intuitive, requiring extensive tutorials. Accessibility is virtually absent, with no compliance with WCAG or eMAG standards. Regarding integration, the system centralizes administrative processes but does not connect with VLEs. Transparency is limited by the absence of data on governance, timelines, and performance indicators. Support for e-learning is residual, allowing the attachment of materials without interactive tools. Innovation management reflects administrative modernization rather than pedagogical transformation.

### **4.7 SIGES/UNESPAR**

SIGES/UNESPAR presents organized usability, albeit with redundancies, requiring parallel records in printed gradebooks (UNESPAR, 2017–2024). In terms of accessibility, the system advances through the provision of tutorials in Brazilian Sign Language (Libras) and the inclusion of gender identity options (2024), although clear compliance with WCAG standards is not evident. Integration is centralized at the state level but remains fragmented and lacks interoperability with VLEs. Regarding transparency, the manuals provide detailed explanations of academic regulations but do not clarify technical development processes. Support for e-learning is indirect, relying on institutional email and the “Minha Biblioteca” platform. Innovation management is expressed through social and cultural measures related to diversity and inclusion; however, these coexist with analog and bureaucratic practices.

## **5 RECOMMENDATIONS FOR DIGITAL ACADEMIC MANAGEMENT**

The analysis demonstrates that, although the state universities of Paraná have made progress in digitalization, significant limitations persist in terms of usability, accessibility, integration, transparency, support for e-learning, and innovation management. The recommendations presented below aim not only to correct technical shortcomings but also to propose strategic guidelines for consolidating more integrated, inclusive, and user-centered digital ecosystems.

### **5.1 Usability**

It is essential to simplify workflows, eliminate redundancies—such as the coexistence of digital and printed records—standardize interfaces, and invest in continuous training processes for faculty, students, and technical staff (UEM, 2018). Usability should not be treated as a punctual design attribute, but rather as an ongoing process of institutional improvement, supported by specialized support units, interactive materials, and consistent policies for training and follow-up.

### **5.2 Accessibility**

The initiatives identified remain largely isolated—such as the provision of tutorials in Brazilian Sign Language (Libras) and the inclusion of gender identity fields (UNESPAR, 2024)—and fall short of full compliance with international accessibility standards. To advance in this area, the full adoption of WCAG guidelines is recommended, along with periodic accessibility audits and the expansion of technological resources, including screen readers, adjustable contrast, keyboard shortcuts, and mobile device compatibility. Accessibility should be understood not as a complementary adjustment, but as a structural dimension of digital academic management, indispensable for ensuring equity, inclusion, and the social function of public universities.

### **5.3 Integration**

System fragmentation compromises efficiency. It is therefore crucial to develop interoperability among academic platforms, virtual learning environments (VLEs) such as Moodle and Google Classroom, digital libraries, and state-level systems. Such integration enables unified reporting, supports evidence-based decision-making, and helps overcome the so-called “spaghetti digitalization,” in which informatization reproduces bureaucratic fragmentation rather than promoting coherent academic governance.

### **5.4 Transparency**

Fragmentation among systems remains one of the main obstacles to efficient academic management, generating overlapping processes and dispersed information. It is thus imperative to invest in interoperability among institutional platforms—including academic systems, VLEs, digital libraries, and state databases—in order to ensure integrated and consistent information flows. This integration not only enables unified reports and enhances data reliability, but also strengthens evidence-based decision-making and contributes to overcoming “spaghetti digitalization,” in which digitalization mirrors bureaucratic fragmentation instead of fostering strategic and cohesive academic governance.



# Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

## 5.5 Support for E-Learning

Currently, the systems focus almost exclusively on administrative functions, limiting their scope to bureaucratic routines and relegating direct support for pedagogical processes to a secondary role. To overcome this limitation, it is recommended that specific teaching and learning modules be developed and fully integrated with VLEs, enabling the generation of academic performance reports, alignment with institutional calendars, and the issuance of automatic notifications to faculty and students. Such functional expansion brings digital management closer to hybrid and online teaching practices and enhances pedagogical innovation, transforming systems into strategic instruments for didactic mediation rather than mere administrative repositories.

## 5.6 Innovation Management

Innovation within the state universities remains episodic and fragmented, lacking continuity and institutional embeddedness that would confer a strategic character. To address this situation, the creation of permanent institutional policies for innovation management is proposed, integrated into institutional development plans and supported by performance indicators that allow the monitoring of their impact on academic quality and administrative efficiency. These policies should include the establishment of experimentation laboratories and “living labs” focused on the co-design of technological solutions, rapid prototyping of improvements in academic management systems, and participatory usability evaluation, ensuring that students, faculty, and technical-administrative staff play a central role in process redesign. Strengthening structured partnerships with research centers in data science, information technology, and digital government is also recommended, aligning universities with national and international digital transformation agendas and enhancing data integration and system interoperability. In parallel, the implementation of permanent digital literacy and training programs for the entire academic community is crucial, encompassing technical, pedagogical, and ethical-political competencies, in order to ensure critical appropriation of technologies and prevent digitalization from becoming merely a mechanism of bureaucratic control. Finally, the institutionalization of continuous forums for dialogue and participation is suggested, reinforcing transparency, democratizing decision-making, and bringing management closer to users’ everyday experiences. The combination of these measures enables a transition from reactive innovation to a collaborative, sustainable, and institutionalized culture of innovation, capable of transforming digitalization into an instrument of cultural, pedagogical, and political reconfiguration of the university, aligning efficiency, inclusion, and the social mission of public higher education.

## 5.7 Considerations on the proposals

The recommendations summarized in Table 2 are presented as feasible guidelines for short- and medium-term implementation, since they do not require substantial financial investment, but rather political will, institutional leadership, and effective engagement of the academic community. Their adoption presupposes an understanding of digitalization both as (i) a technical process of informatization and as (ii) a strategic project of institutional reconfiguration, aimed at aligning administrative efficiency, digital inclusion, transparency, and social participation. By treating digital transformation as a structuring axis of university governance, these measures enable academic management to move beyond a traditional bureaucratic function and become an instrument of innovation, democratization, and strengthening of the public mission of the university, enhancing its capacity to respond in an agile, integrated, and socially responsible manner to contemporary demands in higher education.

**Table 2 – Recommendations for improving digital academic management in higher education institutions in Paraná.**

| <i>Analytical Category</i> | <i>Central Focus</i>                          | <i>Practical Recommendations</i>                                                                                                                                                                                                                                                                                                                                        | <i>Expected Impacts</i>                                                                                                                                                                             | <i>Implementation Horizon</i>                              |
|----------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <i>Usability</i>           | Simplification and standardization of systems | <ul style="list-style-type: none"> <li>– Eliminate redundancy between digital and printed records (e.g., electronic and physical gradebooks)</li> <li>– Standardize interfaces and menus</li> <li>– Provide support materials (digital manuals, tutorials, interactive FAQs)</li> <li>– Offer continuous training for faculty, students, and technical staff</li> </ul> | <ul style="list-style-type: none"> <li>– Reduction of rework</li> <li>– Greater process agility</li> <li>– More intuitive user experience and reduced dependence on in-person procedures</li> </ul> | Short term (technical and institutional adjustments)       |
| <i>Accessibility</i>       | Full digital inclusion                        | <ul style="list-style-type: none"> <li>– Adopt international standards (WCAG)</li> <li>– Conduct periodic digital accessibility audits</li> <li>– Provide resources for diverse user profiles (screen readers,</li> </ul>                                                                                                                                               | <ul style="list-style-type: none"> <li>– Inclusion of students and staff with disabilities</li> <li>– Strengthening of the social legitimacy of the public university</li> </ul>                    | Short and medium term (technical and cultural adjustments) |

## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

|                               |                                            |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                               |                                                             |
|-------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <i>Integration</i>            |                                            | adjustable contrast, keyboard shortcuts, mobile compatibility)<br>– Expand accessible tutorials in Libras and captions                                                                                                                                                                                                                                                     | – Reduction of digital exclusion                                                                                                                                              |                                                             |
|                               | Interoperability among systems             | – Develop interoperability mechanisms between academic systems and VLEs (Moodle, Classroom)<br>– Integrate digital libraries, databases, and state systems<br>– Generate unified real-time reports                                                                                                                                                                         | – Reduction of informational fragmentation<br>– Consolidation of reliable indicators<br>– Support for evidence-based decision-making                                          | Medium term (requires technical and political coordination) |
| <i>Transparency</i>           | Public disclosure and accountability       | – Make public information on vendors, system development, updates, and maintenance<br>– Publish annual performance reports (response times, addressed demands, corrected failures, planned improvements)<br>– Ensure clarity in communication about changes and updates                                                                                                    | – Increased institutional trust<br>– Greater engagement of the academic community in decision-making processes<br>– Strengthening of university accountability                | Short and medium term (administrative demands)              |
| <i>Support for e-learning</i> | Pedagogical integration with platforms     | – Create specific modules to monitor activities in VLEs<br>– Issue integrated performance reports (academic + pedagogical)<br>– Integrate with institutional calendars and evaluation systems<br>– Provide automatic notifications                                                                                                                                         | – Closer alignment between administrative management and pedagogical practices<br>– Support for hybrid and online teaching<br>– Strengthening of pedagogical innovation       | Medium term (requires technical development)                |
| <i>Innovation Management</i>  | Institutionalization of digital innovation | – Create an institutional policy for innovation in academic management<br>– Establish experimentation laboratories in educational technologies<br>– Encourage partnerships with research centers in computing and digital government<br>– Offer continuous training in digital competencies<br>– Institutionalize permanent forums for listening to the academic community | – Continuous rather than episodic innovation<br>– Alignment with social and pedagogical transformations<br>– Development of a participatory and collaborative digital culture | Medium and long term (cultural and structural change)       |

**Source:** authors' elaboration (2025), based on the results and analytical categories of the study.

**Note:** The table synthesizes the proposals derived from the six analytical categories addressed in the research (usability, accessibility, integration, transparency, support for e-learning, and innovation management), organizing them according to central focus, practical recommendations, expected impacts, and implementation horizon. The aim is to provide a systematic and didactic overview of the proposed guidelines, highlighting their feasibility in the short, medium, and long term, as well as their transformative potential for digital university governance.

Table 2 systematizes the recommendations developed from the six analytical categories, translating the research findings into practical guidelines, expected impacts, and implementation horizons. More than an operational summary, the table functions as a strategic synthesis that connects the identified diagnoses with possibilities for institutional transformation, emphasizing that the digitalization of academic management requires both technical adjustments and cultural and political changes. From this systematization, it can be concluded that the proposed recommendations are not limited to technical refinements, but constitute strategic guidelines aimed at consolidating more integrated, inclusive, and innovative digital ecosystems. These propositions reinforce the need to align efficiency, transparency, and democratization as structuring axes of university academic management.

## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

This horizon of transformation, supported by the analytical categories discussed, paves the way for the final considerations, in which the research findings are revisited and their implications for strengthening the public university are highlighted.

### 6 FINAL CONSIDERATIONS

This study aimed to comparatively analyze the digital academic management platforms of the state universities of Paraná, based on the categories of usability, accessibility, integration, transparency, support for e-learning, and innovation management. The research, grounded in documentary analysis and critical examination of institutional materials, made it possible to map the functioning of these platforms and to situate them within the broader context of public university management, which is increasingly shaped by demands for efficiency, inclusion, and transparency.

The results indicate significant advances, such as the computerization of academic records, automation of procedures, and expansion of remote access. However, recurrent weaknesses persist, including redundancy between physical and digital records, lack of interoperability among systems, accessibility barriers, and limited pedagogical integration. Although signs of innovation were identified—such as the inclusion of gender identity fields and the provision of tutorials in Brazilian Sign Language (Libras)—these initiatives remain isolated and fragmented, lacking systematic institutionalization. In this sense, digital transformation should be understood not merely as informatization, but as a political, cultural, and pedagogical process of institutional reconfiguration. The guidelines discussed represent a strategic effort to consolidate the public university as a democratic and innovative space. The study contributes by offering critical and forward-looking insights, with potential applicability to other contexts of Brazilian higher education.

The findings also reveal that digitalization has occurred heterogeneously: while some universities have consolidated robust and transparent systems, others face structural fragilities, such as the absence of public documentation, lack of standardization, and technological instability. Particular attention is drawn to the central role of CELEPAR and state-level infrastructure in the SIGES system, which favors standardization but may also constrain institutional autonomy and local innovation.

Another critical aspect concerns the predominantly administrative nature of the systems, with limited pedagogical articulation, even in a context in which hybrid and online teaching have become structural components of higher education. Inclusive initiatives, although relevant, remain disconnected from comprehensive institutional policies. Therefore, digital academic systems must be rethought as strategic instruments for democratization and quality enhancement, rather than merely as mechanisms of control.

The study confirms the initial hypothesis: despite notable progress, technical and institutional barriers persist that affect efficiency, inclusion, and innovation. At the same time, the research objectives were achieved, as the systems were identified, described, and compared; analyzed through the proposed categories; and used as the basis for grounded recommendations.

Among the limitations of the study are: (i) its reliance on documentary sources, without the systematic inclusion of users' perspectives; and (ii) its restriction to the context of the state universities of Paraná. Nevertheless, the research opens avenues for future studies at the national level, incorporating empirical methods such as usability testing and focus groups, as well as more in-depth analyses of accessibility based on WCAG standards. From a practical standpoint, the results provide strategic input for public policies developed by the State Secretariat for Science, Technology and Higher Education (SETI) and by university rectorates, balancing standardization with institutional autonomy. In the international arena, experiences from countries such as Estonia, Portugal, and Canada offer integrated digital ecosystem models that may serve as critical comparative references, provided they are adapted to the Brazilian context.

The analyses also underscore the centrality of the human factor: without digital literacy and continuous training, systems risk becoming mere instruments of bureaucratic control, devoid of pedagogical impact. Training initiatives must integrate technical, pedagogical, and ethical-political competencies. Another major challenge concerns sustainability, as digitalization must be continuous and supported by stable maintenance, updating, and funding, in order to avoid obsolescence and budgetary vulnerability. This requires long-term strategic planning.

The social effects of digitalization are equally significant. By expanding accessibility, simplifying processes, and integrating services, digital systems contribute to reducing regional inequalities and strengthening the university's mission as an agent of social democratization.

In summary, although progress is evident, a long path remains before digital academic management systems can fully function as instruments of inclusion, transparency, and pedagogical innovation. Technology should be treated as a structuring means to strengthen quality, democratization, and efficiency in public universities. Thus, this study contributes both to academic debate and to the improvement of institutional policies aimed at a more just, integrated, and socially responsible digital academic management.

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## Academic Management, E-Learning, and Systems Digitalization: Challenges and Potential of Digital Platforms in Paraná State Universities

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