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Original Article

Digital government's impact on academic performance and service quality: Evidence from a peruvian graduate education unit

Impacto del gobierno digital en el rendimiento académico y la calidad de servicio: Evidencia de una unidad de posgrado peruana

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Abstract

The study discusses how the implementation of digital government influences the academic performance and service perceptions of graduate students at a public university in Peru. Data were collected from 167 graduate students using a quantitative, non-experimental, cross-sectional correlational-causal design and validated tools with Cronbach's alpha exceeding 0.95. Spearman correlation analyses found statistically significant positive relationships between digital government and academic performance ($\rho = 0.240$, $p < 0.01$) and between digital government and service quality ($\rho = 0.330$, $p < 0.01$). The strongest came between technology implementation and this latter factor ($\rho = 0.443$, $p < 0.01$). A paradoxical finding was that while 73% of the subjects rated digital government as efficient, 67% found its actual impact to be low, indicating substantial gaps between the availability of infrastructure and perceived educational value. These results suggest that digital government can enhance learners' academic performance and the experiences of subjects, but without a strong focus on users or organizational change, its potential remains limited. In this way, these findings provide targeted directions for educational management and policymaking when we design future digital reform schemes.

Keywords: *digital government, e-government, academic performance, service quality, higher education evaluation, educational technology assessment.*

Resumen

El estudio analiza cómo la implementación del gobierno digital influye en el rendimiento académico y las percepciones de servicio de los estudiantes de posgrado en una universidad pública del Perú. Los datos se recolectaron de 167 estudiantes de posgrado mediante un diseño cuantitativo, no experimental, transversal y correlacional-causal, utilizando herramientas validadas con un alfa de Cronbach superior a 0,95. Los análisis de correlación de Spearman hallaron relaciones positivas estadísticamente significativas entre el gobierno digital y el rendimiento académico (rho = 0,240, p < 0,01) y entre el gobierno digital y la calidad de servicio (rho = 0,330, p < 0,01). La correlación más fuerte se presentó entre la implementación tecnológica y este último factor (rho = 0,443, p < 0,01). Un hallazgo paradójico fue que, si bien el 73% de los sujetos calificó el gobierno digital como eficiente, el 67% consideró que su impacto real es bajo, lo que indica brechas sustanciales entre la disponibilidad de infraestructura y el valor educativo percibido. Estos resultados sugieren que el gobierno digital puede mejorar el rendimiento académico y las experiencias de los estudiantes; sin embargo, sin un enfoque sólido en los usuarios o el cambio organizacional, su potencial sigue siendo limitado. De esta manera, estos hallazgos proporcionan orientaciones específicas para la gestión educativa y la formulación de políticas al diseñar futuros esquemas de reforma digital.

Palabras clave: gobierno digital, gobierno electrónico, rendimiento académico, calidad de servicio, evaluación de la educación superior, valoración de la tecnología educativa.

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Introduction

In the current digital era, the transformation of public institutions, including global higher education systems, has become increasingly imperative (United Nations, 2020). Digital Government, as a state modernisation strategy, serves as a pivotal mechanism for public institutions to deliver services. This encompasses the extensive network of universities across the country and constitutes a fundamental component of institutional innovation policies (Innovation Without Borders Project). Digital governance provides an autonomous pathway that addresses contemporary structural issues. Within the university environment, these processes often bypass human intervention; instead, digital services are facilitated through advanced computing and information networks. Empirical research demonstrates that integrating digital tools into education significantly enhances student achievement. For instance, Kandukoori et al. (2024) observed that digital tools increased children's mathematics scores by 24.2%, compared to an 8.3% increase via traditional methods. This underscores the extent to which Information and Communication Technologies (ICT) correlate with educational quality, aligning with UNESCO's Sustainable Development Goal (SDG) 4, specifically targets 4.3 and 4.7, which mandate the expansion of continuous educational accessibility.

Public universities in Latin America are currently undergoing an advanced stage of institutional reform. This transition towards 21st-century higher education renders digitisation an unstoppable force, requiring the identification of common strategic ground (Salazar-Xirinachs et al., 2022). Graduate programs, in particular, have significant implications for training professionals to address the technical and administrative challenges of a highly digitised landscape. However, the impact of these digital innovations on academic performance and service quality warrants further examination. It is crucial that regional pitfalls—such as insufficient internet access in rural areas, obsolete technology, and a lack of digital literacy—are not replicated (García-Estrella & Delgado Bardales, 2025).

This initiative aligns with state modernisation and policy reforms, asserting that public universities must play a central role in this transformation. Challenges in higher education are inextricably linked to university social responsibility, a core tenet of the 2030 Agenda for Sustainable Development (Olivera-Carhuaz & Pulido-Capurro, 2024). This article refers to SDG 4, which seeks to provide equitable and inclusive quality education, ensuring lifelong learning opportunities for all. It specifically emphasises Goal 4.3 (equal access to quality technical, vocational, and higher education) and Goal 4.7 (acquisition of skills for sustainable development).

At the local level, the postgraduate unit under study faces substantial modernisation challenges. Reports from the national audit department revealed that technological equipment exceeding 2.6 million soles—including webcams, projectors, and servers—was unusable or deficient across several faculties. Furthermore, systemic failures prevented students from accessing online platforms, resulting in diminished academic performance and institutional adaptability (CGR, 2024). These deficiencies undermine effectiveness and student engagement, as learners face non-functional platforms while attempting to navigate administrative processes and manage academic records.

This study aims to address these critical issues. By employing a naturalistic observation within an experiment conducted in one of Peru's most prosperous regions, we examine how the official "Digital Government" initiative influences student performance. The specific research questions explore: (a) the effect of digital skills on academic performance; (b) the impact of digital technology implementation on academic success; (c) the perceived impact of digital government on performance; and (d) the subsequent effects on attitudes toward service quality.

The theoretical framework integrates three complementary perspectives. Firstly, Digital-Era Governance (DEG) theory proposes that governments reorganise around citizens, transferring public responsibilities through interoperable, user-centred digital procedures (Yuan et al., 2021). Secondly, the Digital Government Transformation Model suggests that successful digitalisation depends on four

capacities: strategic, organisational, technological, and human (Alenezi, 2021). Thirdly, Digital Discretion Theory addresses the balance between automation and human judgment in public decision-making, advocating for a human-centred technological vision that ensures fairness and transparency (Ranerup & Henriksen, 2022).

Academic performance can be analysed through various lenses. As Bandura (1995) posits, it results from the interaction between personal factors (self-efficacy), environmental factors (teacher and peer support), and behavioural factors (perseverance). Furthermore, Zhen et al. (2020) found that students with high self-efficacy tend to achieve superior grades. Expectancy-value theory also suggests that achievement stems from the belief in one's success and the perceived utility of the task, factors that must be continuously promoted (Guo et al., 2017).

Finally, service quality in education is measured via the SERVQUAL model, comprising five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. From a user perspective, quality in digital environments encompasses usability, accessibility, security, and information provision. The discrepancy between user expectations and actual experience ultimately determines satisfaction and the perception of quality (Ladden et al., 2006).

Materials and methods

Research design

This research employed an applied, quantitative, non-experimental, cross-sectional correlational-causal strategy. The positivistic paradigm was chosen to objectively interpret the influence of digital administration on academic performance and service quality using substantial data. The hypothetico-deductive method provided the logical structure for moving from a broad theoretical framework to the concrete, testable formulation of hypotheses on connections between digital government, student outcomes in terms of grades, and how well service-quality goals are met (Creswell & Poth, 2018).

Participants

In the first semester of 2025, the target group was defined as all graduate students in a graduate unit at a university in Peru (N = 294). Students who were not enrolled in the graduate program, who had other study plans, or who were excluded from the study for official reasons.

were not included. Sample calculations were performed using the formula for a finite population, with 95% confidence, which determined that 167 students were representative, ensuring a maximum margin of error of 5%.

Instruments

To obtain this information, we used a structured questionnaire with three sections measuring: (a) digital government (independent variable), (b) academic performance, and (c) service quality (dependent variables) using a five-point Likert scale. The digital government instrument consisted of three dimensions: digital technology competence and knowledge, digital technology implementation, and its impact on government. Academic performance was measured across five dimensions: academic contributions, enthusiasm for study, organization of teaching materials, grade point average, and study activities. Service quality was measured using five dimensions from SERVQUAL: tangibility, reliability, responsiveness, assurance, and empathy toward others. All instruments also had Cronbach's alpha reliability coefficients greater than 0.95.

Procedure

We obtained prior authorization from the university's research office. The questionnaire was distributed via Google Forms. It was distributed evenly among the 167 students. On March 1, 2025, this survey was published electronically. Participation was voluntary. In addition, reminders were

included in all sections of the form that participants could leave the process at any time or delete their responses without penalty. Respondents completed the forms and submitted them by mail. The latest version of IBM SPSS was used for processing and analysis. All codes are provided for use when accessing the database. The data are stored on a 120 TB hard drive with two copies maintained simultaneously, ensuring against loss of information. The questionnaires were administered anonymously, and responses were recorded with the prior authorization of the study subjects for subsequent publication.

Data analysis

Statistical processing was done using IBM SPSS Statistics (Version 25). Descriptive statistics were employed to understand how perceptions across questions indicate the general level. The Kolmogorov–Smirnov test with the Lilliefors correction was used to assess whether the data follow a normal distribution. Given that all variables showed non-normal distributions ($p = 0.05$), we employed Spearman's rank correlation coefficient for inferential analysis. Every test was conducted at a 0.05 significance level.

Ethical considerations

The research strictly adhered to ethical principles for research involving human subjects. Among the measures adopted was informed consent, which was also anonymous. The questionnaires were coded to facilitate reading. The names of the individuals were also transformed into groups, letters, and codes to ensure confidentiality. Non-maleficence was achieved by having experts review the questions. They removed any elements that could be stressful for participants and limited the survey to 20 minutes. The results must remain in purely aggregated form, as specified by the university's ethical research standards and international guidelines on ethics for new technologies (Kahraman, 2024).

Results

Table 1 illustrates the descriptive statistics for Digital Government and its underlying dimensions. The global variable yielded a mean score of 2.69 (SD = 0.535), placing the overall perception within the upper tier of the "Regular" category and approaching "Efficient" levels. Proportional analysis indicates that a substantial majority of participants (73.1%) perceived digital government initiatives as efficient.

However, a dimension-specific examination reveals a critical structural divergence. While Digital Competencies (D1) and Technology Implementation (D2) exhibited robust performance—with efficiency ratings of 68.9% and 68.3%, respectively—the Impact of Digital Government (D3) presented a markedly different trend. This dimension recorded a mean of only 1.33 (SD = 0.471), with 67.1% of respondents categorising it as "Deficient." Most notably, 0.0% of the sample perceived the impact as efficient. These findings suggest that despite the presence of adequate digital skills and technological infrastructure, these resources have failed to translate into tangible institutional outcomes or perceived benefits for the academic community.

Table 1. *Descriptive statistics for digital government variables and dimensions*

Variable/Dimension	M	SD	Deficient (%)	Regular (%)	Efficient (%)
Digital Government (Global)	2.69	0.535	3.6	23.4	73.1
D1: Digital competencies	2.62	0.607	6.6	24.6	68.9
D2: Technology implementation	2.65	0.550	3.6	28.1	68.3
D3: Digital government impact	1.33	0.471	67.1	32.9	0.0

Note. Scale: 1 = Deficient, 2 = Regular, 3 = Efficient. N = 167.

The mean academic performance was 2.78 globally (SD = 0.458), and 79.6% of students were rated as 'achieved'. The highest-ranked dimension was grade point average (M=2.84). However, at the 'achieved' level, contribution to academic activities received the lowest score (62.3%), which indicated that despite students' technical mastery of tools and methods, there could not have been much gain in terms of participating critically because their use or indeed work with others generally lacked intellectual depth.

The global mean service quality score was 2.77 (SD=0.487), with 80.2% rating it "good". For "good" responses, this was 80.2% of the total. The highest-rated dimension was security (M=2.83; 84.4% "good"), reflecting students' confidence in the conventional system for safeguarding their personal and academic records. Tangibles obtained the lowest evaluation (M = 2.57), with 37.7% ranking in the middle grade. This finding weakens our perceptions of physical and technological infrastructure.

Normality testing

According to the Kolmogorov–Smirnov test, none of the scores for the variables or dimensions is normally distributed (all $p<0.001$). Therefore, nonparametric statistical methods should be used for testing inferentially about these statistics.

Correlation analyses

Table 2 presents the Spearman correlation coefficients between the digital government dimensions and the outcome variables. All the correlations are significant ($p > 0.01$), but the effects range in strength from "weak" to "mild".

Table 2. Spearman correlations between digital government dimensions and outcome variables

Digital Government Dimension	Academic Performance (ρ)	Service Quality (ρ)
D1: Digital competencies	0.278**	0.300**
D2: Technology implementation	0.330**	0.443**
D3: Digital government impact	0.261**	0.285**
Global Digital Government	0.240**	0.330**

Note. **$p < 0.01$ (two-tailed). N = 167.

The statistically weak but positive correlation ($\rho = 0.278$, $p < 0.01$) suggests that improving digital competences has, on balance, produced (if undramatic) effects on results. For academic performance, the correlation ($\rho = 0.330$, $p < 0.01$) indicates there is a slightly stronger relationship. This suggests that both the extent to which digital technologies are implemented in institutional or educational processes and their impact on student learning will be greater.

The study's observations showed a surprising correlation between technical innovation and service quality ($p < 0.01$, $\rho = 0.443$), indicating a moderate positive relationship. This aligns with the assumption that fashionably robust technological platforms and well-automated institutional processes greatly enhance the reliability and design dimensions of service quality, as defined by Parasuraman et al. (1988). Perceived impact, for example, displays weaker correlations with both outcomes than its infrastructure ministered counterpart.

Discussion

The empirical findings of this research confirm the primary hypothesis, establishing that digital administration significantly correlates with both academic performance (rho = 0.240, $p < 0.05$) and service quality (rho = 0.330, $p < 0.05$). While these results align with the broader objectives of the United Nations

(2020) regarding state modernisation, the magnitude of these connections remains small to moderate. This indicates a substantial gap between the speed of administrative digitisation and the students' recognition of these changes as pedagogical improvements. Such a phenomenon distinguishes Western institutional integration from the specific context of Peruvian users. This is consistent with Escobar et al. (2023) and Fuster-Guillén et al. (2025), who observed that Latin American public universities often maintain people-centred strategies despite possessing state-of-the-art technological infrastructure.

Regarding the first dimension, Digital Competencies (D1), the results revealed a positive correlation with academic performance (rho = 0.278). This relationship finds a theoretical basis in Bandura's (1995) social cognitive theory, which posits that as individuals master digital tools, their self-efficacy and performance increase. However, this correlation is notably lower than those reported in previous international literature, such as the systematic review by Valverde-Berrocoso et al. (2022). This discrepancy may be attributed to the specific demographic characteristics of the graduate unit. Unlike undergraduate populations, graduate students often possess varied professional backgrounds that influence how they internalise digital skills for academic purposes. Consequently, digital literacy acts as a foundational yet insufficient driver for achieving excellence in a postgraduate environment.

The second dimension, Technological Implementation (D2), demonstrated a stronger association with academic performance (rho = 0.330). This finding corroborates the assertions of Min (2020) and García-Estrella and Delgado-Bardales (2025), suggesting that institutional platforms designed with didactics in mind foster better student outcomes. Nevertheless, the coefficient observed here remains lower than the rho = 0.78 reported by Espejo et al. (2022) for teaching performance. This suggests that while digital platforms effectively support teacher management and material preparation, they may not yet fully engage students in the learning process. If the educational philosophy remains rooted in passive reception, the mere presence of technology will not significantly alter the depth of the learning experience.

The analysis of service quality as a dependent variable further illuminates the role of digital skills. A weak-to-medium correlation (rho = 0.300) was observed, extending the evidence provided by Chan et al. (2021). Students with higher digital proficiency navigate institutional platforms with less friction, resulting in shorter perceived wait times and a superior service experience. Within the SERVQUAL framework, student digital literacy becomes a determinant of the gap between expectations and reality. Notably, the security dimension received a high rating (M = 2.83), suggesting that digital literacy promotes consciousness regarding data protection. As Kahraman (2024) suggests, ethical and secure technological environments are essential for maintaining user trust in public digital systems.

Technological implementation (D2) showed its highest correlation with service quality (rho = 0.443), classified as a moderate association. This supports the classic models advanced by Parasuraman et al. (1988), where reliability and responsiveness are enhanced by robust automated systems. When a university provides a stable digital environment, the speed of technical support and system reliability significantly improve user satisfaction. This result is also congruent with Mines et al. (2025), who identified technological reliability as a critical factor in higher education satisfaction. Robust infrastructure allows for an automated operations environment that helps all administrative agents carry out their tasks more effectively, reducing the margin for human error in graduate processes.

Despite these positive correlations, a profound lack of harmony exists between technological implementation (M = 2.65) and perceived impact (M = 1.33). Although the university has allocated financial resources for equipment and staff training, as noted in the CGR (2024) report, students perceive the actual impact as "deficient." This paradox is consistent with the warnings of Dunleavy et al. (2006), who noted that without process redesign, electronic systems merely replicate old inefficiencies. If students do not perceive that digital tools simplify their academic life, the investment in human and technological resources fails to generate perceived value. This structural discord suggests that the university has focused on instrumental aspects while neglecting the strategic outcomes of digital transformation.

Furthermore, the data suggest that students can achieve high marks even when they perceive digital systems as adding little value to their education. This reflects the findings of Zhen et al. (2020), where academic self-efficacy and emotional engagement often override technical deficiencies. While students may struggle with non-functioning platforms, their perseverance allows them to maintain performance levels. However, this reliance on student resilience is not a sustainable model for institutional growth. As Olivera-Carhuaz and Pulido-Capurro (2024) argue, university social responsibility requires providing an inclusive and equitable digital environment that actively facilitates the student journey rather than presenting additional obstacles.

The moderate nature of the correlations also points toward the need for better integration between digital tools and pedagogical goals. As Alenezi (2021) notes, a successful digital transformation requires a balance between strategic, organisational, technological, and human capacities. In this study, while technological and human capacities (skills) are present, the strategic impact is missing. This suggests that the postgraduate unit may be suffering from "digital discretion" issues, as theorised by Ranerup and Henriksen (2022). Automated systems must be guided by a human-centred vision that ensures fairness and clarity. Without this, the transition to 21st-century education remains incomplete and purely cosmetic.

The importance of expectancy-value theory, as discussed by Guo et al. (2017), cannot be overlooked in this discussion. Students' performance is tied to the utility they assign to their tasks. If digital tools are perceived as mere administrative hurdles rather than useful learning aids, their motivation to engage with digital governance decreases. The current research highlights that while students possess the skills (D1) and use the platforms (D2), they do not value the institutional impact (D3). To bridge this gap, the university must ensure that digital initiatives are not just technologically advanced but also demonstrably useful for the students' professional and academic development.

The disparity between investment and perceived value also calls into question the management of change within the institution. According to Salazar-Xirinachs et al. (2022), the digital path for Latin America requires more than just hardware; it requires a digital culture. The university seems to have achieved progress in formative aspects, but it has neglected the fundamental organisational development needed for sustainable emulation. Modernisation should not be limited to purchasing servers or webcams, as highlighted in the audit reports (CGR, 2024). Instead, it must involve a strategic review of internal processes to ensure that technological innovation leads to a genuine improvement in the quality of education.

Finally, the study confirms that digital governance provides a self-generating pathway to solve institutional problems, yet this pathway is currently obstructed. The findings suggest that the university has prioritised the "what" (technology) and the "who" (skills) while ignoring the "why" (impact). This creates a situation where the institution is technically modern but strategically stagnant. To reach the levels of efficiency seen in other regions, such as South Korea (Min, 2020), the Peruvian graduate system must align its technological implementation with a didactic philosophy that promotes active student participation. Only then will the impact of digital government reflect the financial and human investment made by the state.

In conclusion, while digital competencies and technological implementation are positively associated with performance and service quality, they are insufficient on their own. The university must move beyond instrumental digitisation toward a transformational model that emphasises user-centred impact. This involves not only maintaining infrastructure but also fostering a digital environment where students feel that technology is an enabler of their success rather than a secondary administrative requirement. The moderate correlations found in this study serve as a baseline for future reforms that should focus on the quality of the digital experience and the strategic alignment of educational technology with the 2030 Agenda goals.

Final Considerations

Firstly, the findings of this research demonstrate that while a positive correlation exists between digital government and academic performance, this relationship is still in its early stages and is hindered by a critical gap between infrastructure and perceived impact. Technological implementation has successfully established the operational foundations within the graduate unit; however, it has not yet transformed into a pedagogical catalyst that students recognise as added value to their higher education. This scenario suggests that modernisation has been predominantly administrative, neglecting the deeper integration of digital didactics which is essential for achieving international standards of educational quality.

Secondly, the disparity detected between users' digital competencies and the notably low perceived impact of institutional initiatives reveals a digitisation paradox within the local context. Although students possess the skills to navigate virtual environments and the institution has invested in technical resources, the persistence of inefficient bureaucratic processes and systemic failures neutralises the benefits of technology. To overcome this stagnation, it is imperative that university management transcends the instrumental view of hardware and software, focusing instead on a citizen-oriented process redesign that prioritises user experience over mere technical availability.

Finally, it is concluded that service quality in graduate studies depends on an urgent harmonisation between technological capacity and strategic leadership. The moderate association found in this study indicates that reliability and responsiveness are the pillars that suffer most in the absence of solid organisational planning. Therefore, the path toward academic sustainability and the fulfillment of global development goals requires that public universities do not merely digitise their procedures, but rather cultivate a human and ethical digital culture. Only through a transformation that prioritises real impact on learning over mere technological presence can truly competitive and equitable graduate education be guaranteed.

Acknowledgments

To our universities.

Conflicts of Interest

The authors declare no conflicts of interest.

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