(07-001) - Approach to Effective Change Management for University Digital Transformation Projects

Álvarez Toro-Moreno, Alejandro 1

¹ Universidad de las Américas

This study delves into the identification of effective strategies for change management within the scope of university digital transformation projects. In the era of pervasive digitalization, educational institutions are under increasing social pressure to adapt by digitizing their administrative and educational processes. While the adoption of Learning Management Systems, remote collaboration tools, and advanced technologies such as artificial intelligence and data analytics is crucial, these measures alone do not guarantee the success of digital transformation. Efficient change management, integrating technological, organizational, pedagogical, and cultural dimensions, is essential for achieving an effective and sustainable transition.

This document examines how university institutions can address these challenges through a participative and comprehensive approach, emphasizing the importance of adopting a strategic vision, organizational adaptability, the development of digital skills, and the creation of an environment conducive to innovation and change. Through an exhaustive review of the literature and analysis of practical case studies, a detailed framework is developed to guide university leaders and managers in planning and implementing digital transformation initiatives. This framework supports the modernization and continuous improvement of higher education.

Keywords: Digital Transformation; Change Management; Business Processes; Information Technologies

Enfoque hacia una eficaz Gestión del Cambio para Proyectos de Transformación Digital Universitaria

Este estudio se centra en identificar estrategias efectivas para la gestión del cambio en proyectos de transformación digital universitaria. En la era de la digitalización, las instituciones educativas enfrentan presión social creciente para digitalizar sus procesos administrativos y educativos. Aunque es crucial adoptar sistemas de gestión de aprendizaje, herramientas de colaboración remota y tecnologías avanzadas como inteligencia artificial y análisis de datos, estas no aseguran el éxito de la transformación digital por sí solas. Una gestión del cambio eficiente, que integre aspectos tecnológicos, organizativos, pedagógicos y culturales, es vital para una transición efectiva y sostenible.

Este documento analiza cómo las universidades pueden enfrentar estos retos con un enfoque participativo y completo, resaltando la importancia de una visión estratégica, adaptabilidad organizacional, desarrollo de habilidades digitales y creación de un entorno que fomente la innovación y el cambio. Mediante la revisión de literatura y análisis de casos prácticos, se desarrolla un marco para orientar a líderes y gestores universitarios en la implementación de iniciativas de transformación digital, apoyando la modernización y mejora continua de la educación superior.

Palabras clave: Transformación Digital; Gestión del Cambio; Procesos de Negocios; Tecnologías de Información

Correspondencia: Alejandro Álvarez Toro-Moreno - aalvarezt@udla.cl



©2024 by the authors. Licensee AEIPRO, Spain. This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<u>https://creativecommons.org/licenses/by-nc-nd/4.0/</u>).

1. Introduction

In an era marked by digital omnipresence, it is crucial to highlight that educational institutions like universities are at a critical inflection point. Indeed, the 21st century is characterized by the digital and technological revolution (Popkova & Gulzat, 2020), marked by rapid development and widespread adoption of various advanced technologies, including artificial intelligence (Mannuru et al., 2023). These innovations have transformed the society in various domains such as the economy, but particularly, they have had a profound impact on educational systems.

This paradigm shift, from traditional teaching practices to digital modalities, represented by technologies like the Internet of Things (IoT), as Rodney (2020) maintains, is not merely a trend but illustrates an essential evolution to align with digital security strategies and measures, along with the infrastructure that constitutes Education 4.0, according to González-Pérez & Ramírez-Montoya (2022). Based on this framework, the digital transformation process portends an increase in the complexity (Brunetti et al., 2020) of educational processes, introducing new challenges that require meticulous analysis and strategic planning. Thus, change management emerges not only as a management mechanism but as a strategic necessity to ensure sustainable and effective transition.

The significance of digital transformation in educational institutions cannot be underestimated. Universities, defined as bastions of knowledge according to Li (2023), face social pressure to adapt in a constantly changing environment, where the digitalization of administrative and educational processes can optimize institutional management and redefine the quality of the educational experience (Schmidt & Tang, 2020).

The integration of Learning Management Systems (LMS), the use of digital educational resources, tools for remote collaboration, and the application of emerging technologies like artificial intelligence or data analytics, enrich the teaching and learning process, thereby promoting greater interaction, personalization, and accessibility for all stakeholders. However, the mere adoption of these technologies does not guarantee success in implementing digital transformation, which, according to Ghobakhloo & Tranmanesh (2021), constitutes the initial step. Rather, it is the educational institution's ability to manage the changes associated with these implementations, a focus supported by Attaran (2020), that is crucial for the sustainability and effectiveness of digital transformation.

Change management in digital transformation projects for universities can represent an interesting and multifaceted challenge, addressing various technological, organizational, pedagogical, and cultural dimensions, as mentioned in the research conducted by Benavides et al. (2020). To this end, it is necessary to address and overcome various obstacles visualized in universities. Among these obstacles are lack of digital literacy, inadequate infrastructure, and the attitudes of the collaborators (Gkrimpizi et al., 2023).

This process requires a participatory and holistic approach, where effective communication, dedicated leadership, and the involvement of all key actors in the university realm play fundamental roles. Consequently, change management does not merely represent the implementation of technologies in institutions, but comprises the process of reinventing organizational culture to increase organizational efficacy (Dos Santos & Pedro, 2020), along with educational practices that respond to the shared needs of the digital age, as Granic et al. (2020) indicate.

The purpose of this document is to investigate the strategies with which universities can effectively address change management, focusing on digital transformation. Through a thorough review of the literature and case study analysis, it aims to determine the most efficient methodologies, as well as to identify common challenges and lessons learned during the

digitalization process in the university context. The goal is to provide a detailed framework to guide university leaders and managers in planning and implementing digital transformation initiatives, a primary concern for top management, according to Mugge et al. (2020).

The importance of having a strategic vision is emphasized, complemented by organizational adaptability, the development of digital competencies, and the creation of an environment conducive to change and innovation. Through this study, it seeks to contribute to the knowledge related to change management in the context of digital transformation of university institutions, to offer enriching perspectives for academics, administrative staff, and managers committed to modernizing and continuously improving university education.

2. Change Management and Digital Transformation in Higher Education

In the university context, digital transformation signifies the coherent incorporation of digital technologies across all aspects of the university, including areas such as finance, assessment systems, administrative management, and research. According to Bygstad et al. (2022), universities are pioneers in adopting digital technologies. However, this transformation should not only fulfill the technological tool requirements but also represent a reevaluation of institutional processes, practices, structures, and cultures (Saarikko et al., 2020), aiming to enhance accessibility, efficiency, and quality of higher education.

Additionally, in the context of digital transformation, addressing change management is critical, defined as the strategic and systematic approach that allows an appropriate transition of work teams and collaborators from an original state of culture and processes to a desired state. This is fundamental in the educational institutions' formative process, as suggested by Concepción et al. (2021), to maximize change acceptance and minimize resistance to adopting new practices and technologies, such as Artificial Intelligence, as indicated by Balakrishnan et al. (2021).

This analysis is supported by various theories related to change management, among which Kotter's Change Model stands out. Its application in higher education has been examined in the studies by Wentworth et al. (2020) and Thu & Thu (2021). Laig & Abocejo (2021) state that this model proposes eight essential steps for an organization to achieve successful transformation, including creating a sense of urgency, forming a powerful coalition, and achieving operational successes. This model provides a guide for how university institutions can plan and execute digital transformation projects.

Furthermore, the Diffusion of Innovations Theory, proposed by Rogers (1963) and cited in the study by Urbizagastegui-Alvarado (2019), describes how an innovation is disseminated among members of a social system, using different communication channels. This approach explores how to adapt emerging technologies in institutions, highlighting the role of opinion leaders and the need for effective communication in the adoption process.

It is crucial to note that the application of these theories within the context of university digital transformation helps to understand the role of change management in transitioning to digital learning environments, gaining importance during the COVID-19 pandemic as highlighted by Shirish et al. (2021). Visionary leadership and effective communication are essential to underscore the importance of digital transformation and its benefits, as well as to mobilize the necessary resources to overcome resistance to change. Additionally, incorporating emerging technologies such as Artificial Intelligence and big data analytics can offer an opportunity to personalize the educational experience, showing significant adoption across various education sectors, as suggested by Luan et al. (2020). This requires careful change management that considers both human and technological aspects.

It is critical to acknowledge other challenges directly related to change management, such as institutional resistance, ongoing development for teachers and collaborators, and the

importance of aligning digital initiatives with the goals of the university. Applying these theories to the university context suggests adopting participatory approaches that involve all stakeholders in the change process. This involvement in organizational transformation is considered by Errida & Lotfi (2021) as a key success factor, thereby promoting an innovative and open collaboration culture.

3. Implementation Strategies

In the context of Digital Transformation, it is evident that academic institutions are confronted with the challenge of integrating technologies within educational and administrative systems, which entails not only adopting new tools but also undergoing a profound change in culture and operations. Within this context, it is understandable why Gong & Ribiere (2021) argue that the concept of digital transformation has been subject to exaggeration in the existing literature, complicating the description of activities to formulate effective organizational strategies and structures, as pointed out by Warner & Wäger (2019). Therefore, selecting effective implementation strategies and understanding proven change management models, such as those of Kotter and Rogers mentioned earlier, is essential.

The integration of strategies like creating a shared vision, fostering collaboration among departments, and developing digital skills, highlighted in the research of Warner & Wäger (2019), along with the application of change management models, ensures that academic institutions can achieve a harmonious digital transformation across environmental, economic, and social dimensions, also promoting sustainability, which are interdependent elements according to Zhanbayev et al. (2023).

Regarding implementation strategies, it is important to focus on specific steps, which may vary according to the digital transformation context. In the educational sector, three key steps can be identified, detailed as follows:

- The first step to consider is **creating a shared vision**. For digital transformation in universities, the definition of how these institutions can enrich learning and knowledge of organizational development (Konopik et al., 2022), demonstrates the establishment of a clear direction, generating motivation and alignment among all stakeholders. It is necessary to add that this vision must be communicated effectively to promote broad commitment, a crucial task for strategic leaders, according to Ojogiwa (2021).
- The second step involves **fostering interdepartmental collaboration**, ensuring that change is inclusive and leverages the diversity of perspectives present within the academic institution. Cooperation among multidisciplinary teams is essential to identify various needs, share knowledge, and implement innovative practices for the institutional digitalization process, thus providing significant benefits to successfully tackle current complex problems (Thielsch et al., 2021).
- The third step relates to **developing digital competencies**, which involves training staff and students in the use of emerging technologies. Research conducted by Knyazeva et al. (2022) indicates that the primary barrier is the gap in the use of digital information and data between teachers and students. Consequently, such training is crucial to reduce resistance to change, allowing for greater adoption and effectiveness of digital tools within the educational process and institutional management.

To illustrate the importance of developing digital competencies, Knyazeva et al. (2022) produced a chart showing the number of academics at the National Research University MPEI who have received advanced Information Technology (IT) training.

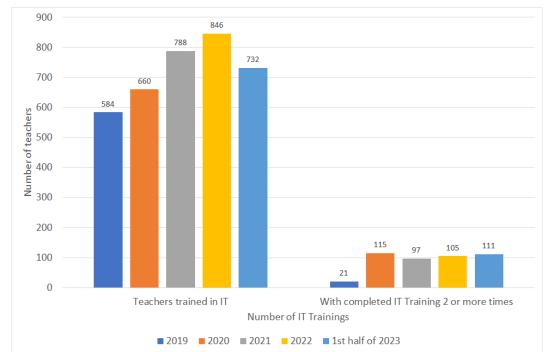


Figure 1: Number of faculty teachers at the National Research University MPEI who have received advanced training in IT between 2019 and 1st half of 2023

Note: research conducted by Knyazeva et al. (2022)

The chart illustrates an increase in the number of faculty members trained in IT. This trend is attributable to the university's initiative where, between 2019 and 2020, faculty underwent training focused on IT usage. Subsequently, between 2021 and 2022, this training was augmented with new educational experiences.

4. Kotter's 8-Step Model

The previously described strategies can be augmented with the 8-step model developed by Dr. John Kotter of Harvard University, which posits that organizational business process change can be categorized into eight steps, extensively delineated in the work of Haas et al. (2019). Some of these steps include:

- **Creating a sense of urgency**, vital for overcoming the complacency often prevalent in organizations. The mindset of "if it isn't broken, don't fix it" can inhibit innovation and change. Seitchik (2023) illustrates this mindset by noting that past business success does not guarantee future success. Thus, it is crucial for the company to identify and leverage opportunities, fostering open communication and seeking support from key stakeholders.
- Forming a powerful coalition, emphasizing the importance of establishing a strong group to lead the change within the organization (Santos et al., 2023). It involves identifying key leaders, creating a coalition, assessing and addressing weaknesses, and incorporating members from various departments and levels of the organization.
- **Creating a vision to support the change**, which is essential for articulating a clear and motivating direction to guide the change initiative, as maintained by Bellantuono et al. (2021). This entails various actions such as crafting a mission statement, developing a clear strategy, effectively communicating the vision, and identifying core values that lay the foundation for the change vision.
- **Communicating the vision**, ensuring that the change vision is effectively understood, accepted, and adopted by the organization. This involves not only disseminating messages

but also implementing actions such as compelling and persuasive communication and integrating the vision into all activities and processes.

5. Rogers' Diffusion of Innovations Theory

According to Çalışkan & Şahin (2020), diffusion, a concept coined by sociologist Everett Rogers, refers to the process through which an innovation can be communicated through various channels over time within a specific social system. In this context, Rogers conceptualizes diffusion as a type of communication where participants exchange information to reach mutual understanding (García-Avilés, 2020), making this theory a process that reduces uncertainty in the organization.

The theory of diffusion identifies five attributes of innovations that affect their adoption, including relative advantage, compatibility, and complexity. Additionally, it recognizes four key components in the diffusion process: the innovation itself, the communication channels, the time required for adoption, and the social system to spread the innovation.

Finally, this theory categorizes adopters into five groups based on their predisposition to adopt innovations, such as innovators, early adopters, early majority, late majority, and laggards.

6. Case Studies on Digital Transformation

In the context of the topics previously described, it is critical to highlight case study examples conducted in the university environment regarding digital transformation. The following presents two case studies that are addressed in various specialized journals to analyze how these instances align with the aspects previously reviewed.

6.1 Digital Transformation at Warsaw University of Technology

The case of Warsaw University of Technology (WUT), analyzed by Grosseck et al. (2020), highlights the adoption of specific digital strategies focused on improving education and administration using advanced technologies. While WUT has achieved positive impacts such as increased flexibility and accessibility in learning, enhanced collaboration and communication between students and teachers via digital platforms, and enrichment of the educational process with online tools, the authors also point out certain challenges that institutions must face. For instance, within the case, Grosseck et al. (2020) include a chart reflecting the students' interest in better utilizing digital technologies for learning, indicating a desire for access to digital books and augmented reality.

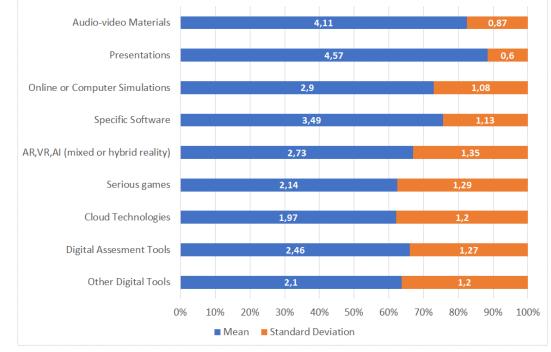


Figure 2: Which of the following digital tools and applications are used for teaching activities?

Note: research conducted by Grosseck et al. (2020)

Using standard deviation, the authors argue that students have lost interest in PowerPoint presentations or audio and video materials. Instead, the use of virtual reality, cloud technologies, among others, is suggested. For this reason, the authors highlight and underline the following challenges:

- Resistance to change by some university teachers and students: facing this challenge, developing a shared vision can overcome such resistance, align the involved actors, and motivate them towards digital transformation. It is crucial to communicate this vision to promote widespread commitment.
- The existing gap in digital skills within the university community: to overcome this gap, it would be beneficial to promote interdepartmental collaboration, which would facilitate the identification and exchange of knowledge for the development of the required digital competencies, thereby leveraging the diversity within the university to address highly complex problems and thus narrow the digital divide.
- The need to invest in technology infrastructure: in response to this challenge, the development of digital competencies through the training of staff and students facilitates the adaptation process to emerging technologies. This requires investments in infrastructure to support such training and, thereby, optimize the use of digital tools.

6.2 Digital Transformation at Universitat Oberta de Catalunya

The research conducted by Romero et al. (2022) examines the digital transformation at the Universitat Oberta de Catalunya (UOC). In this study, the authors highlight how the COVID-19 pandemic has forced an acceleration in the adoption of distance learning within higher education, utilizing online or hybrid learning systems, which entails strategic changes in university processes. Furthermore, the document emphasizes the motivations for adopting these learning systems, noting that flexibility with commitments and geographic flexibility are motivating factors for online learning, as shown in the following chart:

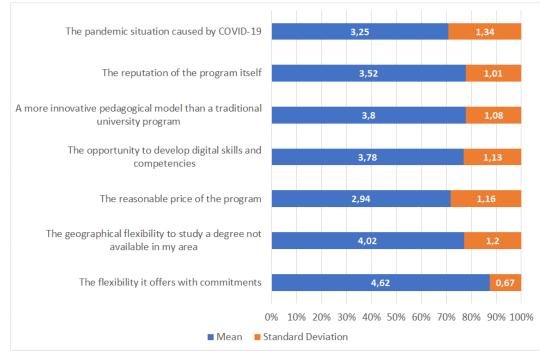


Figure 3: Motivation for Studying Online

Note: research conducted by Romero et al. (2022)

Three significant aspects in this case are relevant and linked to the topics of implementation strategies, Kotter's model, and Rogers' Diffusion of Innovations Theory, as indicated below:

- The importance of establishing a precise vision for digital transformation is emphasized, particularly how the UOC adopts and communicates its mission to facilitate training using digital technologies, which relates to the **creation of a shared vision**. This approach allows for the synchronization and motivation of the involved parties towards common goals, resonating directly with the first step proposed by Kotter.
- The adoption of digital technologies and the transition to online or hybrid educational models require interdepartmental collaboration, as well as considering teams from various disciplines, which is associated with promoting cross-disciplinary collaboration. In this regard, internal collaboration can be emphasized as a strategy for knowledge sharing and considering practices for innovation, addressing the organization's challenges.
- The case also indicates the importance of training staff and students in emerging technologies, highlighted as a crucial approach to overcome the digital barrier and resistance to change, aligned with the **development of digital competencies**. This underlines the importance of preparing the university community for the effective use of available digital tools.

In both cases, an alignment of Kotter's Steps and Rogers' Diffusion of Innovations Theory is evident. For WUT, the creation of a sense of urgency is reflected in the need to improve digital interaction and learning management, driving the adoption of new educational technologies. This aligns with Rogers' relative advantage and compatibility (Ayanwale & Ndlovu, 2024), where adopting advanced technologies offers clear benefits consistent with the needs of students and faculty. In the UOC case, forming a powerful coalition and creating a vision are manifested in the establishment of interdepartmental teams and the adoption of a digital education mission, aligning with Rogers' diffusion process, promoting collaboration and mutual understanding for efficient online learning adoption, consistent with the assertions made by Demuyakor (2020). Both instances illustrate how implementing significant changes in digital

education can be effective when following Kotter's strategic steps and supported by Rogers' principles of adoption and diffusion of innovations.

These examples demonstrate that university digital transformation is not limited to the adoption of emerging technologies but requires a profound cultural and organizational change. It emphasizes that the effectiveness of the models and strategies is manifested in the ability of university institutions to meet current challenges and leverage the opportunities offered by digitalization, thereby ensuring sustainability and strategic positioning in the higher education sector for the digital era.

7. Tools and Technologies for Digital Transformation in Universities

The topics discussed earlier underscore the fundamental role of social and human impact for the success of any digital transformation project, highlighting the need to involve people and processes. However, it is also necessary to consider the specific technologies and tools that facilitate this cultural change. Technologies not only enable the transition to digital environments characterized by greater efficiency, one of the goals of investment in information technologies according to Kraus et al. (2021), but also open new possibilities for learning and interaction within the university environment, thereby enhancing student learning and experience, as noted by Dakhi et al. (2020).

By selecting the appropriate tools, higher education institutions can ensure that digital transformation projects are not only technologically feasible but also support and enhance the educational and social objectives of the universities, leading, as Furjan et al. (2020) indicate, to initiatives increasingly aimed at transforming the organization and the academic and administrative performance of the institutions.

7.1 Digital Transformation in German Universities

The research conducted by Zawacki-Richter (2021) explores the impact of the COVID-19 pandemic on teaching and learning in German universities. The study emphasizes the use of video conferencing platforms such as BigBlueButton or Zoom, as well as the recording of lectures and presentations for later access on educational platforms. Additionally, there is noted an increase in the acceptance of instant messaging services and the importance of adapting content and communication for mobile devices, considering the high availability of digital devices among students. The following table included in this study illustrates this situation:

	•	•		
Device	2012	2015	2018	Change from 2012 to 2018
Smartphone	56%	91%	98%	42%
Tablet	9%	39%	45%	36%
E-Reader	7%	19%	21%	14%
Laptop	86%	92%	95%	9%
Scanner	64%	65%	58%	-6%
Desktop	51%	42%	39%	-12%
Printer	79%	76%	65%	-14%

Table 1: Ownership of	Digital Devices in 2012	2. 2015 and 2018
	Bigital Bothood in 2011	., 2010 ana 2010

Note: research of Zawacki-Richter (2021)

7.2 Digital Transformation in Open Innovation Processes

A second approach that complements the analysis of digital transformation in German universities is presented in the academic study by Urbinati et al. (2020), which aims to identify the organizational actions and processes that companies adopt to integrate digital technologies into open innovation processes.

This report extends the previous case study, indicating that for a total of nine companies studied, the use of various digital technologies for open innovation is crucial. These technologies include Big Data, the Internet of Things (IoT), idea and knowledge management systems, and cloud computing.

The research concludes that these technologies facilitate the management of innovation processes through agile access to and sharing of knowledge, thereby improving operational efficiency, and supporting real-time communication and data analysis.

To achieve effective implementation of digital transformation projects in universities, appropriate tools and technologies must be selected and used. As highlighted in the two cases examined, current technologies such as video conferencing, Big Data, the Internet of Things, and online learning platforms are vital. They not only facilitate the transition to digital environments like distance learning (Langegård et al., 2021) but also contribute to enriching learning and interaction, promoting flexible learning and open innovation (Adamides & Karacapilidis, 2020).

From this, it can be deduced that the accessibility, adaptability, and effective integration of technologies are fundamental elements for achieving academic and social objectives, playing a significant role in the development and success of university digital transformation projects.

8. Potential Indicators for Measuring Change Management Effectiveness

Within the context of university digital transformation projects, it is crucial to have success indicators that effectively measure change management. Therefore, implementing Key Performance Indicators (KPIs) in such projects is essential to evaluate their success and long-term viability. KPIs provide objective metrics to ensure that efforts are aligned with the set objectives (Mtau & Rahul, 2024). Moreover, according to Aithal & Aithal (2023), these indicators support the facilitation of decision-making grounded in data, thereby improving strategic planning, and boosting operational effectiveness.

The use of KPIs allows for the alignment of digital projects with the university's strategy, optimizing change management and technology adoption. Furthermore, KPIs are vital for monitoring the effectiveness of digital interventions, ensuring that these initiatives, in addition to being technologically feasible, contribute to supporting and enhancing the educational and social purposes of the universities.

Below are KPI indicators considered by the author as relevant for measuring the impact of digitalization projects in universities, covering aspects such as technological adoption, operational efficiency, user satisfaction, engagement and collaboration, and advancement in developing digital competencies:

- 1. **Technological adoption level**: this indicator aims to quantify the adoption rate of emerging tools and digital platforms by the institution's students and faculty.
- 2. **User satisfaction**: through regular evaluations and surveys, this measures the satisfaction of university staff and students with emerging technologies and teaching methodologies.
- 3. **Degree of technological integration in processes**: this indicator assesses how digital technologies are incorporated into the university's administrative and academic processes, reflecting the level of adoption and adaptation to digital transformation.

- 4. **Operational efficiency**: this measures the time and resources saved in administrative and academic processes due to technology implementation.
- 5. **Collaboration and participation**: this examines the increase in the university community's participation through collaborative learning environments.
- 6. **Development of digital competencies**: this indicator measures the number of participants in programs designed for digitalization and improvement of digital competencies.

The application of these indicators will allow for evaluating the technological success of digital transformation projects and the level of impact within the university community regarding teaching and learning processes. This includes measuring adoption and satisfaction with the technologies, as well as progress in efficiency and academic performance. The formulas for each of the indicators are presented in the following table.

KPI	Formula	
Technological adoption level	Number of active users / Total number of users	
User satisfaction	Average of scores in satisfaction surveys	
Technological integration degree	Number of digitized administrative and academic processes / Total number of administrative and academic processes	
Operational efficiency	Reduction in time of costs in processes / Time or costs before implementation	
Participation and collaboration	Number of interactions or collaborations / Total number of users	
Development of digital competencies	Number of participants in digital training / Total number of users	

Table 2: KPI Structure

Note: own elaboration

The selection of these KPIs is based on the need to provide a clear and quantifiable view of the progress and effectiveness of digital transformation projects in university institutions. These indicators allow for the reflection of various aspects that are critical to digital change, enabling the systematic evaluation of the success of digital initiatives, identification of areas for improvement, and strategic adjustments for optimizing outcomes.

However, it is important to note that it is not feasible to establish a universal ideal level of measurement in numerical terms for these KPIs, as each university operates within a unique environment, including unique resources, organizational cultures, and strategic objectives. In simple terms, what works for one institution may not necessarily apply to another, akin to what Sepúlveda-Escobar & Morrison (2020) suggest, who argue that the results presented in a study in one sector of a nation cannot necessarily be generalized to other institutions in the country.

In conclusion, although KPIs provide a guideline for assessing digital transformation, the goals must be customized to fit the particularities and ambitions of each university, ensuring that the KPIs are relevant and aligned with the specific educational and social mission and objectives.

9. Conclusions and Future Challenges of Higher Education in Digitalization

The digital transformation of universities has become a crucial aspect of their adaptation to current educational and administrative demands. This document has underscored the significance of strategic implementation, enriched by technological innovation and people's commitment. Within this context, to ensure the success and continuity of these initiatives, it is

vital to have key performance indicators (KPIs) that cover areas ranging from technology adoption to the development of digital competencies within the university.

Looking towards the future, digital higher education must continuously evolve, which includes incorporating emerging technologies like hybrid education or personalized learning, using tools such as artificial intelligence and blockchain for the certification of academic achievements, especially among students as indicated by Jaiswal (2020). These innovations have the potential to significantly enhance efficiency and accessibility in the educational sector, allowing for a redefined learning experience for students, academics, and staff of the institution.

It must be acknowledged that the world is at a turning point where digital transformation is not an option but a necessity for universities that want to remain competitive and relevant. This entails evolving into an institution with greater inclusion, founded on the strategic use of technology (García-Peñalvo, 2021). In this regard, adaptation to change, backed by a forwardlooking vision in an environment characterized by constant evolution (Am et al., 2020), will mark the difference between institutions that thrive and those that fall behind in the global higher education landscape.

10. References

- Adamides, E., & Karacapilidis, N. (2020). Information technology for supporting the development and maintenance of open innovation capabilities. *Journal of Innovation & Knowledge*, *5*(1), 29–38. <u>https://doi.org/10.1016/j.jik.2018.07.001</u>
- Aithal, P. S., & Aithal, S. (2023). Key Performance Indicators (KPI) for Researchers at Different Levels & Strategies to Achieve it. *International Journal of Management, Technology, and Social Sciences*, 8(3), 294–325. <u>https://doi.org/10.47992/IJMTS.2581.6012.0304</u>
- Am, E. N., Affandi, A., Udobong, A., Sarwani, S., & Hernawan, H. (2020). Implementation of Human Resource Management in the Adaptation Period for New Habits. *International Journal of Educational Administration, Management, and Leadership*, 19–26. <u>https://doi.org/10.51629/ijeamal.v1i1.4</u>
- Attaran, M. (2020). Digital technology enablers and their implications for supply chain management. Supply Chain Forum: An International Journal, 21(3), 158–172. https://doi.org/10.1080/16258312.2020.1751568
- Ayanwale, M. A., & Ndlovu, M. (2024). Investigating factors of students' behavioral intentions to adopt chatbot technologies in higher education: Perspective from expanded diffusion theory of innovation. *Computers in Human Behavior Reports*, *14*, 100396. <u>https://doi.org/10.1016/j.chbr.2024.100396</u>
- Balakrishnan, J., Dwivedi, Y. K., Hughes, L., & Boy, F. (2021). Enablers and Inhibitors of Al-Powered Voice Assistants: A Dual-Factor Approach by Integrating the Status Quo Bias and Technology Acceptance Model. *Information Systems Frontiers*, 1–22. <u>https://doi.org/10.1007/s10796-021-10203-y</u>
- Bellantuono, N., Nuzzi, A., Pontrandolfo, P., & Scozzi, B. (2021). Digital Transformation Models for the I4.0 Transition: Lessons from the Change Management Literature. *Sustainability*, *13*(23), 12941. <u>https://doi.org/10.3390/su132312941</u>
- Benavides, L., Tamayo, J., Arango, M., Branch, J., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, *20*(11), 3291. https://doi.org/10.3390/s20113291
- Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: strategies emerging from a multi-stakeholder approach. *The TQM Journal*, *32*(4), 697–724. <u>https://doi.org/10.1108/TQM-12-2019-0309</u>

- Bygstad, B., Øvrelid, E., Ludvigsen, S., & Dæhlen, M. (2022). From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education*, *182*, 104463. https://doi.org/10.1016/j.compedu.2022.104463
- Çalışkan, G., & Şahin, Ö. (2020). Teachers' Communication Channels In The Innovation-Decision Process. TED EĞİTİM VE BİLİM, 45(203). <u>https://doi.org/10.15390/EB.2020.8611</u>
- Concepción, P., Rodríguez, O., & Peñate, J. (2021). The steps of the university formative process in the academic year. *EduSol*, 21(77), 29–44. <u>http://scielo.sld.cu/scielo.php?pid=S1729-</u>80912021000400029&script=sci arttext&tlng=en
- Dakhi, O., Jama, J., Irfan, D., Ambiyar, & Ishak. (2020). Blended Learning: A 21st Century Learning Model at College. *International Journal of Multi Science*, 1(8), 50–65. <u>https://multisciencejournal.com/index.php/ijm/article/view/92</u>
- Demuyakor, J. (2020). Coronavirus (COVID-19) and Online Learning in Higher Institutions of Education: A Survey of the Perceptions of Ghanaian International Students in China. *Online Journal of Communication and Media Technologies*, *10*(3), e202018. <u>https://doi.org/10.29333/ojcmt/8286</u>
- Dos Santos, J. R., & Pedro, L. (2020). *Reinventing Human Resource Management to Increase* Organizational Efficacy (pp. 23–36). <u>https://doi.org/10.1007/978-3-030-19289-1_2</u>
- Errida, A., & Lotfi, B. (2021). The determinants of organizational change management success: Literature review and case study. *International Journal of Engineering Business Management*, 13, 18479790211016273. <u>https://doi.org/10.1177/18479790211016273</u>
- Furjan, M. T., Tomičić-Pupek, K., & Pihir, I. (2020). Understanding Digital Transformation Initiatives: Case Studies Analysis. *Business Systems Research Journal*, 11(1), 125–141. <u>https://doi.org/10.2478/bsrj-2020-0009</u>
- García-Avilés, J. A. (2020). Diffusion of Innovation. In *The International Encyclopedia of Media Psychology*, 1–8. Wiley. <u>https://doi.org/10.1002/9781119011071.iemp0137</u>
- García-Peñalvo, F. J. (2021). Avoiding the Dark Side of Digital Transformation in Teaching. An Institutional Reference Framework for eLearning in Higher Education. *Sustainability*, *13*(4), 2023. <u>https://doi.org/10.3390/su13042023</u>
- Ghobakhloo, M., & Iranmanesh, M. (2021). Digital transformation success under Industry 4.0: a strategic guideline for manufacturing SMEs. *Journal of Manufacturing Technology Management*, 32(8), 1533–1556. <u>https://doi.org/10.1108/JMTM-11-2020-0455</u>
- Gkrimpizi, T., Peristeras, V., & Magnisalis, I. (2023). Classification of Barriers to Digital Transformation in Higher Education Institutions: Systematic Literature Review. *Education Sciences*, 13(7), 746. <u>https://doi.org/10.3390/educsci13070746</u>
- Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, *102*, 102217. <u>https://doi.org/10.1016/j.technovation.2020.102217</u>
- González-Pérez, L. I., & Ramírez-Montoya, M. S. (2022). Components of Education 4.0 in 21st Century Skills Frameworks: Systematic Review. *Sustainability*, *14*(3), 1493. <u>https://doi.org/10.3390/su14031493</u>
- Granic, I., Morita, H., & Scholten, H. (2020). Beyond Screen Time: Identity Development in the Digital Age. *Psychological Inquiry*, 31(3), 195–223. https://doi.org/10.1080/1047840X.2020.1820214

- Grosseck, G., Maliţa, L., & Bunoiu, M. (2020). Higher Education Institutions Towards Digital Transformation—The WUT Case. In *European Higher Education Area: Challenges for a New Decade*, 565–581. Springer International Publishing. <u>https://doi.org/10.1007/978-3-030-56316-5_35</u>
- Haas, M., Munzer, B., Santen, S., Hopson, L., Haas, N., Overbeek, D., Peterson, W., Cranford, J., & Huang, R. (2019). DidacticsRevolution: Applying Kotter's 8-Step Change Management Model to Residency Didactics. Western Journal of Emergency Medicine, 21(1), 65–70. https://doi.org/10.5811/westjem.2019.11.44510
- Jaiswal, P. (2020). Integrating Educational Technologies to Augment Learners' Academic Achievements. *International Journal of Emerging Technologies in Learning (IJET)*, *15*(02), 145. <u>https://doi.org/10.3991/ijet.v15i02.11809</u>
- Knyazeva, N., Mikhailova, I., Usmanova, N., & Shindina, T. (2022). Overcoming Barriers in Developing Digital Skills for Higher Education Teachers: Challenges and Solutions. *Review of Artificial Intelligence in Education*, 3, e024. https://doi.org/10.37497/rev.artif.intell.educ.v3i00.24
- Konopik, J., Jahn, C., Schuster, T., Hoßbach, N., & Pflaum, A. (2022). Mastering the digital transformation through organizational capabilities: A conceptual framework. *Digital Business*, 2(2), 100019. <u>https://doi.org/10.1016/j.digbus.2021.100019</u>
- Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3), 21582440211047576. <u>https://doi.org/10.1177/21582440211047576</u>
- Laig, R. B. D., & Abocejo, F. T. (2021). Change Management Process in a Mining Company: Kotter's 8-Step Change Model. *Journal of Management, Economics, and Industrial Organization, 5*(3), 31–50. <u>https://doi.org/10.31039/jomeino.2021.5.3.3</u>
- Langegård, U., Kiani, K., Nielsen, S. J., & Svensson, P.-A. (2021). Nursing students' experiences of a pedagogical transition from campus learning to distance learning using digital tools. *BMC Nursing*, *20*(1), 23. <u>https://doi.org/10.1186/s12912-021-00542-1</u>
- Li, M. (2023). Adapting Legal Education for the Changing Landscape of Regional Emerging Economies: A Dynamic Framework for Law Majors. *Journal of the Knowledge Economy*, 1–30. <u>https://doi.org/10.1007/s13132-023-01507-2</u>
- Luan, H., Geczy, P., Lai, H., Gobert, J., Yang, S. J. H., Ogata, H., Baltes, J., Guerra, R., Li, P., & Tsai, C.-C. (2020). Challenges and Future Directions of Big Data and Artificial Intelligence in Education. *Frontiers in Psychology*, *11*, 580820. https://doi.org/10.3389/fpsyg.2020.580820
- Mannuru, N. R., Shahriar, S., Teel, Z. A., Wang, T., Lund, B. D., Tijani, S., Pohboon, C. O., Agbaji, D., Alhassan, J., Galley, J., Kousari, R., Ogbadu-Oladapo, L., Saurav, S. K., Srivastava, A., Tummuru, S. P., Uppala, S., & Vaidya, P. (2023). Artificial intelligence in developing countries: The impact of generative artificial intelligence (AI) technologies for development. Information Development, 02666669231200628 https://doi.org/10.1177/02666669231200628
- Mtau, T. T., & Rahul, N. A. (2024). Optimizing Business Performance through KPI Alignment: A Comprehensive Analysis of Key Performance Indicators and Strategic Objectives. *American Journal of Industrial and Business Management*, 14(01), 66–82. <u>https://doi.org/10.4236/ajibm.2024.141003</u>
- Mugge, P., Abbu, H., Michaelis, T. L., Kwiatkowski, A., & Gudergan, G. (2020). Patterns of Digitization. *Research-Technology Management*, 63(2), 27–35. https://doi.org/10.1080/08956308.2020.1707003

- Ojogiwa, O. T. (2021). The Crux of Strategic Leadership for a Transformed Public Sector Management in Nigeria. *International Journal of Business and Management Studies*, *13*(1), 83–96. <u>https://sobiad.org/menuscript/index.php/ijbms/article/view/481</u>
- Popkova, E. G., & Gulzat, K. (2020). *Technological Revolution in the 21st Century: Digital Society vs. Artificial Intelligence*, 339–345. <u>https://doi.org/10.1007/978-3-030-32015-7_38</u>
- Rodney, B. D. (2020). Understanding the paradigm shift in education in the twenty-first century: The role of technology and the Internet of Things. *Worldwide Hospitality and Tourism Themes*, *12*(1), 35–47. <u>https://doi.org/10.1108/WHATT-10-2019-0068</u>
- Romero, M., Romeu, T., Guitert, M., & Baztán, P. (2022). La transformación digital en la educación superior: el caso de la UOC. *RIED-Revista Iberoamericana de Educación a Distancia*, *26*(1), 163–179. <u>https://doi.org/10.5944/ried.26.1.33998</u>
- Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons*, *63*(6), 825–839. <u>https://doi.org/10.1016/j.bushor.2020.07.005</u>
- Santos, E., Queiroz, M., Borini, F. M., Carvalho, D., & Dutra, J. S. (2023). The journey of business transformation: unfreeze, change and refreeze – a multiple case study. *Journal* of Organizational Change Management, 36(1), 47–63. <u>https://doi.org/10.1108/JOCM-03-2022-0063</u>
- Schmidt, J. T., & Tang, M. (2020). Digitalization in Education: Challenges, Trends and Transformative Potential. In *Führen und Managen in der digitalen Transformation : Trends, Best Practices und Herausforderunge*, 287–312. <u>https://doi.org/10.1007/978-3-658-28670-5_16</u>
- Seitchik, M. (2023). Organizational Self-Awareness: A Key to Sustainable Competitive Advantage. *Strategia Analytics*, 1–15. <u>https://www.strategiaanalytics.com/wp-</u> <u>content/uploads/2023/02/Organizational-Self-Awareness-A-Key-to-Sustainable-</u> <u>Competitive-Advantage-Feb-27-2023.pdf</u>
- Sepulveda-Escobar, P., & Morrison, A. (2020). Online teaching placement during the COVID-19 pandemic in Chile: challenges and opportunities. *European Journal of Teacher Education*, 43(4), 587–607. <u>https://doi.org/10.1080/02619768.2020.1820981</u>
- Shirish, A., Chandra, S., & Srivastava, S. C. (2021). Switching to online learning during COVID-19: Theorizing the role of IT mindfulness and techno eustress for facilitating productivity and creativity in student learning. *International Journal of Information Management*, *61*, 102394. <u>https://doi.org/10.1016/j.ijinfomgt.2021.102394</u>
- Thielsch, M. T., Röseler, S., Kirsch, J., Lamers, C., & Hertel, G. (2021). Managing Pandemics—Demands, Resources, and Effective Behaviors Within Crisis Management Teams. *Applied Psychology*, *70*(1), 150–187. <u>https://doi.org/10.1111/apps.12303</u>
- Thu, T., & Thu, H. (2021). Change management in Higher Education by Kotter's Model: A Case Study in Vietnam Private University. *Journal of International Business and Management*, 5(1), 1–12. <u>https://web.archive.org/web/20211230175854id /https://rpajournals.com/wpcontent/uploads/2021/12/JIBM-2021-12-2097.pdf</u>
- Urbinati, A., Chiaroni, D., Chiesa, V., & Frattini, F. (2020). The role of digital technologies in open innovation processes: an exploratory multiple case study analysis. *R&D Management*, *50*(1), 136–160. <u>https://doi.org/10.1111/radm.12313</u>

- Urbizagastegui-Alvarado, R. (2019). El modelo de difusión de innovaciones de Rogers en la bibliometría mexicana. *Palabra Clave (La Plata)*, *9*(1), e071. https://doi.org/10.24215/18539912e071
- Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326–349. <u>https://doi.org/10.1016/j.lrp.2018.12.001</u>
- Wentworth, D. K., Behson, S. J., & Kelley, C. L. (2020). Implementing a new student evaluation of teaching system using the Kotter change model. *Studies in Higher Education*, 45(3), 511–523. <u>https://doi.org/10.1080/03075079.2018.1544234</u>
- Zawacki-Richter, O. (2021). The current state and impact of Covid-19 on digital higher education in Germany. *Human Behavior and Emerging Technologies*, *3*(1), 218–226. <u>https://doi.org/10.1002/hbe2.238</u>
- Zhanbayev, R. A., Irfan, M., Shutaleva, A. V., Maksimov, D. G., Abdykadyrkyzy, R., & Filiz, Ş. (2023). Demoethical Model of Sustainable Development of Society: A Roadmap towards Digital Transformation. *Sustainability*, *15*(16), 12478. <u>https://doi.org/10.3390/su151612478</u>

Communication aligned with the Sustainable Development Goals

