sciendo

Land Forces Academy Review
Vol. XXIX, No. 1(113), 2024

# DIGITAL RENAISSANCE IN EDUCATION: UNVEILING THE TRANSFORMATIVE POTENTIAL OF DIGITIZATION IN EDUCATIONAL INSTITUTIONS

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**ABSTRACT**

*This paper examines the ongoing trend of digitization within educational institutions, analyzing the potential opportunities that lie ahead. As educational landscapes evolve, embracing digitization offers institutions a pathway to unlock a myriad of prospects. This research explores the current state of digitization in educational settings, highlighting the opportunities that arise from the integration of digital technologies. The driving forces behind significant changes in higher education include escalating operating costs, the emergence of micro and nano degrees, the surge in online learning, the influx of digitally-native students, and the overarching wave of digital transformation. Students are increasingly leveraging digital technologies to showcase a diverse array of tools, integrating structured learning environments into the fabric of higher education teaching. This research provides a comprehensive overview of digital transformation in higher education, evaluating the potential of digitalization and forecasting its prospects in the near future. Key concepts such as digital transformation, virtual reality (VR) technology, artificial intelligence (AI), and Technology, Entertainment, Design (TED) courses are examined as practical and indispensable elements shaping the future of education. Through a meticulous analysis, it becomes evident that digitalization marks only the initial phase in a broader process wherein institutions harness new technologies not merely to replicate old tasks but to redefine educational paradigms. Furthermore, the paper emphasizes that digital transformation necessitates the infusion of new management practices capable of harnessing the full potential of information and communication technologies (ICT). The journey towards the digital transformation of educational institutions involves a profound shift in mindset, encompassing innovative approaches to teaching, learning, and administration. As institutions embrace this transformative journey, they position themselves to create enhanced value for students and forge dynamic collaborations with partners in the evolving landscape of higher education.*

**KEYWORDS**: educational digitization, educational institutions, higher education digitalization

JEL Classification: M10, I20, I23

DOI: 10.2478/raft-2024-0003

## 1. Introduction

In line with a prioritized firm strategy, "digital transformation" is defined as *"the massive expansion of business operations, processes, knowledge and skills, and modeling methodologies for the optimal transformation of a technology mixture and its expedited effect on society"*. If higher education institutions are to stay relevant and an essential component of this transformation throughout time, they must adjust.

Higher education institutions must adapt to the digital transformation in order to stay relevant and remain an essential component of this transformation over time. This means that universities and colleges must embrace new technologies, integrate them into their operations and teaching methods, and develop the necessary skills and knowledge to use them effectively.

Digital transformation is a crucial component of many industries, including education. It can help institutions to improve efficiency, reduce costs, enhance student engagement and outcomes, and increase access to education for students from all backgrounds. Higher education institutions must be willing to adapt to these changes to remain competitive and to provide their students with the skills and knowledge they need to succeed in the digital age.

Some ways that higher education institutions can adapt to the digital transformation include investing in new technologies and infrastructure, integrating digital tools and platforms into their teaching methods, and providing their faculty and staff with the training and support they need to use these tools effectively. They can also collaborate with industry partners and other institutions to stay up to date with the latest trends and best practices in digital transformation.

We consider that higher education institutions must be proactive in embracing the digital transformation if they want to remain relevant and continue to provide their students with high-quality education and opportunities for success.

The application of digital transformation concepts to the education sector is an emerging topic that has attracted much attention recently because they allow us to see the complex interrelationships among stakeholders in a digitized teaching and learning environment. It can be challenging to re-evaluate the processes of an entire organization across the value chain, as this requires the proper use of all the skills and potential provided by the wealth of readily available digital technologies. This is a more severe dilemma for companies continuously trying to compete in a global marketplace. Nonetheless, because of the increased rivalry to attract the top researchers and students, institutions are also grappling with it. It is interesting to note that cutting-edge business models are putting pressure on higher education institutions to deal with disruptive situations that seem to change their past trajectory, proactively engage internal and external customers, and encourage employee engagement and interactions with the institution. Higher education institutions are facing increasing pressure to adapt to the rapidly changing business landscape and the competition to attract top researchers and students. The emergence of new business models and technological advances is transforming the way education is delivered and consumed, and institutions must keep up with these changes to remain relevant and competitive.

One key challenge for higher education institutions is to proactively engage with both internal and external stakeholders, including students, faculty, staff, alumni, employers, and community partners. This requires a deep understanding of their needs and preferences, as well as the ability to leverage digital technologies and data analytics to provide personalized

and seamless experiences across different touch points.

Another challenge is to foster a culture of innovation and collaboration within the institution, by empowering employees to experiment with new ideas and technologies, and by promoting cross-functional and interdisciplinary teamwork. This can help to break down silos and facilitate knowledge-sharing and co-creation of value.

Ultimately, higher education institutions must be agile and adaptable in their approach to transformation, by continuously monitoring market trends and evolving their strategies and operations to meet changing demands. This requires strong leadership, effective governance, and a willingness to embrace change and take calculated risks. By doing so, institutions can position themselves for success in the global marketplace and contribute to the development of a skilled and knowledgeable workforce for the 21st century.

Digital transformation at the level of higher education institutions involves implementing digital strategies to enhance teaching, learning, research, and administration. While many institutions recognize the importance of digital transformation, not all are able to effectively implement it due to a lack of foresight, persistence, and perseverance.

To understand the current state of knowledge about digital transformation in higher education institutions, it is important to recognize the unique characteristics that have emerged as a result of this transformation. These include new perspectives on teaching and learning, changes in the roles and responsibilities of stakeholders, and increased stakeholder engagement.

For example, digital transformation has led to the emergence of new teaching and learning perspectives, such as blended learning and online education. These new perspectives require institutions to rethink their traditional approaches to teaching and learning and to adopt new technologies and instructional methods.

Digital transformation has also resulted in changes in the roles and responsibilities of stakeholders, including instructors, administrators, and students. Instructors may need to develop new skills and competencies to effectively teach in digital environments, while administrators may need to restructure their operations to support digital initiatives. Students, on the other hand, may need to adapt to new learning environments and technologies. Finally, digital transformation has increased stakeholder engagement, as institutions work to involve all stakeholders in the digital transformation process. This includes engaging with students, faculty, staff, alumni, and other stakeholders to ensure that digital initiatives are aligned with institutional goals and priorities (MacIntyre, Gregersen & Mercer, 2020).

Developing a dedicated digital strategy is an important first step for higher education institutions that want to adapt to the digital transformation. However, as you mentioned, many organizations lack the foresight, perseverance and persistence to effectively implement these strategies.

To overcome these challenges, higher education institutions need to develop a holistic understanding of digital transformation and its impact on their operations and stakeholders. This includes a thorough analysis of their current knowledge and capabilities and an assessment of the specific characteristics and challenges of digital transformation in higher education institutions.

Key perspectives that should be considered when developing a digital transformation strategy include the needs and preferences of different stakeholders, such as students, faculty, staff, and alumni, as well as the evolving trends and best practices in technology and education (Bucăţa, Popescu & Tileagă, 2022).

In terms of characters, higher education institutions need to foster a culture of innovation, experimentation and collaboration by providing the necessary resources, incentives and support systems for staff to explore and implement new ideas and technologies.

Implementing digital transformation at the higher education level can include the integration of digital tools and platforms into teaching and learning, research and administration, as well as the development of new products and services that leverage new technologies and data analytics.

A successful digital transformation strategy requires strong leadership, effective governance and a commitment to continuous learning and improvement. By embracing digital transformation, higher education institutions can better serve their stakeholders and remain competitive in the global marketplace.

## 2. Methodology

Our research approach was a qualitative study. Based on a socio-technical approach, we defined the object of our investigation as digital infrastructure. Interviewees were selected from different faculties and departments to ensure sufficient breadth. Each informant was selected for their particular expertise and experience in digitization. Interviews were semi-structured, lasted a maximum of one hour and focused on the areas of expertise of both students and faculty members.

The research hypotheses on which the formulation of the interview was based were as follows:

*Hypothesis 1*: Autonomy and flexibility in digital education promote motivation and personal growth.

*Hypothesis 2*: Teacher professional development influences student satisfaction and achievement.

*Hypothesis 3*: Integration of virtual tools improves practical skills.

*Hypothesis 4*: Digital education affects job readiness.

*Hypothesis 5*: Teachers' digital literacy improves the effectiveness of digital education can you put it another way.

In addition to the interviews, we collected available materials such as plans, reports as well as websites. The types of documents we considered in our attempt to collect data for our qualitative study on digital infrastructure in education include: strategic plans for digital education of higher education institutions or reports on digitization initiatives of these institutions. We also examined faculty development plans, curricula and course outlines.

Searching institutions' official websites, online learning platforms and other digital spaces for relevant information and announcements related to digital education completed this approach.

In conjunction with the qualitative interviews and the collection of available materials, our research methodology also included an in-depth analysis of the collected data. We used thematic coding to identify recurring patterns, themes and key findings related to digital infrastructure in the academic context. In the context of analyzing the characteristics of digital infrastructure in science, we have tried to apply the following thematic codes within the formulated research questions: *increased engagement, platform compatibility issues, positive impact, learning curve, accessibility of resources or technological challenges.*

This analytical approach allowed us to derive meaningful interpretations and make connections between different aspects of the digitization process.

To ensure the reliability and validity of our findings, we employed member checking techniques where participants were presented with summaries of their interviews and asked to check the accuracy and interpretation of their statements.

This iterative feedback loop helped to increase the credibility of our study by incorporating participants' perspectives and corrections.

In addition, the socio-technical approach guided our investigation of the complex interplay between social and technical factors in the field of digital infrastructure. We explored how the adoption and use of digital technologies influenced social structures, communication patterns and collaboration practices within the academic community. At the same time, we looked at the technical aspects of digital infrastructure and assessed the effectiveness, scalability and interoperability of existing systems.

In the final phase of our research, we synthesized the qualitative data, taking into account the perspectives of students and faculty. This synthesis allowed us to develop a comprehensive understanding of the challenges, opportunities and impacts of digitalization in the academic environment. Our findings contribute to the existing body of knowledge in this area and provide valuable insights for academic institutions looking to improve their digital infrastructure and optimize the integration of technology in education.

## 3. Digital Transformation of the Higher Educational Institutions

Digital platforms and materials have become increasingly important in the teaching and learning process, especially in higher education institutions. With the development of educational standards and practices, it has become necessary for institutions to use resources that are up to date and in line with the latest trends and technologies.

Digital technology-based tools are a top priority in this regard as they offer a number of benefits such as greater flexibility, accessibility and interactivity. Online learning management systems (LMS), for example, allow students to access course materials, participate in discussions and submit assignments from anywhere and at any time using their own devices. This can help overcome barriers to learning such as geographical distance and time constraints.

Digital platforms can also support a range of teaching methods and pedagogies, including flipped classrooms, blended learning, and personalized learning. For example, digital simulations, games, and multimedia resources can help to engage students and promote active learning, while digital assessments and analytics can provide real-time feedback to instructors and inform their teaching strategies.

Moreover, digital platforms and materials can enable institutions to reach a broader audience, including non-traditional and international learners, and to foster global collaborations and partnerships. This can help to promote diversity, equity, and inclusion in education, and to prepare students for the increasingly interconnected and digitalized world of work.

Digital technology-based tools have become a necessary and integral part of the teaching and learning process in higher education institutions, and institutions must continue to invest in and leverage these resources to remain competitive and meet the evolving needs and expectations of their stakeholders.

Academic, programmatic, institutional, and structural changes are critical to the successful implementation of digital education strategies in higher education institutions. While digital educational resources can offer a range of benefits, their effective use requires a shift in traditional teaching and learning practices and the development of new skills and competencies by both instructors and students.

Academically, digital education strategies can provide opportunities for students to develop critical thinking, problem-solving, and digital literacy skills, which are increasingly important in the

modern workforce. Digital resources can also enable instructors to offer more personalized and differentiated instruction, as well as to incorporate real-world applications and case studies into their teaching.

Programmatically, institutions need to ensure that digital education strategies align with their overall educational mission and goals, as well as with industry and labor market demands. This may require the development of new programs and courses, as well as the integration of digital technologies and tools into existing curricula.

Institutionally, digital education strategies may require changes in organizational structures, policies, and practices, such as the establishment of dedicated digital education departments, the adoption of open educational resources, and the implementation of data analytics and evaluation systems to monitor and improve student outcomes.

Structurally, digital education strategies may require changes in physical and technological infrastructures, such as the provision of high-speed internet, adequate hardware and software, and supportive learning spaces and environments. Additionally, institutions may need to invest in professional development and training programs for instructors and staff to ensure their effective use of digital technologies and tools.

The use of digital educational resources can empower teachers and students with new tasks, create flexible and engaging learning environments and promote more autonomy and collaboration in the teaching and learning process. However, this requires a comprehensive and strategic approach that takes into account academic, programmatic, institutional and structural changes in higher education institutions.

Digital literacy and digital skills are becoming increasingly important in the modern workplace. As we move into the digital age, the ability to effectively navigate and utilize technology has become a core competency for many jobs and industries. Digital literacy refers to the ability to use technology to access, evaluate and create information. This includes skills such as searching for information online, using social media and communicating via digital platforms. Digital literacy, on the other hand, refers to the specific technical skills required to operate and manage digital technologies, such as coding, data analysis and software development.

Both digital literacy and digital skills are becoming increasingly important in the sharing economy as new, well-trained workers are needed who are adept at both human relations and technology. For example, many jobs in the gig economy, such as ride-sharing and food delivery, require workers to use digital platforms to connect with customers and manage their work (Alexander, 2020).

It is recommended to provide technical and pedagogical support from the perspective of higher education teachers. Some higher education institutions have leveraged technology to provide instructional flexibility and timely support to students to increase access to a quality education while streamlining internal processes for delivering instruction. Depending on the circumstances that support it, digital technology can have a number of storefronts from an infrastructure perspective. Learning portals and digital services are important resources that meet the latest standards and practices in education (Biloshchytska et al., 2021).

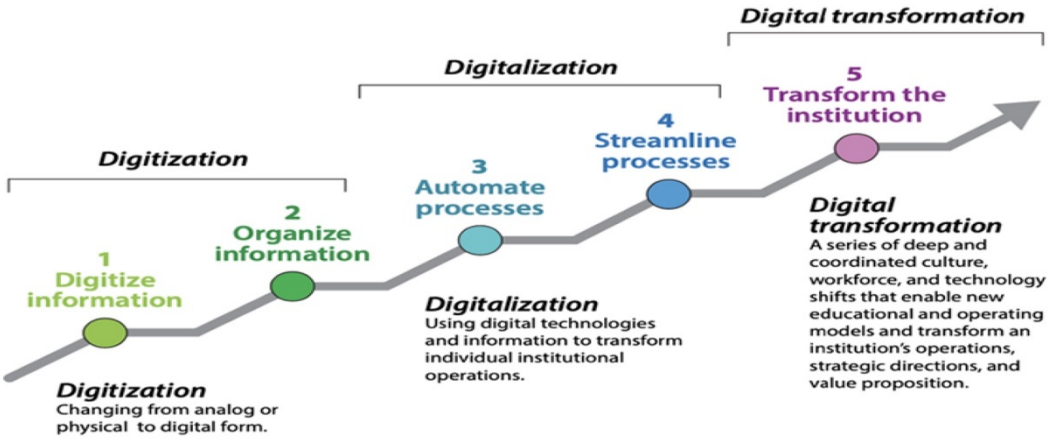


Figure no. 1: *The digital transformation process*
(Source: https://www.educause.edu/ecar/research-publications, 2020)

Digital transformation has become a critical necessity for educational institutions, reshaping traditional teaching methods, administrative processes and the student experience. Digital transformation in educational institutions is a holistic and integrated process that involves profound changes in culture, workforce dynamics and technology. This transformative journey leads to the adoption of new educational and operational models that fundamentally change an institution's strategic direction, operations and overall value proposition. It is a synergistic evolution that aligns cultural change with workforce adaptation and technological advancements to reshape the core fabric of the institution and enable it to thrive in the digital age as shown in Figure no. 1.

It is about reshaping pedagogy, improving administrative efficiency and fostering a culture of innovation to prepare students for the challenges of the digital age. While there are challenges, the transformative outcomes position educational institutions at the forefront of providing relevant, accessible and engaging learning experiences.

Higher education institutions are increasingly using digital strategies to improve the way they deliver education, engage with students and stakeholders, and remain competitive in a rapidly changing world. This is due to a number of factors, including the changing demands of the job market and rising student expectations for innovative and engaging learning experiences. Digital strategies can help institutions improve their recruitment and operational practices by enabling them to streamline processes, reduce costs and increase efficiency. For example, the use of digital tools and platforms can help institutions automate administrative tasks such as admissions, enrollment and student data management, freeing up time and resources for other strategic activities.

Moreover, digital strategies can help institutions to improve the quality and relevance of their educational programs, by enabling them to incorporate new technologies and pedagogies into their curricula, and to offer flexible and personalized learning experiences to students. This can help to meet the evolving needs and expectations of students, and to prepare them for the changing demands of the workforce.

Additionally, digital strategies can help institutions to engage with a broader audience, including prospective students, alumni, employers, and partners, by providing them with access to digital resources and services, such as online

learning platforms, career development tools, and networking opportunities. This can help to enhance the institution's reputation and brand, and to foster collaborations and partnerships with external stakeholders.

Higher education institutions are using now digital strategies to improve their current work, create value, and represent the impact of digital technology, in order to remain relevant and competitive in a rapidly changing world. By embracing digital transformation, institutions can enhance the quality and relevance of their educational programs, improve their operational practices, and engage with a broader audience, thereby ensuring their long-term success and sustainability. For the DT to transition from antiquated to modern technology, a considerable financial investment is required.

If academic institutions want to flourish, they must change their organizational and educational democratic accountability model to react fast and precisely, produce innovative ideas productively, and offer adaptable and respectful facilities. It is essential to begin the mental transformation toward an "entrepreneurial attitude". Business intelligence systems' connections to data management and service level indicators give decision-makers a comprehensive perspective of the ongoing operations of the organization and a crucial vantage point from which to make wise decisions.

The chosen research methodology should align with the goals and expectations of participants while seamlessly integrating with the ongoing digital revolution. In higher education institutions, the convergence of human resources and technological advancements is evident. Digital technology significantly impacts various aspects related to human resources, ultimately enhancing overall performance. For universities, the key focus lies in establishing a proficient digital workspace facilitated by the digital proficiency of staff.

The establishment of integrative connections among organizations, specialized community colleges, large corporations, and local authorities is facilitated through autonomous skills certifications. The identification and effective management of digital solutions become imperative for organizations undergoing increased digitization, as any alterations can profoundly affect the successful implementation of these solutions.

The educational sector must undergo thorough analysis and design to align with the overarching strategy and governance framework of higher education, mirroring how governance practices should correspond to the conceptual, institutional, and tactical dimensions of innovative resource allocation. From a technical standpoint, the primary stakeholders include academics, students, faculty, college administrators, and the digital technologies team.

Depending on the cultural, institutional, and technological perspectives considered, digital technology processes within universities are steered by diverse objectives. Presently, the most crucial objectives are those that, from a sociological standpoint, strive to enrich society, enhance workforce skills, and contribute to societal progress (Cunningham & Villaseñor, 2016).

In order to take advantage of digital technology, adapt curricula and be flexible, the human resources of higher education institutions are a crucial factor. The legitimacy of higher education institutions facilitates technological change in administration, removes interstellar barriers and focuses on the promotion of educational opportunities. The framework model, business operations, administration, teaching, curriculum, accessibility to employment, marketability, research and internet marketing are the main objectives of digitization in

higher education institutions, which should be considered as separate variables.

The worldview, culture and digital literacy of individual members of a higher education community can have a significant impact on the functioning of the institution and the success of its students.

By worldview is meant the set of beliefs, values, and assumptions that individuals hold about the world and how it works. These beliefs can influence how students approach their studies, how faculty teach, and how administrators make decisions.

Culture refers to the shared values, beliefs, and behaviors of a group of people. A university's culture can affect everything from the types of courses offered to the way students interact with each other.

Digital literacy refers to the ability to effectively use digital technologies to find, evaluate, create, and communicate information. As technology plays an increasingly important role in education, digital literacy is becoming a critical skill for students, faculty, and administrators alike.

Understanding the worldview, culture, and digital literacy of stakeholders within a university can help administrators make decisions that better support student success. For example, if a university has a culture that values collaboration and community building, administrators can prioritize initiatives that encourage students to work together and build connections with one another. If faculty and students are highly digitally literate, the university can invest in more advanced technological tools to support teaching and learning. Thus, the vast majority of opportunities and challenges arising from organizational change are caused by individuals, groups, organizations, and competitive dynamics. The fourth industrial revolution is often described as the result of the merging and mutually reinforcing effects of several "exponential technologies" such as artificial intelligence, biotechnologies, and nanomaterial's. These technologies are characterized by their ability to improve and accelerate at an exponential rate, leading to rapid changes and advancements in a variety of fields.

From a technological and physical perspective, these advances are driven by factors such as the increasing computing power of computers, the development of new materials and manufacturing processes, and the increasing availability of data and connectivity through the Internet of Things (IoT). This is leading to the development of new and innovative products and services, as well as new ways of organizing and managing companies and industries.

The fourth industrial revolution is also having a significant impact on education. Digital technologies and tools are being used to support teaching and learning and offer students new opportunities for collaboration and innovation. In addition, the development of new technologies such as artificial intelligence and virtual and augmented reality is opening up new opportunities for personalized and adaptive learning.

The fourth industrial revolution is changing the way we live, work and learn and is likely to continue to have a profound impact on society in the years to come (Pucciarelli & Kaplan, 2019).

Achieving digital transformation is a context-specific endeavor, acknowledging that there is no one-size-fits-all approach. The success of digital transformation initiatives hinges on tailoring activities and strategies to align with the unique goals, values, and business ambitions of each organization. A strategic and reflective implementation is essential to foster a transformation that resonates with the specific context.

While the pathways to digital transformation are diverse, certain common elements underpin the process. These foundational aspects, often already ingrained within the organization, provide a framework for considering the stages of

transformation. Figure no. 2 illustrates the stages of digital transformation, emphasizing the need for a strategic and contextualized approach that builds upon existing elements within the organizational framework. This diagram serves as a visual guide, highlighting the dynamic and interconnected nature of the digital transformation journey, where each stage is intricately linked to the overarching goals and values of the institution.

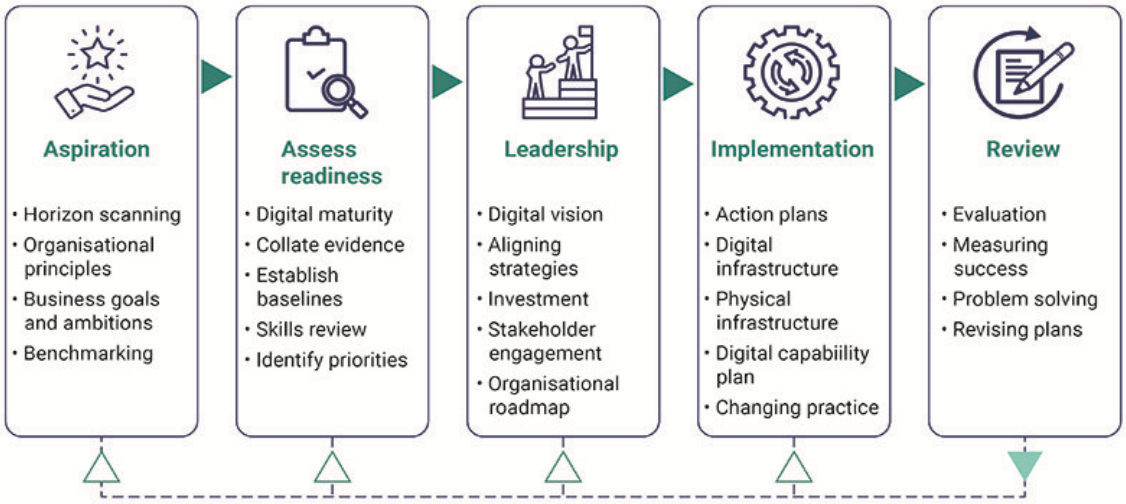


Figure no. 2: *Digital transformation steps diagram*
(Source: https://www.jisc.ac.uk/guides/digital-transformation-in-higher-education, 2023)

Emerging boundary-pushing digital technologies such as IoT devices (Santos, Batista & Marques, 2019), 3D printing and big data analytics have the potential to drive significant change in higher education institutions beyond improving internal processes. These technologies can enable universities to develop innovative business models, refine their organizational structures and cultures, and even reshape entire industry structures. To take advantage of these technologies, universities need to build a flexible IT infrastructure, leverage new enterprise platforms and create a robust and scalable operating foundation. This requires investment in state-of-the-art hardware and software systems, as well as upgrading existing infrastructure to enable the seamless integration of digital technologies into existing workflows and processes.

We think that it is essential for higher education institutions to equip their staff and faculty with the essential skills and expertise to use and implement these technologies competently. This requires the provision of comprehensive training initiatives, workshops and certifications that focus specifically on areas such as data analytics, 3D printing and IoT technologies. The aim is to ensure that the academic community is well equipped to utilize and capitalize on these technological advances.

Additionally, universities need to foster a culture of innovation and entrepreneurship, to encourage students, staff, and faculty to develop new ideas and solutions that can leverage these technologies for the benefit of the institution and society as a whole. This can involve the establishment of incubators, accelerators, and other innovation hubs that provide resources and support for the development of new ventures.

Finally, universities need to ensure that they are open to global markets and

accessible to a wide range of stakeholders, including students, faculty, industry partners, and the wider community. This can involve the development of online learning platforms, partnerships with other institutions and organizations, and the establishment of global research networks, to facilitate collaboration and knowledge exchange across borders.

The adoption and integration of cross-border digital technologies can enable universities to improve their capabilities in human resources, education, innovation, management, access, market opening, construction processes, society, and research, and remain competitive and relevant in a rapidly changing world (Petrov, Radev, Dimitrov & Simeonidis, 2022).

## 4. The Potential of Digital Education and Perspectives on the Future

Higher education is being dramatically altered by digitalization: cross-border collaboration and new kinds of mobility and exchange provide numerous options in a globally networked environment. In the last two years, higher education institutions have seen a boom in digitization, which has resulted in changes in teaching, research, and university administration. Digital educational technologies have the potential to further internationalization while also allowing for new types of engagement and mobility. This digital shift in education is not restricted to teaching and learning. Let us discuss the key components of digitalization in the education industry, as well as the next trends and solutions for improving the entire teacher and student experience (Kumar, Ritzhaupt & Pedro, 2022). Then, how will digital technology impact education? Digital transformation is the use of technology to simplify corporate operations. Digital transformation in education may enhance students' learning experiences while also improving the entire experience for alumni, mentors, and teachers. It also aids in the management of institutions. It can assist in providing:

– a simple student enrolling procedure;
– learning experience that is both engaging and interactive;
– improved learning outcomes;
– capability to study and teach from remote areas;
– students may learn on any device, at any time, thanks to the course structure's flexibility;
– monitoring of student performance;
– school/college/university management that is seamless.

Also, the rise of EdTechs (Education Technology) in recent years has not gone ignored. Education firms have been making learning more interactive and assisting students in reaching greater levels of learning. EdTech firms' membership fees have increased fivefold in the last year. In the meanwhile, the major cause of this rise is the suspension of education in schools (due in part to the epidemic). With an increase in requests for online programs, EdTech firms needed to plan for two aspects: student onboarding and coaching. CRM (customer relationship management) software, which is widely used in B2C enterprises, has been adopted by EdTechs.

After COVID, higher education institutions recognize that digital higher education policies are not just required for potential new crisis scenarios, but that digital higher education is already perceived as the 'new normal' by students and faculty. Institutional advancements in digital learning must now be advanced by institutional strategies and policies and driven to the system level, therefore activating bottom-up innovation processes with institution-wide influence. Governments can help accelerate this process by supporting and activating innovation through financial channels. Prior to COVID, digital innovation in higher education was driven by individual academic professors and leaders rather than

a cohesive national or institutional strategy (García-Morales, Garrido-Moreno & Martín-Rojas, 2021).

Three areas of provision are emerging in higher education: degree education, continuing education and professional development, and open education. Educational technology has an impact on all three areas. As more flexibility is needed for off-campus students to increase access and scalability through place- and time-independent learning, this impact will be greater in the areas of continuing and open education. As a result, institutional technology-enhanced educational frameworks might evolve as: synchronous hybrid and blended degree education as the backbone of educational offerings, mainly for campus-based students; blended and online distance continuing education and professional development, including micro-credentials with both an academic and professional orientation, mainly for off campus students whose numbers will increase and possibly exceed those of degree education, due to the needs on the labor market and in society at large; online distance open education in the public domain with MOOCs and OERs, for off campus learners (Goulart, Liboni & Cezarino, 2021).

A distinct structure and change management are required for the successful implementation of institutional digitalization policies. Leadership should support and empower teaching staff and other professionals at all levels of the institution to achieve institutional goals in the best interests of the students. Drivers are system factors that govern how leadership and instructional staff at all levels prioritize innovation efforts. Drivers are external factors that system leaders and experts cannot ignore:

– students, instructors, higher education institutions, legislators, and governments are recognizing the benefits and prospects of digital education and requesting reforms;

– priorities for financing include establishing sustainable and scalable costing and investment models for digital education, as well as support for leading innovators and adopters;

– strategic plans: governmental and institutional goals and objectives that outline specific targets and investments in teaching and learning innovation via digitization, including the entire organization;

– curriculum requirements: integrating digital competencies necessary in all curricular areas, including 21st century abilities;

– assessment requirements: utilizing technology's capabilities in formative and summative evaluation of knowledge and skill attainment levels; quality assurance: connected to the degree of digital teaching innovation;

– individual student needs and skills: reacting to student diversity, employing technology for flexible access, boosting student preparation for digital education;

– teachers' career options include: prizes for teaching quality, as well as encouraging personal motivation in instructors who reinvent their classroom instruction.

Responsibility for the drivers is usually divided between the institutional and governmental level of policy. None of drivers are completely under the control of the institutions. All levels should contribute to innovation and digitization strategies in higher education to make change system-wide. The COVID crisis had a huge impact on these drivers, especially on funding and budgeting related to education technology infrastructure and resources, strategic plans on technology and innovation, curriculum and assessment requirements, and responding to student needs. This impact needs to be further improved and consolidated in the coming years. This is also supported by the European Digital Education Action Plan.

The four main goals listed below are often emphasized by higher education leaders. They are increasingly turning to

technology to improve the learning environment for students, increase operational efficiency, enhance computing capacity for research, and promote innovative teaching. One way that technology is being leveraged to achieve these goals is through the incorporation of TEDx courses, applications for deeper study, and VR-AI tools that enable students to engage with content in new and meaningful ways. These technologies can help students develop the skills they need to succeed in the 21st century workforce, including critical thinking, problem-solving, and technical proficiency. In addition to benefiting students, technology can also provide educators with access to research-based tools and resources that can support their teaching and improve student outcomes. For example, digital tools such as quizzes and modules can be used to assess student growth and adjust curriculum as needed, helping to ensure that students are receiving a high-quality education that prepares them for success in their chosen fields.

Digital transformation is becoming increasingly important in higher education as institutions seek to remain competitive and meet the evolving needs of students and employers in the 21st century. By embracing new technologies and innovative teaching methods, higher education institutions can better prepare students for the challenges and opportunities of the future (Martin, Polly & Ritzhaupt, 2020).

Institutions of higher education across the country have been using analytics since the early 2000s to cope with fluctuating enrollment and rising recruitment costs Higher education institutions are increasingly using various forms of data analytics to inform decision-making processes across a range of areas, from marketing and recruitment to academic planning and financial management. Diagnostic analytics involves analyzing data to identify the root cause of a problem or issue. This type of analytics is often used by institutions to pinpoint areas that require improvement and to recommend effective solutions to address these issues.

Descriptive analytics involves analyzing data to gain insights into past and current trends and patterns. This type of analytics can be useful for institutions in describing various situations, such as student demographics, academic performance, and institutional finances. Predictive analytics involves analyzing data to identify future trends and events. This type of analytics is used by institutions to forecast future outcomes, such as student enrollment numbers, graduation rates, and institutional revenues.

The use of data analytics in higher education can help institutions make informed decisions and remain competitive in an increasingly complex and rapidly evolving landscape (Hess, Matt, Benlian & Wiesboeck, 2020). Digital technology has greatly expanded access to information and educational resources, making it easier and more affordable for students to access quality educational content.

Digital libraries such as JSTOR, Google Scholar, and ProQuest provide students and researchers with access to millions of publications, including books, reports, conference proceedings, and dissertations. These resources can be accessed from anywhere with an Internet connection, making it easier for students to research and access information.

Search engines such as Google and YouTube also provide students and teachers with access to an endless amount of research and educational content. These platforms allow users to easily search for information on a wide range of topics, making it easier to find relevant resources quickly and efficiently. In addition to these external resources, many schools are developing their own IT stacks to help students find information on tests, courses, and other topics. These IT stacks often

include learning management systems, digital libraries, and other tools designed specifically to support teaching and learning.

Digital technology has transformed education by giving students access to a wealth of information and educational resources. As technology continues to evolve, we can expect to see even more innovative tools and platforms that make accessing education more convenient and effective for students.

A conceptual model of digital transformation of the educational environment envisages a dynamic framework that integrates technological innovation, pedagogical evolution and organisational adaptability. The model presented in Figure no. 3 encompasses the complex interplay between digital tools, teaching methodologies and the overall structure of the educational ecosystem, providing a comprehensive roadmap for navigating the complexities of educational transformation in the digital age.

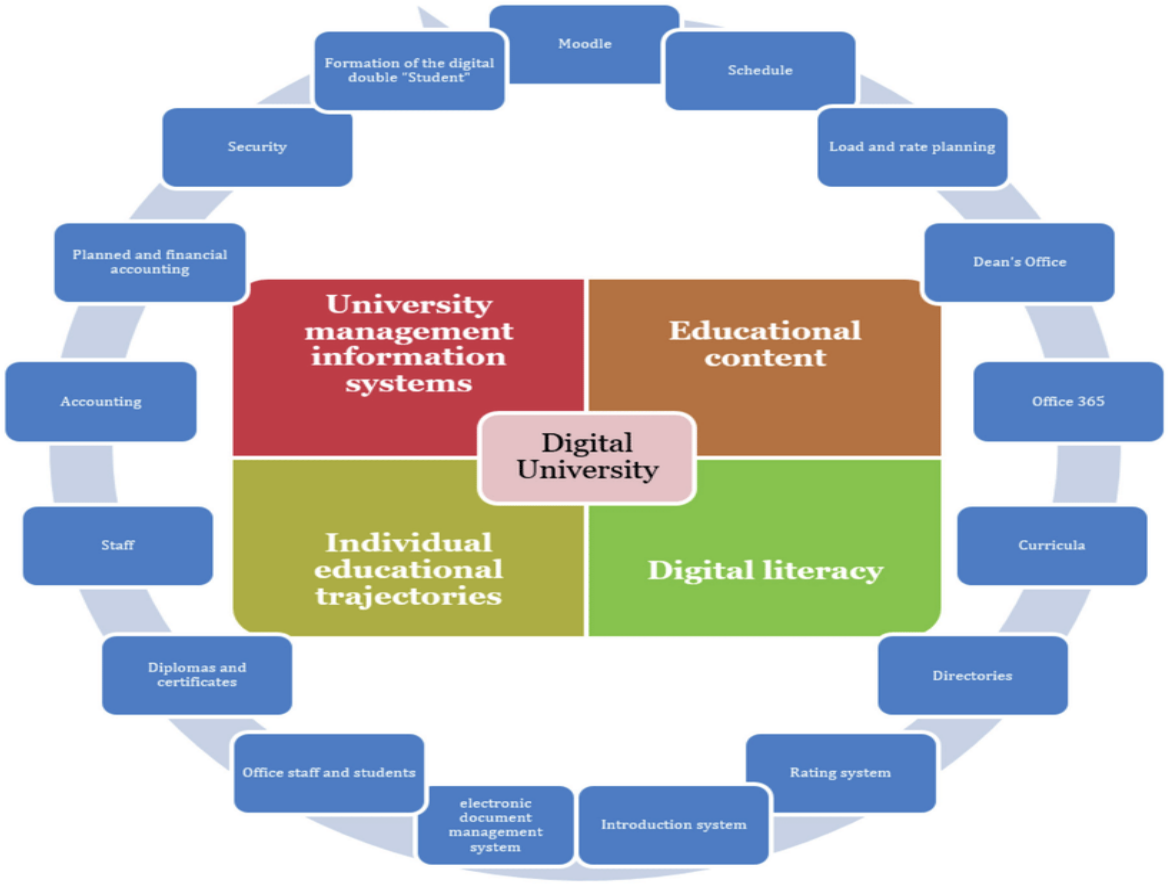


Figure no. 3: *Conceptual model of digital transformation of the educational environment*
(Source: Researchgate, Scientific Journal of Astana IT University, 2021)

According to students, the main benefits of incorporating digital elements into the educational pathway are autonomy in assembling resources for personal development, promoting individual flexibility and strengthening motivation for self-directed learning and personal growth. Students agree that teachers' professional development should focus on public speaking, technical dexterity and psychological acumen. The integration of virtual tools into the digital higher

education landscape facilitates the development of various skills for students. These include the ability to apply knowledge gained in online courses, master the technical intricacies of distance learning and improve communication skills to effectively manage the educational processes in these institutions.

In addition, students believe that improving access to electronic resources for all segments of society and preparing prospective students to use digital technologies and electronic resources should be among the goals of public organizations and international educational institutions. This is especially important given the increasing importance of digital technology in education and the need for students to be prepared for the demands of the modern workplace. Nevertheless, students in digital higher education institutions may also encounter difficulties. These include the formalization of education, which can lead to rigid structures that limit creativity and flexibility, and the high pressure students face throughout the educational process. In addition, teachers' lack of ability to use digital resources can limit the effectiveness of digital education initiatives.

To address these challenges, institutions may need to provide additional support for students and faculty, including training on the use of digital resources and the development of more flexible and adaptable educational structures. In this way, higher education institutions can ensure that students have the skills and resources they need to succeed in a rapidly evolving digital landscape (Vongkulluksn, Xie & Bowman, 2018).

Effectively using pedagogical concepts in digital education requires careful consideration of implementation methods and regulation of legal and methodological aspects. An important aspect of this is the definition of the function of digital technologies in teaching and in the system of knowledge integration. This involves how digital technologies can be used to improve learning outcomes and promote student engagement, and how they can be integrated into existing pedagogical frameworks and curricula.

We believe it is important to define the contexts to which these provisions apply. This requires identifying the specific educational contexts in which digital technologies are used, such as online learning environments, blended learning models, or digital classrooms. Creating the conditions for effective implementation is critical to ensure that digital technologies are used in ways that maximize their potential to promote student learning and engagement. This may include providing training and professional development opportunities for teachers, investing in the development of high-quality digital content and resources, and establishing clear guidelines and standards for the use of digital technologies in teaching and learning. Effectively using pedagogical concepts in digital education requires careful consideration of a range of factors, including the function of digital technologies in teaching, the contexts in which they are being used, and the conditions necessary for their effective implementation. By addressing these issues, educators can maximize the potential of digital technologies to support student learning and engagement in the digital age. Technological development has had a significant impact on education and has enabled greater collaboration and innovation across multiple sectors, including science, society, government, business, and innovation. One of the most significant ways that technology has transformed education is by enabling the growth of digital education, which includes online learning, virtual classrooms, and other forms of digital instruction. This has created new opportunities for collaboration and knowledge-sharing, as well as increased access to education and knowledge for people around the world. For example, individuals who may not have access to traditional

educational opportunities due to geographic or economic constraints can now participate in online courses and digital learning programs.

In addition, technology has facilitated greater collaboration between educational institutions and industry partners, allowing for the development of new and innovative programs that are designed to meet the evolving needs of the workforce. This has led to the creation of new job opportunities and has helped to drive innovation in multiple industries.

To take advantage of these opportunities, institutions may need to adopt new approaches to education and training, such as blended learning and online education. This may include the use of digital technologies and tools to support teaching and learning, and to facilitate collaboration and communication among students, faculty, and other stakeholders. It is important to recognize that effective use of digital technologies in education requires careful planning and implementation. This includes addressing issues such as access, equity, and digital literacy, and ensuring that digital technologies are used in ways that support and enhance learning. In this way, institutions can take advantage of digital education opportunities and ensure that all students have access to quality education and training. Digital education promotes effective collaboration among multiple academics, students, learners, and teachers in learning new content and developing digital skills. Modern virtual education technologies, according to some scholars, allow teachers to automate most of their activities, free up time for searching, interacting, and working with students face-to-face, get quick feedback from students, and become more adept at the educational process.

## 5. Conclusions

Technological development has had a profound impact on education and has created new opportunities for collaboration and innovation across multiple sectors. As technology continues to evolve, it is likely that we will see even more transformative changes in the field of education in the years to come.

The digital transformation of educational institutions and systems requires a holistic approach that encompasses changes in pedagogy, management, and culture. By leveraging the power of digital technologies in these areas, educational institutions can create more engaging, effective, and efficient learning environments that better prepare students for success in the digital age.

A truly revolutionary change in the way we experience virtually every aspect of our lives is being actively experienced and shaped by the majority of the X-generation and baby boomers. Social media, the Internet and other profoundly innovative technologies have changed the way we interact, do business, have fun and do our work. Education is a key element in these developments. On the one hand, the arrival of modern technologies in schools, colleges and universities means that almost every subject is taught and studied in a new way. Surprisingly, these institutions will equip future generations with the information, expertise and skills they need to use these ICTs, limiting their future prospects for breakthrough innovations. Digitization represents just the initial phase in a larger process where institutions leverage emerging technologies to execute traditional functions. The digital transformation of an educational institution, or even the entire system, transcends the simple adoption of new technologies. It necessitates a fundamental reconsideration of the responsibilities of all stakeholders in the educational process. This includes endorsing innovative strategies like “flipped learning”, “gamification”, or “crossover learning” and incorporating novel management approaches that harness information and communication technologies (ICT) to redefine the fundamental activities that generate value within these organizations.

We believe that the research objectives have been achieved after validating all research hypotheses. We can conclude that the survey results indicate that students who experienced a higher degree of autonomy in the arrangement of educational resources and flexibility in their learning choices showed higher motivation to self-learn and demonstrated personal growth. The data collected also suggests that there is a positive correlation between faculty professional development in areas such as public speaking, technical skills, and psychological acumen and students' academic satisfaction and success in the context of digital higher education.

Analysis of interview responses revealed that the effective integration of virtual tools into the digital higher education environment has a positive impact on the development of students' practical skills, such as applying knowledge gained in online courses, mastering technical aspects of distance learning, and improving communication skills.

The results of the interviews suggest that preparing students to use digital technologies and electronic resources in digital higher education is essential to prepare them for the demands of the modern workplace.

The data collected suggests that the level of digital literacy of faculty positively influences the effectiveness of digital education initiatives, emphasizing that the ability of faculty to use digital resources effectively is critical to the success of these initiatives.

To summarize, the results obtained from the interviews support the research hypotheses and thus provide a solid foundation for further research. These hypotheses can serve as benchmarks for more detailed empirical research, and the findings can contribute to the improvement of educational practices in digital higher education environments.

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