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Article Reviews

Urgency of Managing Digitalization in Higher Education

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Abstract

The digital transformation of higher education institutions has become one of the most significant trends in recent years. Unfortunately, this change is facing many challenges and pitfalls. Therefore, understanding how to manage digitalization amid continuous change should be a top priority for leaders of higher education institutions. This article reviews previous research focused on digitalization in higher education. Using non-systematic literature methods, it starts by summarizing the main driving forces, barriers, and pitfalls of digitalization in higher education. The selected papers were chosen based on their relevance to the article's purpose. The findings discuss the four main elements of managing digitalization in higher education. These four elements should be a priority in universities' strategy. Finally, the proposed framework in this article is expected to contribute to developing theory and practice in managing digitalization in higher education.

Keywords: *Digitalization; Higher Education; Education; Digital Transformation*

INTRODUCTION

Digitalization in higher education has been an essential frontline to transform education systems and services in the era of the industrial revolution 4.0. Digitalization in higher education is not just switching face-to-face learning to distance learning but also aims to enhance and transform the learning experience, enabling open and more responsive education systems (Bangun et al., 2021). For instance, digital technology can be used to deliver learning material and administration work, such as monitoring absenteeism and students' and teachers' performance. (Kilag et al., 2022; Underwood, 2009). Pu et al. (2022) even highlighted that digital transformation is a way for higher education institutions to promote sustainable development. The transition to digital education must be viewed as a long-term strategy influenced by institutional development and government policies. This strategy should include preparing the educators' knowledge and skills to meet the new challenges faced in an educational environment. Being digitally trained helps educators improve their research, communication, and assessment skills (Kilag et al., 2022). Thus, managing digitalization in higher education institutions should involve various internal and external aspects. The internal aspects are organizational culture, technological infrastructure, employee competency, and business processes (Bates, 2015). Technology implementation requires an innovative organizational culture and encourages people to take risks and learn from failures. In contrast, external aspects are government policies, industry standards, and the global market situation. For example, implementing technology into education systems involves substantial funding from the government, and in most cases, most developing countries cannot provide this funding.

In practice, one indicator that digital technology in education is becoming increasingly important and widely accepted is the increasing number of MOOC courses. A report by Class Central showed that in 2021, 40 million new learners signed up for at least one MOOC, compared to 60 million in 2020. The presence of MOOCs provides an opportunity for many people to learn in a new way. The use of technology has proven flexibility in the learning process and the opportunity to interact with trainers, educators, and classmates worldwide. The ease of the learning process also

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occurs when technology can be used to assist in monitoring students' learning progress and administration in the learning process.

Underwood (2009) stated that there is a growing body of research from various backgrounds and cultures studying the impact of digital technology on measuring learning outcomes. Kilag et al. (2022) found that ICT integration has successfully promoted an effective teaching process. E-learning increases the quality of learning by using online tools and simplifying access to information, as well as foreign exchanges and cooperation (Alenezi, 2021). Research on higher education institutions (HEIs) has also explored the main barriers and enablers for leveraging the potential of digital technology (e.g., Aditya et al., 2022a, 2022b; Alenezi, 2021; Khan et al., 2012; Núñez-Canal et al., 2022). Conducted in a developing country, Aditya et al. (2022) found that Indonesia's main obstacle to digitalization is the need for more human resources or expertise in digital transformation. Meanwhile, Khan et al. (2012) found that the low commitment from the government and institutions has made the implementation of digital technology in Bangladesh slow. Other main obstacles are weak, unsupportive, and limited IT infrastructure, lack of strategic planning in digital transformation, and the inability to translate strategy into action. Some researchers have also tried to measure all stakeholders (students, lecturers, and institutions) readiness to apply digitalization in HEIs (e.g., Bubou & Job, 2022; Limani et al., 2019).

While a significant body of research has shown that digitalization has entered education, organization leaders must plan out key strategies to manage it in light of the numerous challenges and changes that have occurred. By doing so, they can develop effective strategies to manage digitalization in higher education and remain competitive in a rapidly changing environment. Therefore, this paper will review related literature on digital transformation in higher education institutions (HEIs) by highlighting the primary forces, barriers, and pitfalls to gain a comprehensive understanding of issues and facts related to digitalization in HEIs globally. This paper will also describe the urgency of managing digitalization in higher education by emphasizing the priority strategy for management. This study selected papers based on their suitability for the article's purposes.

RESEARCH METHOD

This paper uses a non-systematic literature review approach to provide information and a topic review. Green et al. (2001) stated that a non-systematic literature review is also known as a narrative review. This method is a comprehensive narrative synthesis of previously published information. This method does not follow a set process of literature searching, as its name suggests. This can be a weakness of the non-systematic literature review method. Nonetheless, narrative methods can still be useful for answering research questions because they provide a broad perspective and keep the reader informed (Green et al., 2001). The database used to extract the information is SCOPUS. This database is chosen because it’s the largest available database for multidisciplinary scientific literature. Considering the objective of the study, the search was refined by entering some keywords: “digitalization” AND “higher education”. The main article selected is relatively new, written in English, and discusses digital management in higher education. Then, the articles reviewed were selected based on relevance and were considered helpful in identifying trends, issues, and a better understanding of digitalization in HEIs.

LITERATURE REVIEW

Digital transformation in higher education: The underlying forces

Many different perspectives have been taken on digital transformation in higher education. In essence, digital transformation involves change and relates to people, processes, strategies, structures, and competitive dynamics (Rodrigues, 2017). Digital transformation is counted as an

accelerated evolution. It was considered an effort to modernize the educational system through ITC technology and process thinking principles. A shift to digitalization allows universities to capture and model activities and integrate digital technologies into teaching, learning, and organizational practices. The undergoing changes have made digital transformation a question of survival. In general, there are three central pressures in HEIs to introduce digital transformation and learning experience.

1. The technology leap. New digital technologies, such as artificial intelligence (AI), automation, robotics, cloud computing, and the Internet of Things (IoT), are changing how work is done, forcing organizations to adapt and take advantage of new opportunities (Cascio & Montealegre, 2016; Peetz, 2019). In education, technological advancement has made information easily accessible via the Internet (Miranda et al., 2021; Regudon et al., 2022). Furthermore, the changing nature of the labor market has forced higher education institutions to work on a mission to help students develop employability skills and prepare them for the future. Such skills and competencies must be integrated into all modules, courses, and learning settings (Núñez-Canal et al., 2022).
2. Competition. In the massive growth of the University, HEIs need to create a new model of competitive advantage, striving for efficiency and optimizing the use of resources (Wiseman, 2022). Moreover, the competition forces the need to re-imagine new operations models for more efficiency and agility. This mission could be possible if organizations depend on technology.
3. Increased demand for personalized experiences. New generations of students prefer learning valuable, enjoyable, and relevant information (Regudon et al., 2022). Thus, in today's learning environment, learners increasingly expect a high level of customization, interaction, and control (Collins & Halverson, 2010; Walkington & Bernacki, 2020). Technology provides ample potential for the implementation of personalized experiences. For instance, the learning process usage of devices like tablets, netbooks, and mobile devices outside the classroom will enhance the personalized learning experience (Walkington & Bernacki, 2020).

The advancement of digitalization in HEIs can be seen in many aspects of business operations. For instance: in the teaching and learning process, pedagogy, administration, communication, research, working in HEI, location, and reviews and examination (OECD 2016, 2007; Petkovics et al., 2014). The overview of these changes is detailed in Table 1.

Table 1. The changes in categories in the new digital trends

Changes categories	Examples of new digital trends
1. Learning and teaching process	Mostly student-centered. Using virtual equipment and interactive digital sources (such as mobile apps and flipped learning) to enhance learning. Massive open online courses (MOOCs) The information sources are based on online sources. Learning outcomes are focused on critical competencies, both soft and hard.
2. Communication and educator role	Communication between lecturers and student

Changes categories	Examples of new digital trends
	is also a field with a high level of digitization. Educators act as mentors, coaches, collaborators, and references.
3. Administration	The operational administration of the various services is focused on digital platforms (such as online enrollment and student administration processes).
4. Curriculum and digital literacy	The need of modernizes the curriculum to meet the educational standards and techniques.

Sources: (Miranda et al., 2021; OECD 2016, 2007; Petkovics et al., 2014)

In managing digitalization in HEIs, it is crucial to identify future technological trends and short and medium-term challenges. The emerging technologies that have the potential to impact education in the coming years are artificial intelligence and machine learning, augmented and virtual reality (AR/VR), chatbots and virtual assistants, blockchains, and The Internet of Things (Kuppusamy, 2020). A fundamental aspect of AI is making data-based decisions, including search tools for scientific research and connecting university students with universities. Chatbots are software programs that stimulate conversing with a human. An Internet of Things is a collection of internet-connected devices that share sensor data or receive instructions from each other. The applications of this technology in higher education range from making student devices more connected to enabling campus infrastructure and cloud services so that students can have a truly individualized learning experience.

These technologies play a significant role in bringing HEIs from traditional education to intelligent education. The use of technology has made learning more effective and efficient (Kilag et al., 2022). It changes the new face of learning experiences and methods. For instance, technology can improve the learning process by enabling sharing of lessons and learning resources, administration work, and monitoring students' learning progress and performance (Kilag et al., 2022; Underwood, 2009). Technology in education promotes flexibility in learning because of the rise of online education platforms. A study conducted in the Philippines showed that digitalization had given students some benefits, such as easier to get information and data, helping to understand the lesson, and enabling them to work independently and students can watch lessons repeatedly (Operio, 2022).

Several existing studies have shown how digitalization benefits HEIs at institutional and individual levels. At the institutional level, Salmi (2017) explained how digitalization affects the core process in HEIs. For instance, it promises administrative and recruitment efficiencies. It also helps monitor behavior to reduce persistent absenteeism, a factor in academic underachievement, or more subtle profiling of underachieving students to produce a personalized work program. At the individual level, using technology in learning provides students with better access to information. Therefore according to Ginsburg et al. (2000), digitalization fits adults' learning style because learners have more autonomy to access more information. The teachers no longer have to

specify rigid activities but may become facilitators encouraging the class to take more control and responsibility for the learning process. The digital transformation in education has increased people's participation in HEIs. Thus, digital transformation in HEIs has led to a better-personalized learning experience and student-centered, participatory, and creative learning opportunities (Kuppusamy, 2020; Núñez-Canal et al., 2022; Regudon et al., 2022; UNESCO, 2019).

UNESCO (2019) stated that technology in education promotes the new way of learning in the digital era, such as social, customized, blended, interactive, immersive, adaptive, and continuous learning. First, adaptive learning is learning that adjusts to the learner's needs. It gives the digital ecosystem the responsibility to create training programs and present them at the right time to the right individuals. The system makes it possible to offer customized lessons to each learner. For example, MOOCs provide a self-paced learning option, allowing learners to progress through the course at their speed. The second is continuous learning. Technologies are capable of encouraging habits to learn continuously. The current situation has pushed us to learn and unlearn continuously and open our minds to new things. For example, MOOCs offer course materials that are available and accessible to a wide range of learners. Third, online courses offer greater flexibility and accessibility, allowing students to learn at their own pace, customized lesson plan and test, and the ability to learn from anywhere in the world. This learning is known as customized learning. BookWidgets planner is one application that helps personalize a lesson plan for students. The fourth is immersive learning. With digital innovations, the learner understands the concepts and applies what has been learned in certain situations. For instance, using FundamentalVR allows trainee surgeons to perform ultra-realistic operations. Finally, digital technology has been designed to enable a group of learners to share a screen and have an interactive discussion. For example, the usage of Miro in the classroom provides a collective experience that creates social learning.

Barriers to digital transformation in higher education

Digital transformation will benefit businesses and employees, but the path to digital transformation in higher education could be faster in HEIs. Alenezi (2021) stated that the digital transformation process has become more complex due to several disturbing trends in HEIs, such as declining enrollment, rising operational costs, and changing educational demands. In general, HEIs have a particular characteristic that hinders them from a smooth digital transformation. Barriers can be categorized into contextual, social, technical, and cultural factors.

1. Contextual factors. The barriers could be management and institutional policy (Marks et al., 2020; Watty et al., 2016), clarity of vision on the digital transformation (Khan et al.,2012), and lack of expertise in digital transformation (Kalolo, 2019; Microsoft, 2017).
2. Social factors. The barriers from social factors are leadership skills and behavior. A survey conducted by Microsoft Asia Digital Transformation Survey (2017) found that most education leaders in the Asia Pacific are aware of the urgent need to transform institutions to enable future growth. However, based on their perspective, they face primary barriers, such as a lack of organizational leadership.
3. Technical factors. These factors could be unsupportive infrastructure (Khan et al., 2012; Operio, 2022), IT risk/data privacy concerns (Microsoft, 2017), and lack of IT support services (Watty et al., 2016).
4. Cultural barriers. Some cultural barriers are a lack of commitment (Aditya et al., 2022a, 2022b; Kim et al., 2019), attitudes and perspectives about digitalization (Khan et al., 2012), and reluctance to leave a comfort zone (Aditya et al., 2020).

These four factors are known as primary barriers to HEIs globally. However, each barrier

varies in different contexts and countries. For instance, to understand particular barriers to digital transformation in HEIs in Indonesia, Aditya et al. (2020) conducted a systematic framework. They mapped the key barriers based on the level of importance and the degree of difficulty to fix, and thus they were able to classify the priority barriers. In conclusion, they explained that in the case of Indonesia, the main barrier is HEIs' leaders' commitment to turning institutions digitally. This scenario probably happened because they needed more strategic planning in the digital transformation and were reluctant to leave their comfort zone. This situation is aligned with a report released by Microsoft (2017) revealed that most HEIs in Asia had just begun implementing digitalization; thus, there still needs to be a setback in the actual progress of the implementation. Indeed, to achieve a smooth transition to digitalization, HEIs must have a good understanding of the related barrier. Management's capacity to recognize the specific barriers will become a reasonable basis for crafting strategies for managing digitalization.

Digitalization's pitfalls in higher education

Prior literature helps in understanding the barriers to applying digitalization in HEIs and identifying the pitfalls of digitalization in education.

1. **Education gap**. It is undeniable that digitalization has exacerbated educational inequalities. While developed nations can easily plan to switch to virtual learning, the situation is more challenging for developing countries (Kalolo, 2019; Khan et al., 2012). The IT infrastructure in developing countries needs to be improved. Unequal access to the internet implies unequal access to information, knowledge, and international networks. Therefore, educational device usage has yet to optimize its goals to expand opportunities and access to education.

   Although digitalization in education has started, progress still needs to be faster. Notably, a large proportion of the population in the developing country still needs to be made available to students accessing digital learning. This progress is substantial because students' differences in internet access might hinder their consistency in remote learning participation (Underwood, 2009). However, developing countries still have the potential to expand access and improve the quality of instruction and learning at all levels. UNICEF (2021) reported that the Indonesian government has shown numerous initiatives to promote digital learning. For instance, before the pandemic, Indonesian government support for digital learning primarily focused on TV programming and making digital versions of textbooks available online, launched SPADA Program that intended to increase student access to learning through quality massive open online courses (MOOCs). During the COVID-19 Pandemic, the Indonesian government has attempted to create an ecosystem for open-access digital education. Some efforts are shown by developing Rumah Belajar, Guru Berbagi, and Guru Belajar platforms and launching the Driving School Program to transform learning ecosystems and public-private collaborations for advanced Indonesia. Thus, the initiative to support digital transformation in education and to prevent the education gap in developing countries should be supported by the ongoing collaboration between government agencies, educational institutions, individual communities, and non-profit organizations (Guri-Rosenblit, 2009).

2. **Education has lost its fundamental nature**. Digitalization strongly influences learning culture. Miranda et al. (2021) mentioned that in Education 4.0, the educator becomes a mentor, coach, or collaborator. The approach in the classroom is primarily student-centered. This approach encourages active and high-independence learners. They are able to access information and learning network based on their preference (Collins & Halverson, 2010). They

enhance their personal learning experiences without depending on the educator in the class. However, this situation led to a disconnection between educators and students, indicating a shift in value transferred.

Guri-Rosenblit (2009) states that the implementation of digitalization should enable HEIs to implement the Seven Principles of Good Practice. One of the principles is that digital technologies enable and enhance active learning. Using digital technology in the learning process should enable students to talk about their learning actively, reflect on studied themes, and respond to each other's reflections. Thus, the educator should optimize digital technology in enhancing active learning without changing the nature of social connections in the learning process.

3. **Information overload.** Although information overload has posed a problem long before the internet, it has been perceived as one of the critical challenges for organizations in the digital age. Previous literature has explained that employees face more complex and varied tasks in the digital era, the more comprehensive information from internal and external sources. Moreover, employees also have greater access to search and choose the source of information (Lauri et al., 2021). Thus, these contribute to information overload and, in the long term, will lead to communication behavior, word-of-mouth activities, and decreasing judgment accuracy. In an education setting, Lauri et al. (2021) state that information culture in HEIs is valuable in understanding information environments and their relation to the perception of information overload. The academic staff mainly perceived information overload as the overload of work tasks arising from their diverse roles that combine teaching, research, development, and administrative tasks.

Managing digitalization in higher education

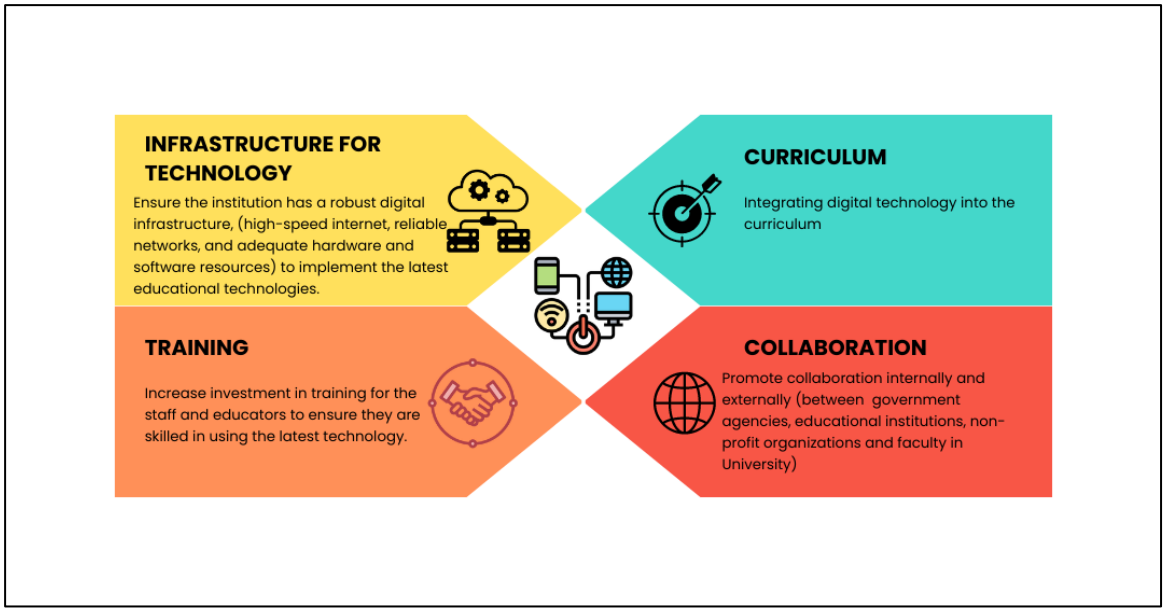
There has already been digitization in higher education, but progress has been slow due to institutional and individual obstacles. As found in previous studies, the obstacles faced by each institution vary greatly. Therefore, understanding how to manage digitalization amid continuous change should be a top priority for leaders of higher education institutions (Alenezi, 2021). The focus of organizational leaders should be directed toward prioritized strategies. Generally, the management of digitization should be focused on four primary areas, namely: namely: infrastructure for the use of the latest technology, curriculum, training, and collaboration (Figure 1).

1. **Infrastructure for the latest technology.** Effective use of technology requires adequate resources, infrastructure, and appropriate maintenance actions. The readiness of institutions to adopt technology is measured by the willingness to invest in infrastructure (such as offering up-to-date hardware and software, as well as reliable, fast internet connections). Aditya et al. (2022) and Khan et al. (2012) found that digitization in HEIs becomes unrealistic due to the need for more reliable infrastructure. This situation is even more severe in developing countries (Aditya et al., 2022a; Bates, 2015). Therefore, the first strategy in managing digitization in education is to prepare the appropriate infrastructure to implement advanced technology.
2. **Curriculum.** One of the main dimensions in managing digitization in HEIs is the development of a curriculum that meets standards to accelerate the digital learning process and expand the use of information and communication technology (Alenezi, 2021). Digital technology should be integrated into HEI's curriculum to maximize the benefits of technology use throughout the

learning process (KPMG, 2020). In addition, a digitally integrated curriculum will prepare graduates for work in the future.

3. **Training.** Students, teachers, and staff need regular training to stay up-to-date with constantly changing technology. The growing use of technology in the learning process will replace traditional learning methods with digital learning. Consequently, technology use in HEIs will be measured by whether staff, teachers, and students believe they can improve learning (Alenezi, 2021; Miranda et al., 2021; Regudon et al., 2022). Therefore, the strategy for managing digitization in HEIs should be directed toward investing in providing training for staff, teachers, and students.
4. **Collaboration.** The increasingly competitive global market in HEIs encourages institutions to collaborate with many parties. By collaborating, the University can optimize digital technology to achieve competitive advantages. Technological developments enable institutions to collaborate better and more widely through platforms connecting government agencies, educational institutions, individual communities, and non-profit organizations (Guri-Rosenblit, 2009).

Figure 1. Framework for Managing Digital Transformation in Higher Education



Source: study results

CONCLUSIONS

Digital transformation has become one of the significant changes in educational institutions in recent years. Digital transformation is applied in HEIs for various purposes: transformational educational programs and the transformation of the educational process. The implementation of digital transformation can be applied to many aspects of the educational system, including the learning and teaching process, pedagogy, curriculum, communication, and infrastructure. It has been found that the challenges in implementing digital transformation vary in different contexts and cultures. However, in general, a lack of organizational leadership, unsupportive infrastructure, lack of IT support services and experts, and commitment have become the main barriers. Thus, to keep focusing on the education mission, HEIs management should understand the priority barriers and craft a strategy to deal with these.

Based on the literature review conducted, this study concludes that four elements should be the focus of universities' strategy in managing digitalization in education. These four elements are

infrastructure, curriculum, training, and collaboration. These four elements are outlined in the framework in Figure 1. A well-designed strategy will help the universities' management to bring HEIs to a digital era without dwelling on the pitfall of digitalization in the future. This framework is expected to contribute theoretically to exploring phenomena and issues related to digitalization in HEIs. Practically, this study provides important implications regarding the main strategies that university leaders should establish in adopting technology to create a competitive advantage.

LIMITATION & FURTHER RESEARCH

Given the wide range of discussions about digitalization in higher education, future research capturing the strategy for managing HEIs in the digital era could be beneficial. However, this study has a limitation in terms of methodology. This study should have considered the systematic literature review in reviewing the articles. This current study is only based on a knowledgeable selection of current, high-quality articles on the topic of interest. The article selection process did not follow a predefined protocol. Thus, further research should consider doing a systematic literature review.

This study proposed several exciting new directions for future studies on digitalization in HEIs. The link between digitalization and lecturers' and students' performance has been interesting for many years. Nevertheless, continued attention is needed to the connection between digitalization and University's performance. A direct effect of an institution's investment in technology and the institution's performance (for instance: the University's accreditation and student number) should be measured to ensure that the strategy is value-added. This idea is essential because it will affect the University's survival strategy and create competitive advantages. Previous research has also explained that technological developments enable people to learn anytime from various sources and use alternative educative tools, such as Massive Open Online Courses (MOOCs). However, a study examining how MOOCs affect people's interest in enrolling in higher education institutions needs further exploration.

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