DIGITAL TRANSFORMATION IN GLOBAL HIGHER EDUCATION: A REVIEW OF LITERATURE AND IMPLICATIONS FOR VIETNAMESE UNIVERSITIES

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Abstract

Digital transformation in higher education has become a common trend in the pursuit of a sustainable education system in the future. This trend fosters higher education institutions to implement teaching, learning and research activities in an innovative and creative way. Globally, universities are making efforts to boost digital transformation application as a way to maintain their competitive advantages. This literature review aims to discuss digital transformation in global higher education, elaborate types of digital transformation, digital transformation frameworks for universities and put forth implications for Vietnamese higher education. It is hoped that this paper will provide insights into digital transformation in higher education in the world so that educators, policy makers and university leaders can collaborate and take proper actions to enhance the effectiveness of digital transformation application.

Keywords: *Artificial intelligence, big data, cloud computing, digital transformation, Internet of things, universities.*

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CHUYỂN ĐỔI SỐ TRONG GIÁO DỤC ĐẠI HỌC: MỘT NGHIÊN CỨU TỔNG QUAN VÀ CÁC HÀM Ý CHO CÁC TRƯỜNG ĐẠI HỌC VIỆT NAM

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Tóm tắt

Chuyển đổi số trong giáo dục đại học đã trở thành một xu thế chung trong nỗ lực duy trì một hệ thống giáo dục bền vững trong tương lai. Xu thế này thúc đẩy các cơ sở giáo dục đại học thực hiện các hoạt động đổi mới sáng tạo trong giảng dạy, học tập và nghiên cứu. Trên thế giới, các trường đại học cũng đang đẩy mạnh áp dụng số hóa nhằm gia tăng lợi thế cạnh tranh. Nghiên cứu tổng quan này được tiến hành nhằm thảo luận các vấn đề về chuyển đổi số trong giáo dục đại học trên thế giới, phân tích các thành phần, các mô hình chuyển đổi số trong giáo dục đại học và đưa ra một số hàm ý cho các cơ sở giáo dục đại học ở Việt Nam. Hy vọng rằng bài viết sẽ cung cấp những tri thức về chuyển đổi số trong giáo dục đại học trên toàn cầu, từ đó các nhà giáo dục, nhà hoạch định chính sách và các lãnh đạo nhà trường cùng đề ra phương hướng hợp tác và đưa ra các hành động phù hợp để nâng cao hiệu quả của hoạt động áp dụng chuyển đổi số trong trường đại học.

Từ khóa: *Chuyển đổi số, điện toán đám mây, dữ liệu lớn, Internet vạn vật, trường đại học, trí tuệ nhân tạo.*

1. Introduction

In recent times, digital transformation (DT) has exerted enormous influences on all aspects and dimensions of human life. As higher education institutions (HEIs) serve as knowledge providers for the dynamic development and innovation of thesociety, digital transformation in HEIs plays a crucial role in promoting sustainable education system. Specifically, DT has tremendously impacted on all activities in higher education including processes, places, formats and objectives of teaching, learning, and research. This transformation involves the upgrade of infrastructures and the increasing utilization of digital media and technologies in learning, teaching, research, administration, and communication (Kaputa et al., 2022). To date, DT strategies are deemed to increase revenue, enhance productivity, create more value via innovation, and strengthen brand reputation and novelty for universities (Matt et al., 2015). Therefore, many HEIs worldwide have announced strategies and goals on DT in response to the rapid changes, competitiveness and challenges in this sector. This emerging issue has aroused interest from researchers and practioner globally; thus, a considerable number of studies have been conducted on characteristics, challenges, implementation process, stakeholders' perspectives pertaining to digital transformation (Rodriguez, 2017; Kaminskyi et al., 2018; Thoring *et al*, 2018; Benavides, 2020). However, in Vietnam there is a scarcity of research on this field, therefore it is essential to conduct a literature review on this issue in higher education globally and subsequently put forth implications for domestic universities in order to promote and sustain HEIs in Vietnam.

2. Literature review

2.1. Definition of digital transformation

Digital transformation is initially derived from business which is defined as the changes caused by digital technologies in an organization. Young and Rogers (2019) posit that DT is a process of change which stems from omnipresent data, connectivity and decision-making that transform products, processes and organizational structure. In higher education, DT is considered as a way to attract upper-class students, improve students' experiences, offer quality teaching materials and provide blended learning (Mohamed Hashim, 2022). Indeed, in times of global pandemic, universities have incrementally adopted digital technology to ensure the continuity of knowledge transfer to students. As such, teaching remotely has become the popular trend in higher education. During Covid 19, with DT, the knowledge on a wide range of courses and disciplines can be accessible by students from different platforms such as open-source, databases and applications which make learning possible and easier than ever before.

2.2. Typical types of digital transformation

DT is characterized by the following elements:

Artificial Intelligence (AI)

AI is defined as the simulation of human intelligence, which is executed by machines, particularly computer systems (Mohamed Hashim, 2022). It facilitates personalized learning pertinent to students' needs (Nicola & Dalessio, 2019) which is currently influencing learning methods of global education (Rouse, 2019). The aim of AI application in education is to sustain the collaboration between human and machine in our life, study and work. Researchers encourage the adoption of AI in education in five key areas including education management, teaching, learning assessment, skills development for life and work in AI era, and lifelong learning offerings for all.

Cloud computing (CC)

According to Mell and Grance (2011), cloud computing is a model of computing resources which can be configured, shared, deployed and accessed via a number of networks. Nowadays, CC is widely implemented in universities across the globe to enhance students' learning experience, foster innovation, boost entrepreneurial mindset, and promote educational delivery (Mohamed Hashim, 2022). The application of CC is enabled by the use of the Internet, virtualization, virtual reality, etc.

Internet of things (IoT)

According to Furness (2008), IoT is a world which allows things to connect to computers and each other to yield benefits to human beings. In other words, IoT facilitates the connection and communication of devices around the globe to obtain information and store it for later usages (Gil et al., 2016). In this regard, there is a massive transformation for students to move from paper books to tablets and laptops which allow them to learn at their own pace with all the necessary learning materials at hand. Moreover, IoT also accommodates teachers with technology-based which makes teaching process more effective. For instance, teachers no longer have to mark students' papers manually; instead, they can prioritize students' personalized learning by collecting data on students' performance and subsequently work out the most optimum method to cater to their needs. Additionally, via connected devices, universities administrators can take control of their students, faculties and resources at a lower cost.

Big data

As higher education is now facing numerous challenges pertaining to competitiveness and innovation, institutions have increasingly utilized data to make their decisions (Menon et al., 2014). To this end, the data relating to decision-making process is derived from social media, online data resources and digital libraries with exponential growth in volume yet lower cost of storage which eventually facilitates accessibility and analytics (Daniel, 2017). When Big Data is applied effectively, it can accommodate institutions to enhance learning experience, better students' performance, minimize dropout rates and maximize graduation rates (Dringus, 2012).

It is noted that DT is considered as a good opportunity for HEIs to enhance their delivery and reputation. Moreover, DT may create an inevitable change from traditional teaching and learning experiences to innovative and creative teaching and learning methods. This requires educators and researchers to rethink teaching and learning approaches in the new context of DT application.

3. Methods

The data in this research was 29 research articles regarding DT in higher education published in electronic database of Web of Science (WoS) and Scopus from 2012 to 2022. The key words were used to search the relevant articles including DT, higher education, universities, institutions, and digitalization. The articles selected complied with some certain criteria as follows:

- The articles are full-paper version.

- The articles are in English as they are published in WoS/Scopus.

- The articles must relate to higher education.

- The articles must relate to.

Subsequently, the data was researched and categorized in terms of DT issues, types, and frameworks in global higher education. Then, the paper puts forth some recommendations for Vietnamese universities in response to the need for gradual adoption of digitalization in higher education sector.

4. Results and discussion

4.1. Digital transformation in global higher education

It is generally accepted that DT is a beneficial strategy as it leads to the continuous improvement of universities which is considered a prominent competitive advantage. DT such as artificial intelligence, cloud computing, Internet of things, and big data play the key roles in the era of knowledge economy and globalization. AI is functioned based on engine applications and devices in order to facilitate distance learning which ultimately brings about socio-economic benefits. It also exerts tremendous impact on the decision-making process at universities. Cloud computing allows universities to synthesize a wide range of virtual resources which are convenient and cost-effective for teaching, learning and research. CC is believed to help universities disseminate research knowledge effectively. Internet of things enables universities in the world to deliver any program remotely and effectively. IoT makes communication

with global students possible with fast speed and high efficiency which is deemed a competitive advantage to universities. Institutions in the world also make the best use of big data to forecast students' behaviours and provide them with timely support (Daniel, 2017).

4.2. Digital transformation framework for higher education institutions

The digital era creates the demand for a highly skilled workforce with ample knowledge and skills in technology. Therefore, there is a pressing need for universities to renovate the curriculum, upgrade infrastructure and transform the roles of learners, teachers, and researchers in more interactive and engaging manners (Elena, 2017). In order to successfully implement the DT, universities should refer to the transformation frameworks, taking into account the core value of higher education institutions namely teaching, learning, research, and community service. Many HEIs in the world have followed DT models proposed by Google and Microsoft as follows:

a. Framework proposed by Google

Figure 1. Digital transformation framework proposed by Google (Source: Google)

Google identifies seven constituting factors namely vision, learning, culture, technology, professional development, funding and community. It is suggested that university managers should boost innovative culture and nurture the risk-taking and failure-overcoming mindset. Technology becomes a critical element in DT process, thereby requiring leaders to encourage students and staff to adopt technology in achieving success. Moreover, financial sources should be taken into consideration to maintain the DT as strategic development. Notably, it is essential for school administrators to engage all the stakeholders such as parents, enterprises, government, and citizens in the process. Finally, the model recommends that training courses should be provided to academics to equip themselves with necessary skills and knowledge for successful DT implementation.

b. Framework proposed by Microsoft

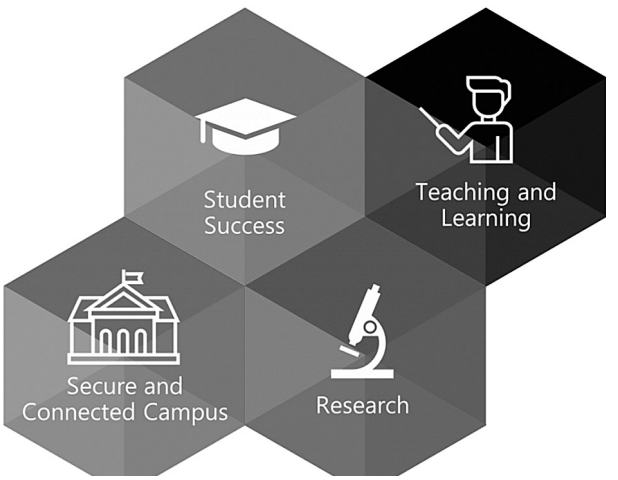

Figure 2. Digital transformation framework proposed by Microsoft (Source: Microsoft)

Microsoft has introduced a framework for DT in higher education which serves as a useful guide for HEIs in establishing a route map in pursuit of their visionary objectives. The model is composed of four elements namely student success, teaching and learning, research, and a secure and connected campus. Specifically, student success refers to ways to attract students, meeting their needs and ensuring long-standing relationships with them. In terms of teaching and learning, institutions need to maintain a life-long learning culture and continuous improvement in education. Research dimension focuses on offering researchers essential skills, research-supported resources and competences so that they can take the initiatives in conducting research.

In assessing the digital implementation capability of a university, Rodriguez-Abitia et al. (2020) posits that digital maturity can be evaluated through information technology infrastructure for classrooms, laboratories and administrations and how DT is applied in teaching and learning. Rodríguez-Abitia and Bribiesca-Correa (2021) also state that higher education institutions are behind other businesses and industries pertaining to DT implementation. However, HEIs are making every effort to offer high quality education with the application of DT.

5. Implications for Vietnamese universities

5.1. Vietnamese context

In recent years, there are an increasing number of young people using smart devices and Internet in Vietnam which familiarize themselves with digital environment. Statistically, Vietnam is among the top 10 countries accessing the Internet with 68.72 million Internet users, making up 70.3% of the population. Additionally, about 73.7% people using social network which is also a favorable condition for Vietnamese people to approach education in the 4.0 era (Phung The Vinh, 2021). Particularly, in June 2020 Government have issued Decision No. 131 which highlighted "National digital transformation program to 2025, with a vision towards 2030", stressing that education is expected to become one of the eight priorities in DT (Prime Minister, 2022). In this regard, Vietnam is expected to apply information technology (IT) and digital transformation in education with a view to innovate this sector and eventually boost the development of digital government and economy. For the past three years, the serious spread of Covid 19 has been accelerating digital education tremendously. As such, Decision No. 131 also places the importance of online learning with the targets that half of all students and teachers have easily accessed to online learning and teaching. Therefore, at least 50% of higher education institutions will have to provide online learning programmes to meet this demand.

5.2. Challenges for digital transformation in Vietnamese higher education

The DT implementation process in Vietnam may encounter numerous challenges that universities need to take into consideration. In the first place, the obstacle comes from academics' resistance to changes because DT requires teachers and administrators to adapt to new teaching methods and technologies. Thus, there is a need for institutions to raise academics' awareness about the necessity of DT in promoting university's position in today's competitive setting. In this regard, some pilot projects should be conducted to work out the potential problems and ensure the success of the process (Alenezi, 2021). Second, there is a tendency that universities often concentrate on urgent and current issues rather than DT which involves enormous investments, tremendous efforts, and complicated processes. This issue can be handled by drawing up a plan for digital investment as a roadmap for sustainable development. Third, in the DT implementation process, there may exist disparities in the digital literacy among teachers and students. DT in higher education necessitates new teaching methods, learning tools, and digitally-based research tools such as video conferencing, Zoom, Google Doc, Google Classroom, Canvas, Schoology, etc. However, there is a gap between dynamic young teachers and students who are digital competence and old teachers and remote-area students who are less adaptive to new technologies. To overcome this problem, universities should encourage DT learning environment and frequently organize training courses to enhance DT knowledge and skills for academics and students. Finally, DT is likely to bring about a number of disadvantages. For examples, confidential information about exam questions, personal information and lecturers' accounts are at the risk of being hacked. Moreover, there also exists scams, cyberbullying, toxic pages on the Internet which negatively affect students and teachers' mental health. To this end, university leaders should implement network security and safety system to store and secure databases, avoiding the possibility of cyber attracts and

database theft at universities. Additionally, the school administrators in collaboration with lecturers are responsible for orienting and educating students to take caution of online communication and online learning in order to become smart Internet users (Nguyen et al., 2023).

5.3. Implications for Vietnamese universities

Apparently, the demands of the future lead to many challenges for international and national higher education institutions which include competition (Pucciarelli & Kaplan, 2016), profit (Spearling, 2017), and the focus on students (Curaj et al., 2018). As such, in Vietnam, DT is considered as a complicated process involving a number of stakeholders namely students, teachers, administrators, and community. Firstly, there is a tendency that students will expect university's implementation of digital technologies such as artificial intelligence, the Internet of Things, cloud computing, big data to enhance their learning experience and align with digital economy workforce. Therefore, Vietnamese universities can apply DT in many different ways by recruiting students through the use of social media, making enrolment digitally via students' mobile phone, offering various online services and learning options like blended courses, distance learning, etc., monitoring students' performance digitally, and co-operating with enterprises to seek job opportunities. Secondly, in the digital age, teachers need to equip themselves with digital skills through professional development training courses. It is imperative for teachers to achieve certificate about digitalization and the application of digitalization in pedagogical innovations. Thirdly, universities should establish the target to widely implement DT in three key aspects including 1) Enhancing digital infrastructure, 2) Training teachers' digital skills in teaching and research, and 3) Teaching students' digital skills in their study and future job (Grosseck, 2020). Fourthly, it is essential for Vietnamese universities to cut down on paper work; in other words, "paperless" should be encouraged to foster electronic information systems which facilitate students to access to all the information online through faculty or university websites. Furthermore, social media platforms such as facebook, instagram, etc. should be taken advantage of to update the latest information about faculty and university. These platforms are also effective channels for timely student-student and student-teacher interaction. Fifthly, it is critical for Vietnamese universities to build a culture of decision-making based on data to figure out how work should be executed and how information should be exploited. Finally, Vietnamese universities should gradually implement digital technologies such as IoT, artificial intelligence, cloud computing and big data within its campus. For example, universities can use AI conversational interface to make students feel as if they are engaging in a real conversation with teachers or administrators in faculty and university websites.

6. Conclusion

This study conducted a literature review of DT in global higher education; subsequently put forth some implications for Vietnamese context. The paper has addressed the definition, types of DT and some current issues for DT in the future as well as recommendations for universities in Vietnam. In order to provide insightful information about DT, the paper suggests that more studies including literature review and empirical research should be conducted both qualitatively and quantitatively to investigate the challenges and opportunities in the implementation of DT in higher education.

As DT plays the key role in the future roadmap of sustaining higher education in Vietnam, government, Ministry of Education, university managers, policy makers, and enterprises should work in close collaboration on the execution of DT in an attempt to build competitive advantage to promote Vietnamese higher education domestically, regionally and internationally./.

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