

DIGITAL TRANSFORMATION IN HIGHER EDUCATION: AN INTEGRATIVE REVIEW APPROACH

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ARTICLE INFO		ABSTRACT
Received:	16/4/2021	Digital transformation enables higher education to change the traditional ways of running their activities including teaching, learning, researching, and operating with novel, creative and saved manners. Over the world, higher education institutions are struggling to build up and develop their digital transformation strategy and activities to find for themselves the most suitable models. This study aims to comprehensively review the pertinent literature to provide an integrative approach about digital transformation in higher education. We used Web of Science (WoS), Google Scholar, Research Gate, ScienceDirect as databases to access the papers about digital transformation in higher education. The selected papers must be about digital transformation in higher education, in English and with full-text accessibility. Totally, 24 papers were included in the review. Based on the information provided by our review, future research can use empirical design to identify and examine the factors impacting on the execution of digital transformation in higher education.
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Digital transformation		
Digitalization		
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CHUYỂN ĐỔI SỐ TRONG GIÁO DỤC ĐẠI HỌC: NGHIÊN CỨU TỔNG QUAN

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THÔNG TIN BÀI BÁO		TÓM TẮT
Ngày nhận bài:	16/4/2021	Chuyển đổi số giúp các trường đại học thay đổi các hoạt động dạy – học, nghiên cứu và vận hành truyền thống với các cách thức đổi mới, sáng tạo và tiết kiệm chi phí hơn. Trên thế giới, các trường đại học đều cố gắng xây dựng và phát triển chiến lược và các hoạt động chuyển đổi số để tìm ra một mô hình phù hợp nhất với từng đơn vị. Nghiên cứu này hệ thống tổng quan tài liệu để cung cấp những thông tin tổng hợp về hoạt động chuyển đổi số trong giáo dục đại học. Nghiên cứu sử dụng các cơ sở dữ liệu như Web of Science (WoS), Google Scholar, Research Gate, ScienceDirect để tiếp cận các bài báo về chuyển đổi số trong giáo dục đại học. Các bài báo được lựa chọn để nghiên cứu tổng quan phải đáp ứng các tiêu chí: có nội dung về chuyển đổi số trong giáo dục đại học, viết bằng tiếng Anh và có thể tiếp cận toàn văn. Tổng cộng có 24 bài báo được sử dụng để nghiên cứu tổng quan. Dựa vào các kết quả của nghiên cứu tổng quan này, nghiên cứu thực nghiệm trong tương lai có thể xác định và đánh giá các yếu tố ảnh hưởng đến công tác triển khai hoạt động chuyển đổi số trong giáo dục đại học.
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1. Introduction

Digital transformation is among the most popular concepts mentioned in recent years. The concept of digital transformation refers to the application of digital technology in various fields of society. Digital transformation in education represents a change in teaching methods, which employs information technology and modern devices in teaching and learning. The employment of information technology and modern devices facilitates the need satisfaction of students and teachers, thereby helping learners and teachers maximize their thinking, creativity, and initiative in teaching and learning [1]. The application of digital transformation in higher education worldwide has demonstrated numerous benefits which help to remarkably save time and money. At the same time, it creates favorable conditions to help teachers and learners overcome the barriers of space and time - which are of the biggest barriers to implement traditional teaching methods due to unexpected events. In particular, the benefits that digital transformation brings are even more evident in unfavorable conditions, such as natural disasters and epidemics [2] - [5]. Realizing the benefits that digital transformation brings, leaders of Vietnam government have begun to research and apply digital transformation in the field of education. However, it was not until the end of 2019 when we experienced the emergence of the global COVID-19 pandemic that the advantages of digital transformation in education compared to traditional education was highlighted. In Vietnam, understanding the situation of the pandemic, the Ministry of Education has issued the motto "pause to go to school, never stop learning". Following that motto, in Vietnam, 85% of schools and 245 universities have organized online teaching and learning; in which, 80 institutions teach and learn completely online. These led to that the education sector has completed the tasks of the 2019-2020 academic year while ensuring the health of students and teachers during the pandemic. Thanks to the timely application of digital transformation, all activities of the Vietnam education sector can not only take place normally but also achieve remarkable results. Through online learning with communication applications such as Zoom, Skype, and Google Classroom... students completed their semester with good results. Schools and teachers also complete the pre-determined teaching plan. Hence, digital transformation can be considered as an undeniable trend in education in general and in higher education in particular, in a changing and fluctuating environment. It can be said that digital transformation plays a vital role in the current 4.0 era. It helps people to be proactive in learning, working, and production activities in the fluctuating conditions of the natural – social environment. If the application of digital transformation in education works effectively, then this will be the key to completely change the traditional way people have been working.

Whereas, higher education institutions (HEIs) around the world in general and in Vietnam in particular are struggling to build up and develop their digital transformation strategy and activities [6] – [8] posing a need for an comprehensive view about digital transformation in higher education. Thus, we conduct a research aiming to review the pertinent literature to provide a integrative approach about digital transformation in higher education.

2. Methodology

2.1. Database

This study used multiple recognized scientific databases to access the papers related to digital transformation in higher education. The databases include Web of Science (WoS), Google Scholar, Research Gate, ScienceDirect. The databases enable advanced structures to be searched, which applies logical operators that are suitable for to the features of the review proposed in our study.

2.3. Search strategy

Several keywords were used to find and access the potential papers for the review. The keywords include: DIGITAL TRANSFORMATION, HIGHER EDUCATION, UNIVERSITY,

INSTITUTIONS, DIGITALISED, E-LEARNING, DIGITAL LIBRARY, ONLINE TEACHING, DIGITAL CLASSROOM, FULL-TEXT, FULL-PAPER. These keywords were either one-by-one inserted to the search machines or combined together. Such search strategy enables the most potential to access the full-text papers about digital transformation in higher education.

2.3. Paper selection

The criteria for the selection of papers to review are as follows:

- (1) The papers must include Digital transformation issues
- (2) The papers must include higher education issues
- (3) The papers must be in English or Vietnamese
- (4) The papers must not be duplicated with each other
- (5) The papers must be with full-text version

2.4. Review protocol

The protocol of the review is presented in Figure 1.

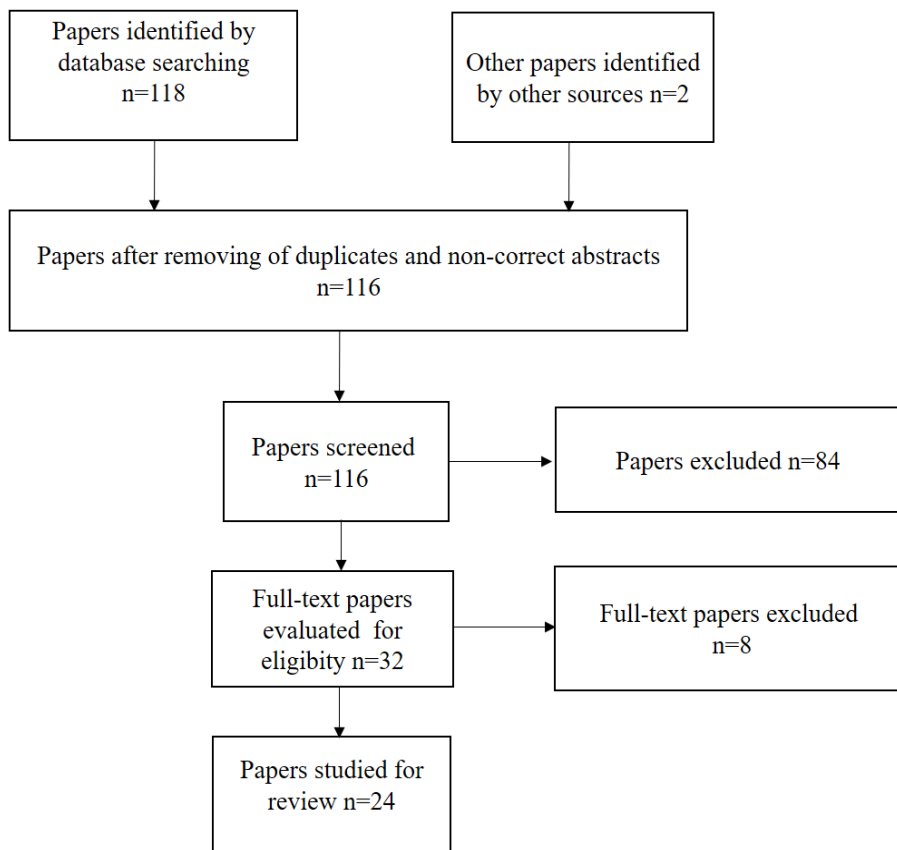


Figure 1. Review Protocol

Figure 1 shows the protocol for viewing and recording data. In the first step, we collected 118 papers from the database search, of which 2 papers were from other sources. After removing papers of duplicates and non-correct abstracts, we had 116 papers left. In the next step, we continued to screen these 116 papers for further related contents from their abstracts, resulting in 84 papers being excluded. We then assessed the eligibility of the remaining 32 papers, of which eight full-text articles were excluded. Finally, we were left with 24 papers that fully satisfied the selection criteria.

3. Results and discussion

3.1. Definitions of transformation in higher education

Table 1 shows the definition of digital transformation in higher education across reviewed papers.

Table 1. Definition of digital transformation in higher education

Paper	Definition of digital transformation
[3]	Digital transformation can be understood as the “changes that the digital technology causes or influences in all aspects of human life”.
[4]	Digital transformation is about adopting disruptive technologies to increase productivity, value creation, and the social welfare.
[5]	Digital transformation of higher education institutions is a process of their technological and organizational changes, primarily caused by the development of digital technologies.
[6]	The digital transformation is intrinsically connected to what has been defined as the “fourth industrial revolution” - a process through which digital technologies are shaping the future of society and economic development in a comparable manner to the case of steam power for the first industrial revolution.
[7]	Digitalisation of education involves various aspects of quality, ranging from organisational issues, technological infrastructure to pedagogical approaches and influences internationalisation by offering online and flexible educational programmes.
[8]	Digital transformation has recently attracted a considerable amount of interest from scholars and practitioners, given its enormous potential impact on products, services, innovation processes, and business models
[9]	Digital transformation must ensure 4 elements, including: empowering lecturers; interact with students; Organization optimization and method innovation. The university's digital transformation process takes place in all three stages, including: planning; formulate strategies independently and implement innovations; monitoring the impact of technology deployment.
[10]	Digital transformation is concerned with transforming organizational processes; build new competencies and models through digital technologies in a profound and strategic way.
[11]	Digital transformation is fundamentally about change and it involves people, processes, strategies, structures, and competitive dynamics. Digital disruption is defined as the changes facilitated by digital technologies that occur at a pace and magnitude that disrupt established ways of value creation, social interactions, doing business and more generally our thinking
[12]	Digital transformation is a process that integrates digital technology in all aspects and requires changes in the areas of technology, culture, and operations, among others
[13]	Digital transformation of teacher education is an important part of the modernization of the education system, which creates the need to create mechanisms for its digital transformation.

Table 1 presents the definition of digital transformation in higher education across papers published in this field. It is noted that digital transformation within HEIs has been described by alternative approaches from various perspectives. Moreover, a comprehensive consensus on definition of digital transformation in higher education has not yet been reached.

3.2. Distribution of digital transformation in higher education papers

From Figure 2 and Figure 3, we can see the evolution of the number of studies about digital transformation in higher education. It is noticed from Figure 2 that the number of the papers has dramatically increased since 2019. This may be explained by the impacts of COVID 19, which forces the HEIs to implement digital activities in their institutions. Thus, many studies have been conducted about digital transformation in higher education to discuss the implementation and strategy about such transformation. Figure 3 illustrates data about the number of paper

publication distributed across countries. Germany, the U.S, and Turkey are three countries that have the most papers about digital transformation in higher education at three articles. The second most popular is Denmark and Vietnam with two articles. The remaining countries have the least number of papers about digital transformation in higher education that is published, just one article. It is noted that the numbers of the articles as shown in Figure 3 reflex the publication distribution within the framework of the present review study (with only 24 articles which meet the selection criteria presented in Section 2.3).

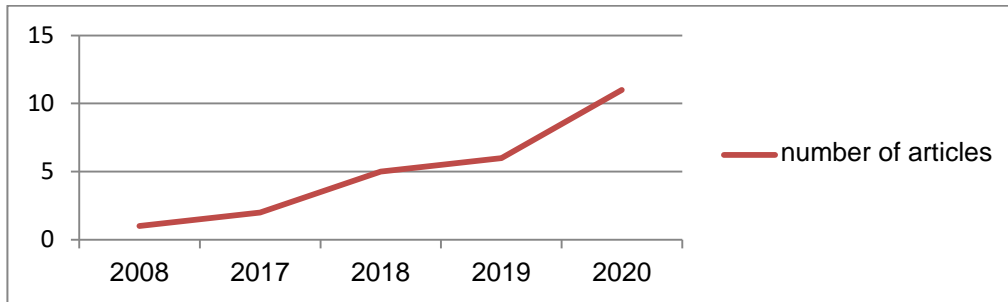


Figure 2. Publication distribution through years

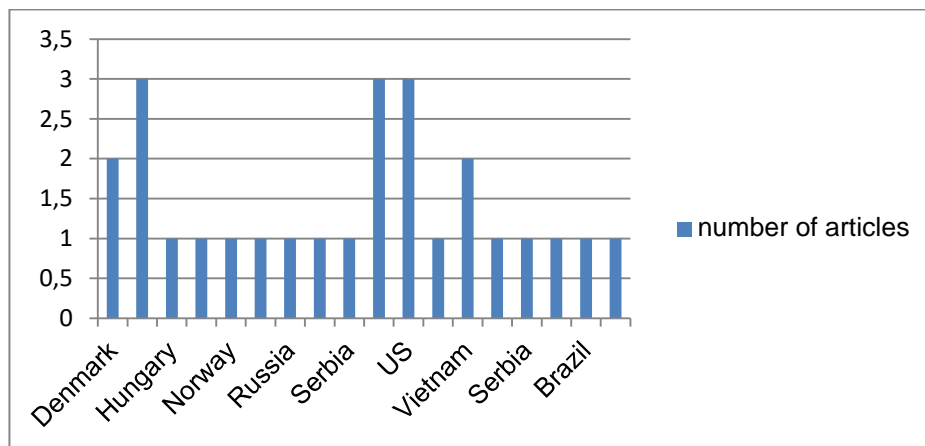


Figure 3. Publication distribution across countries

3.3. Model of digital transformation in higher education

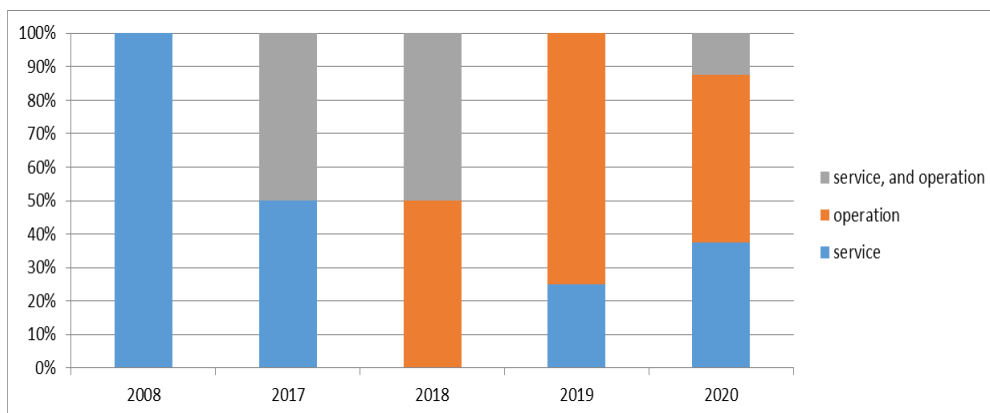


Figure 4. Model of digital transformation in higher education

Sandkuhl and Lehmann [14] suggested several paths to build up and implement digital transformation strategy and activities in higher education, including:

(1) Service – first transformation: Focus on activities of creating new training products towards digital transformation, digitizing traditional training products, building and implementing digital platforms to implement interaction - cooperation between trainers and students, eg. lecture and e-learning materials development, e-learning

(2) Operation – first transformation: Focus on digital transformation for university management / operating processes such as enrollment, student management, subject registration, testing, program development, quality assurance, and management equipment, building timetable, assigning lecturers, e-library

(3) Service – operation combined transformation: The university implements extensive digital development on all processes and activities from operations to teaching

Following suggestion of Sandkuhl and Lehmann [14], we classified the digital transformation into the three models and presented the result of the review in Figure 4. As we can see, in past years, the models only covered service aspect of digital transformation. However, in recent years, the models of digital transformation in HEIs cover both service and operation aspects (combined models).

3.4. Dimensions of digital transformation in higher education

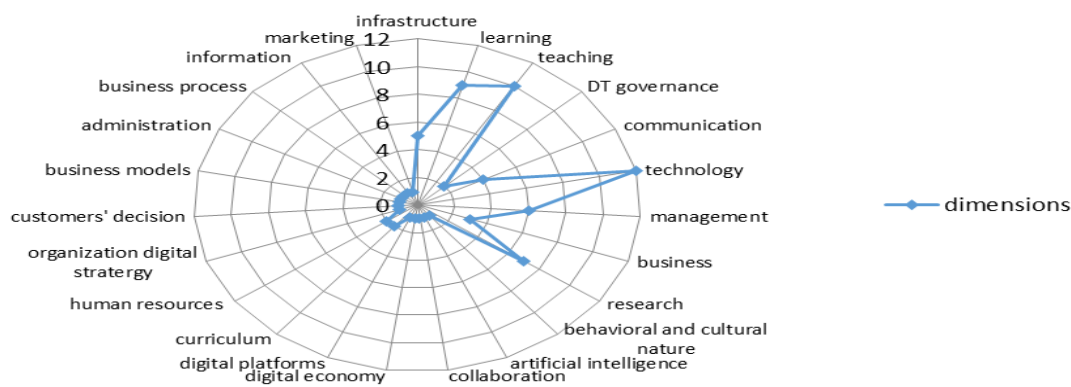


Figure 5. Dimensions of digital transformation in higher education

Figure 5 shows the dimensions that digital transformation had focus on. Through studying 24 papers, we found numerous dimensions related to digital transformation in higher education, which are 23 dimensions as shown in the Figure 5. However, we choose to focus on the six most prominent dimensions.

Technology: Several authors have recognized a pressure about communication technology. They said that the development of innovation and technology in higher education must response the demand of the rapid change taking place in the world. Moreover, the use of technology is increasing in everyday life, so the application of digital transformation in higher education is inevitable [2], [15] - [17].

Teaching: In digital transformation, the teaching dimension has several faces [11], [18]. Nowadays, using Internet has been common, their range has been differentiated and the creation of teaching documents has been changed to broaden such digital and online education [1], [19].

Learning: Digital transformation in higher education is acknowledged as requisite for development by everyone, and changes in students' learning approach and application technology are taken into account [1], [16], [20], [21].

Digital solutions in the classroom can be hardware-based or software-based. To build up the learning process, we can base on hardware solutions by using devices such as tablets, smart phones or interactive SMART boards [2], [22].

Infrastructure: In higher education, digital transformation demands to be conceptualized and internalized. Especially, the essential of providing appropriate infrastructure is emphasized [17], [18], [23].

Research: Digital transformation in higher education has included the involvement of sustainable management, to conform to the changes imposed by new technologies. Trends in global research on this topic have been considered and studied between 1986 and 2019 [12], [24].

4. Conclusion

We conducted a study of integrative review about digital transformation in higher education. This study contributes to the literature by providing a comprehensive insight for the definitions, distribution, models, and dimensions of digital transformation in higher education. We call for future research which could approach alternative aspect to further provide insightful information about research of digital transformation in higher education. Moreover, original and empirical studies are encouraged to quantitatively examine the factors influencing the execution of digital transformation in higher education.

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