DIGITAL TRANSFORMATION IN HIGHER EDUCATION: TRENDS AND IMPACT OF THE PANDEMIC IN 2020

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Abstract. *Digital transformation is fundamentally changing the way companies approach their operations, product and service offerings, marketing efforts, and all other aspects of their organization. Higher education is one of the largest industries that can reap significant benefits from digital transformation. The article presents an analysis of key trends related to the digital transformation of higher education. This article also describes the impact of COVID-2019 on higher education. In this case, the virus was the driver of the development of digitalization*

Key words: *university, higher education, digital transformation, international trends, COVID-19.*

Introduction

The goal of digital transformation is to better serve customers and streamline business operations. In higher education, the customers are the students and they have an immense amount of learning options to choose from — private vs. public schools, online vs. on-campus learning and full-time vs. part-time enrollment.

And with more options than ever before, college and university leaders are struggling to maintain a competitive edge, which is even more concerning when you take into account the declining rate of high school graduates. As Forbes reports, the number of high school graduates has decreased across most of the country every year and won't see an increase until 2024 [1].

The main goal of this research paper is to identify current trends of digital transformation in Higher Education, and determine the change in the pace of digitalization of education in the context of a pandemic in 2020.

The object is the main trends related to the digital transformation of higher education.

The subject is the world education system.

The main hypotheses are the assumption that:

- digitalization in the higher education system is an inevitable ongoing process;
- the coronavirus pandemic in 2020 was a driver of the growth rate of digitalization in higher education systems.

To achieve the goal, in the first part of this research paper, key trends of the digital transformation in higher education will be examined. The goals of digital transformation in higher education will be considered.

The second part of the work examines the tendency for the development of digitalization in higher education within the context of the spread of covid-19 in 2020.

Literature review. The vectors of international trends were assessed according to the best one at the top in terms of relevance and possible consequences for university education and the process of organizing education. Content analysis, structural analysis, literature review and expert interviews revealed the most significant international trends. They are presented in this article in general.

Research Results

Each college and university will have a specific area they want to focus on first, but some of the main goals of digital transformation in higher education include:

- Improving the Student Experience: This focuses on improving student performance such as retention, graduation rates, course success rates, and other metrics that confirm overall success.
- Enhancing Competitiveness: This goal seeks to differentiate the institution from competitors through digital technology.

- Building a culture of data-driven decision-making: This includes adopting digital thinking across all areas of the campus for students, faculty, executives, and other staff.
- Resource Optimization: This covers everything from improving interactions between administrators to reducing energy-related costs.

There are two main business areas that digital transformation is affecting:

1) Services: This transformation involves creating new products and changing existing ones. Examples include offering an online MBA program or migrating from using tangible textbooks to digital eBooks.

2) Operations: Processes are going completely digital. Examples here include applying for admission or graduation, registering for courses every semester, and monitoring resource allocation using modern technology [1].

Key trends related to the digital transformation of higher education.

- The Internet of Things (IoT). The IoT refers to the extension of internet access to devices and everyday items, like a Fitbit fitness tracker. Schools can use the IoT to better allocate campus resources by installing devices like intelligent thermostats and lighting. These smart devices can detect occupancy and adjust settings accordingly to eliminate wasted electricity.
- Security. With so much student data available, security is a top concern — especially since IoT devices are expanding the reach and amount of information that can be collected. Institutions are installing new tools to enhance cybersecurity, most notably user and entity behavior analytics to detect suspicious activities.
- Augmented Reality & Virtual Reality. Classroom learning can mimic hands-on experience through augmented reality (AR) and virtual reality (VR). These technologies can put architect students right in the middle of a construction site or bring medical students inside of a hospital.
- Blockchain Technology in Education. Known for making Bitcoin possible, blockchain offers exceptional security. According to Forbes, “blockchain is a public ledger that automatically records and verifies transactions … and operates through a decentralized platform making it fraud resistant.” In higher education, blockchain is being used to:
  - Verify academic credentials
  - Share student records
  - Secure infrastructure networks from hackers
  - Access employment and criminal records
- Artificial Intelligence & Machine Learning. Artificial intelligence (AI) tools can be set up around campuses to answer simple student questions, like where the library is or what time the cafeteria closes. This can be especially impactful for first-year students who are still finding their bearings.
- Chatbots for Learning. The University of St. Thomas offers a website widget that lets students chat with librarians and ask questions about basic research topics, eliminating the need for them to go to the library or pick up the phone. This practice can be utilized across any department to streamline processes like making appointments, requesting dorm room maintenance or checking on financial matters.
- ADA Compliance. Making education accessible to everyone is an absolute must under the Americans with Disabilities Act (ADA), and digital transformation is helping colleges and universities go above and beyond. Tools designed for transcription services can help hearing-impaired students easily understand an entire lecture.
- Big Data Analytics. Technology has fast-tracked the amount of data colleges and universities collect, and digital transformation is all about using it to your advantage. Institutions are using data analytics platforms to collect, manage, analyze, and share reports for crucial metrics like student success rates and retention rates. With the help of an automated and secure analytics program, making data-driven decisions can become the foundation of your digital transformation [1].

Development of digital transformation of higher education in 2020.

At the start of 2020, right before COVID-19 struck, governments and civil society, across Europe as well as in the US, Canada,

and Australia, were greatly concerned about the following five aspects pertaining to higher education:

- Providing access and guaranteeing equal opportunity to lower-income students and to members of disadvantaged minorities.
- Regulatory bodies were interested in finding a formula that would allow them to measure learning outcomes and attainment in relation to graduate employability and distribute public money in accordance with this criteria.
- Universities were assuming a more stalwart and proactive commitment to the Sustainable Development Goals, and additionally were taking a firmer stance on helping the economic development of their regional settings.
- Some parties pushed for universities to clearly encourage competence training as well as to create education programs for working adults.
- Finally, within university campuses, there was a concern regarding the wellbeing of faculty and students (including their nutrition, physical and mental health) [3].

As of April 8, 2020, universities and other tertiary education institutions are closed in 175 countries and communities, and over 220 million post-secondary students—13% of the total number of students affected globally—have had their studies ended or significantly disrupted due to COVID-19. Table 1 depicts the current state of disruption and proportion of tertiary education students affected out of the regional total tertiary student populations [2].

Table 1. Total affected tertiary education students, by region and income level (as of 8 April 2020, based on World Bank calculations).

Disaggregated by Region and as proportion of total disrupted tertiary education students			
Region	**Out-of-school tertiary ed students**	**Total tertiary ed students**	**%**
East Asia and Pacific	72,391,442	73,538,139	98%
Europe and Central Asia	36,948,926	38,030,033	97%
Latin America and Caribbean	27,007,997	27,111,868	100%
Middle East and North Africa	14,282,666	14,282,666	100%
North America	20,640,820	20,640,820	100%
South Asia	40,468,782	40,468,782	100%
Sub-Saharan Africa	8,399,127	8,533,188	98%
Grand Total	**220,139,760**	**222,605,496**	**99%**

Disaggregated by Income Level and as proportion of total disrupted tertiary education students			
Income Level	**Out-of-school tertiary ed students**	**Total tertiary ed students**	**%**
High income	53,479,089	54,103,566	99%
Upper middle income	97,493,490	97,934,594	96%
Lower middle income	65,358,490	66,421,264	98%
Low income	3,808,691	4,146,072	100%
Grand Total	**220,139,760**	**222,605,496**	99%

Immediate challenges to confront:

- Broadscale institutional disruption
- Staff and student illnesses—provision of appropriate support
- Mass student displacements and/or loss of vital campus services and support
- Technical 'debt'—even advanced, wealthy countries find themselves hampered by the use of outdated technology platforms
- Maintaining instructional operations, including coursework, exams, and awarding of degrees – modification of assessment modalities
- Maintaining or closing research operations, including on campus laboratories and facilities, field work, conferences, and external research collaborations
- Curtailing of international mobility, including logistical implications for repatriation or locally housing international students and staff
- Staff and faculty furloughs
- Student loan maintenance (including deferrals/repayment freezes)
- Equity implications—academic, social, financial, physical—for low income/at-risk students (potentially those with COVID-19 health vulnerabilities) [2].

Very few people would have predicted that universities would face such a paradigm shift

– with predominant virtual teaching and remote working bursting onto the scene – as a consequence to a global pandemic. Perhaps it might have been envisaged that the evolution of the digital world, or a new technological breakthrough, or even a drastic shift in education market demands - the "ed-tech phenomenon" - would have caused the gradual sea change we are witnessing. But few expected a virus to become one of the main drivers of digital transformation in higher education in 2020.

COVID-19 has redirected and amplified the concerns and actions of universities across the world, reshaping and challenging their interests into guaranteeing short-term operational continuity, while ensuring long-term institutional viability.

COVID-19 changed everything, and this list was no exception. New, more pressing goals were added as priorities. Throughout this short but dizzying historical event, there was a first stage (March to April 2020) focused on a new sociology of work: teaching, research and working condition-related changes in universities.

Forced by the sudden shuttering of their physical campuses, universities had to take their classes online for the remainder of the 2019-20 year. In doing so, the universities ensured a degree of class continuity and normality in the eyes of both students and their families. This led to an immediate disruption in the lives of many. It also brought to the forefront the inequalities between those students with resources and technological means at their disposal, and those without access to these devices [4].

Following this initial upheaval, some less-than-encouraging predictions were made on the financial impact that a lack of physical activity might have on universities: pared-down fundraising estimates along with the corresponding losses of a potential decrease in the number of students enrolling and deferral of admission fees.

However, some nations rapidly sprung into action in order to counteract the short-term losses the university system might suffer.

At the same time, several Massive Open Online Course (MOOC) platforms took advantage of the virtual transition and offered their online portfolio free of charge, as a temporary alternative to all students lacking university continuity. The overall number of courses taking in business, technology and data skills has grown considerably in a few months.

From May to June 2020, it reached a second stage, in which express, in-house training improved and consolidated the technological abilities needed to tele-commute and allow faculty to teach class in the best possible way.

By doing so, curricula, evaluation methods, support material, assessment systems, as well as technological tools to enable virtual interaction in class, were all adapted. There were those who, taking advantage of the blurry economic and health recovery horizon of COVID-19, talked about potential mergers between universities and tech companies, along with the disappearance of small and medium-sized institutions. At the time, others pondered what the consequences would be of a curbing of international students, given that issuance of visas would be frozen as well as trans-continental travelling.

The third phase (July and August 2020) has been devoted, for the most part, to administrative and managerial tasks, since universities have been rearranging themselves internally [4].

Internal data is being compiled and centralized, everything is being handled on a case-by-case basis, and plans are being designed by task forces specializing in everything from campus testing, tracing, tracking and cleaning of common spaces for the health and safety of all; to the technological resources available in classrooms and labs.

Many voices in the field of higher education have seized Joseph Bower and Clayton Christensen's concept of "disruptive innovation" to explain the current situation and subtly prescribe turbulent times for the status quo of universities.

As J. Bower and C. Christensen wrote in a Harvard Business Review article in 1995: "Companies must give managers of disruptive innovation free rein to realize the technology's full potential – even if it means ultimately killing the mainstream business. For the corporation to live, it must be willing to see business units die."

It would therefore be wise to be cautious when abandoning the conventional, in-person and socializing model of universities, since blindly adopting “disruptive technology” will force many to question what they know and do, making this period of change even more challenging for higher education.

Experts reached a conclusion to this problem in a recent webinar held by Harvard Business Publishing: learning technology should not be envisioned as a mere utility, but as an academic opportunity. For innovation to actually take place, changing some of the processes of universities is key. Therefore, inspiring discourses for change are not enough unless they are followed by an internal culture of action and example.

A consensus view is that the first institutional component to be prioritized right now at any university is the teaching and learning. An optimum understanding and applicability of the "learning sciences" (neuroscience and cognitive psychology) are key as the transition takes place face-to-face classes towards blended and hybrid ones: the visuality, the narrative, the socializing and the interaction, in each syllabus. Therefore, instructional design, multimedia production and data analytics seem vital at this stage.

Academic content does not become better just for being saved in a Learning Management System (LMS) and spread through a global Online Program Management (OPM). Therefore, all universities now in a virtual learning transition should refocus, emphasize, and generate a proactive and collaborative attitude and capacity for learning along with, and for the students. If we turn to Alvin Toffler, we will be embracing at that point a philosophy and organizational agility inspired by the principle of “unlearning to relearn what we once learned”, which entails almost overturning the natural order.

Scholars from all disciplines will have to be motivated, guided and well-equipped, as their courses and programs are adapted and redesigned – which will entail a smart pedagogic overhaul – and we will have to assume that they are truly attracted by gaining the art of distance training and student engagement.

Taking advantage of the virus-induced virtual culture for universities will require both imaginative and creative implementation, as well as open leadership, and an innovative mentality, until the short and mid-term future is determined.

Universities are the founding pillars of higher education, which have shown resilience throughout human history. Therefore, in a pandemic, there is a rapid development, analysis and implementation of strategic and tactical measures, which leads to the accelerated development of the digital transformation of higher education around the world [4].

Conclusions

The digital transformation of higher education opens up new opportunities for organizing training, interaction between a student and an employer, issuing diplomas, etc. Technological changes imperceptibly penetrate higher education, becoming its everyday life. Universities will have to accept the changes, otherwise they risk losing competition to other universities (perhaps traditionally unrelated to education) that offer innovative alternative options for obtaining knowledge and certificates. But the future is not predetermined. These are just predictions. Technological experimentation on campuses can help strengthen their position. And they will surely provide new food for thought and decision-making. Universities need to calculate possible risks, identify positive and negative consequences of the introduction and dissemination of technologies, and build their own development trajectories in order to minimize negative consequences.

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ЦИФРОВАЯ ТРАНСФОРМАЦИЯ В ВЫСШЕМ ОБРАЗОВАНИИ: ТЕНДЕНЦИИ И ВЛИЯНИЕ ПАНДЕМИИ В 2020 ГОДУ

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Аннотация. *Цифровая трансформация коренным образом меняет подход компаний к своей деятельности, предложениям продуктов и услуг, маркетинговым усилиям и всем другим аспектам своей организации. Высшее образование - одна из крупнейших отраслей, которая может получить значительные выгоды от цифровой трансформации. В статье представлен анализ ключевых тенденций цифровой трансформации высшего образования. В этой статье также описывается влияние COVID-2019 на высшее образование. В данном случае вирус стал драйвером развития цифровизации.*

Ключевые слова: *университет, высшее образование, цифровая трансформация, международные тенденции, COVID-19.*