TWIST

Higher Education in Digital Phenomenon

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Abstract
Over the centuries, the concept of 'higher education' has evolved through socio-cultural, political and economic dynamics with pre-determined goals to offer advanced knowledge acquisition. Out of the value chain of 'higher education' is the University structure with its attendant developmental objectives and global competitiveness. However, within the pace of recent centuries, 'digital transformation' of higher education has dominated academic discourse, and a key approach is the rethinking of the learning process, enabled mostly by technology with a view to achieving a '*digital learning'. Accentuated by the fall outs of COVID-19,* educational institutions applied different digital platforms with varying capabilities and strategies to facilitate learning which made digital technology a primary medium of education. Consequently, this research-article examined the principal objectives of digital institutions in higher education, its innovation, factors promoting the use of digital technologies in education, the variant of digital technologies in education, and related studies with technology beliefs, attitudes and barriers in education.

This study adopted a comprehensive literature review approach; critically evaluates and synthesizes existing research findings and theories related to the specific study objectives which include: enhancing the learning environment for the students; raising the programme operational effectiveness; boosting computer capacity for cutting-edge research, and promote educational innovation. As a Desktop research (secondary research), the study identifies patterns, trends, gaps, and inconsistencies in the existing body of knowledge in the digital concept of higher education; proposing a new pattern of digital phenomenon.

Ultimately, among other findings, the research-article identified digital technologies in education to include: Learning Management Systems (LMS); Publish and Share tools; Collaborative Systems; Social Networking; Interpersonal Communication Tools; Content Aggregation Tools; 3D Virtual Worlds; Assessment and Feedback systems; Mobile Tools (mobile applications internet based), and Information and Communication Technologies (ICT) -software or applications internet based. It also highlighted factors that tend to promote the use of digital technologies in education as: digital skills and literacy, infrastructural investment, digital technologies transformation and evolution, and digital technologies for learning in urban–rural context. It was also researched that digital technology drives innovation in higher education in the last five years, and formed the basis of the strategic response of Ministries of Higher Education.

Conclusively, the rapid advances in technology are reshaping our society, social institutions and schools. Modern technologies have vastly increased capacity to communicate and collaborate with others. They allow transmission of information quickly and widely, linking distant places and diverse areas of endeavor in productive new ways. These advances allow us to form and sustain communities for work, play and learning within a decade ago. Invariably, today's students have a wide range of new technology open and available to them. This information changes the relationship between people and knowledge. Applied technology affects learner's lives positively, and by adapting it, education stakeholders derive positive improvements in different categories such as: academic performance, motivation, critical thinking skills, literacy, attitudes and real life work skills.

Keywords
Higher Education, Digital Transformation, Digital Learning, Digital Platforms, Applied Technology

INTRODUCTION

The university as a concept has a long history. Over the centuries, this educational structure has adapted to socio-political conditions. However, the concept of higher education, its functions, applicants has changed in the context of scientific and technological progress and geopolitical processes. These processes have radically changed both the concept of universities and the goals of education itself. Universities are considered to be a key factor in every country's economic development and global competitiveness. Digital transformation of higher education has been discussed in the past decade, and the vision deals with many aspects, such as managerial strategy (Jackson, 2019), asynchronous collaboration (Hazemi, Hailes, & Wilbur, 2012), and the use of communication tools (Bond, Marín, Dolch, Bedenlier & Zawacki-Richter 2018). A key approach is a rethinking of the learning process, enabled by technology, that is the development of a digital learning space (Jackson, 2019; Gafurov. Safiullin,, Akhmetshin. Gapsalamov & Vasilev, 2020).Nevertheless, the means of achieving educational goalsallow and improve with digital information and communication technologies (Brolpito, 2018). At themacro level, the phenomenon of digitalisation of universities is understood broadly as the reorganization of social, cultural, and economic structures and relations, motivated by the generalization of digital information and communication technologies in all areas of human activity within modern society (Alkhowailed, Rasheed, Shariq, Elzainy, El Sadik, Alkhamis& Al Abdulmonem, 2020).

Digital technology has had a progressively major effect on almost all areas of activities and shifted society today. Because of digitalization, teaching and learning at universities are changing in a radical way. Information transfer, student evaluation, students' assistance, and the administration process are being digitalized, and digitalization intends to deliver superior opportunities for productive learning (Brink, Packmohr, &Vogelsang, 2020). Using digital devices in the class can create a particular level of ease and comfort but also knowing student experiences of using digital tools, it also makes it difficult in teaching and learning (Uğur, 2020). Smartboards and projectors connect wirelessly to computers or laptops, lectures can record, and students have access to the lectures anytime, students take notes on a laptop rather than handwriting notes and they tend to use computers in the classroom and this is a massive shift in education.

DIGITALIZATION IN HIGHER EDUCATION

Educational institutions had to use different digital platforms with different capabilities and strategies to facilitate learning which made digital technology a primary medium of education in the Covid-19 outbreak for students and universities (Mustapha, ThuyVan, Shahverdi, Qureshi & Khan, 2021). Moving to online learning by higher education during the pandemic affected learners, lecturers, and learning performance (Maqableh & Alia, 2021).Distance learning (DL), face-to-face learning (FFL), and Hybrid learning (HL) are three formats that higher education delivers the programme. The use of technology in higher education has some benefits such as allowing students to watch recorded lectures before and after a class as per their ease and engage in more interactive activities or students can better collaborate with each other and rely on the instructor as a facilitator and higher education was not ready for this situation (Mahlangu, 2018). Mahlangu (2018) further argues some of the challenges of hybrid and distance learning are quality assurance, passive resistance, not enough lecturer training to use digital tools, lack of tools and technologies that facilitate adaptivity. Higher education institutions are following the same principle and trying to collaborate both throughdigital platforms after the rise of the pandemic.

Higher education is a central venue for the creation of new knowledge economies for the 21st century (Sam & Van Der Sijde, 2014), and digital technologies are key means for realizing this potential (Selwyn, 2016). At the same time, there is ongoing commercialization of the sector, particularly in the English-speaking countries, where strategies from private sector industries are seen as beneficial also for higher education (Commission (EC) E (2012); Pucciarelli& Kaplan, 2016). Some researchers have argued that universities have fallen behind other sectors in digitalization (Rodríguez-Abitia&Bribiesca-Correa, 2021).

Historically, universities were characterized by decentralized organizations to address local and regional as well as professional needs in the researchers' national and international networks. There is, therefore, an inherent tension between the governments' ambitions to use centralized approaches dominated by strategic thinking (Pucciarelli& Kaplan, 2016), and the various professional specialties' need for self-management and control (Clark, 1986), dominated by local knowledge optimization. Digitalization of higher education is, therefore, both top-down and bottom-up. While the strategic level has focused on centralization of IT and governance to enable more effective processes, academic staff are more interested in how digitalization can support education and research.Digitalization is going to make a great shift in the economy and society of any environment it is applied to and will affect all areas of individual activities in both developed and developing countries. Digitalization can simply be explained as the transformation of the skills needed by the world's working population and the young in order to successfully engage in a globalised modern economy (Webb, McQuaid& Webster, 2021). In a learning environment, it is changing the way students learn and also the ways by which institutions deliver education (Webb, McQuaid& Webster, 2021). In recent times the need of digitalization has shown a steady high in national, regional and Higher Educational Institutions (HEIs) all over the world. These HEIs across the globe are undergoing constant transformation so that they can meet the needs and requirements of the society and their respective markets (Webb, McQuaid& Webster, 2021). In this modern era, in order to stay in competition and to stay relevant, universities and HEIs need to develop the capabilities that help them in order to match the needs of the digital age

PRINCIPAL OBJECTIVES OF DIGITAL INSTITUTIONS IN HIGHER EDUCATION

The following four major objectives are frequently mentioned by higher education leaders according to Peña-López (2016). They want to enhance the learning environment for the students, raise programme operational effectiveness, boost computer capacity for cutting-edge research, and promote educational innovation. In order to make these visions into reality, management uses digital transformation. The followings are ways how a digital institution can accomplish these objectives:

- Improving the learning environment for students: With additions such as TEDX seminars, apps for more thorough learning, and VR-AI technologies that enable students to share their views and ideas and comprehend subjects better, technology improves the learning environment. In general, technology aids students in developing the social, technical, and critical thinking abilities required for high-paying employment in the twenty-first century. Along with other advantages, technology provides teachers with access to evidence-based tools (such as tests and modules) that enable them to assess student performance and modify the curriculum as necessary.
- Increasing the organisation's operational effectiveness: Higher education institutions have used analytics to control erratic enrolment and escalating recruitment costs since the early 2000s. Higher education institutions employ diagnostic analytics to suggest (then analyze) potential solutions to their problems, descriptive analytics to describe conditions, predictive analytics to forecast events, and so forth in order to compete. Marketing, recruitment, admissions selection, financial assistance, student counseling, academic planning, financial forecasting, and even executive planning all employ data analytics on campus.
- Boosting computer capacity for cutting-edge research: Complete articles and abstracts for millions of publications, including monographs, reports, conference proceedings, and dissertations, are available in digital libraries and databases. Infinite research is accessible to students and teachers thanks to well-known search engines, such as Google and YouTube. To assist students in finding information about tests, curricula, and other topics, schools put up their own information technology infrastructures. In summary, digital technology offers a streamlined, affordable path to high-quality education, complete with the most up-to-date, reliable material in all fields.
- Promoting educational innovation: Teachers now have more time and resources to create because of technology. For example, only seven Ph.D. graduands out of 200 can secure full-time positions in academia or research after they graduate. Innovation is needed more than ever to create jobs and make use of technology in improving the education experience.
- Spending less: By moving campus technology systems to the cloud, substituting skilled instructors with e-learning, gradually replacing textbooks with digital re- sources, and replacing expensive equipment with VR or AR resources, educational technology lowers the cost of higher education. While other solutions save time by enabling educators to tailor and speed their instruction, apps for instructors liberate educators to focus on more important work. Under-resourced schools especially benefit from technology because it makes access to high-quality content more inexpensive. Through professional learning communities, they can educate both themselves and their personnel, among other advantages. They can also use less expensive tech to speed up their sessions.

DIGITAL TECHNOLOGY DRIVES INNOVATION IN HIGHER EDUCATION

In the last five years, digital technology has formed the basis of the strategic response of Ministries of Higher Education. The present digital strategy was launched together with the emergence of the Covid-19 pandemic with two goals: to ensure the proper functioning of universities and to promote student success in a crisis (Alkhowailed, Rasheed, Shariq, Elzainy, El Sadik, Alkhamiss& Al Abdulmonem, 2020). The growth of digital technology every day offers new opportunities for innovation and transformation of higher education. In a fast and changing world, higher education institutions are engaged in a pursuit of innovation: they are constantly rethinking their pedagogy, renewing their infrastructure, and finding new ideas to offer their students a better learning experience. The goal is often to be national and international leaders. In this respect, the most significant innovations of the digital university stand out as follows according to Doroshenko, Kalpinskaya and Makarova (2021).

Innovation	Description
Massive open online courses	Open online courses are offered by institutions of higher education around the world. These are free trainings that allow any student to become a participant. A certification system exists for certain courses and requires a financial contribution. Topics are often varied, from math to social sciences to personal development or health. These courses, open to all, democratize access to knowledge. They are a godsend for students who want to train in specific topics. It is an opportunity for universities to gain increasing appeal and international influence through multilingual platforms
Digital libraries and search engine based on ORI OAI technology.	The mechanism of digital educational resources is for everyone: students as well as teachers, researchers, professionals, and the general public. Digital libraries bring together educational resources containing a huge amount of educational resources.
Self-Positioning Tests	Lectures are gradually giving way to more participatory and interactive courses. Thus, a trend towards pedagogy is emerging, attracting students to be active Computer or augmented reality tests are regularly organized for this purpose. Such programs allow instructors to organize tests, to check whether students are adhering to academic virtue and have understood course concepts and for students to self- assess.

Video Based Learning

Video- based learning is a part of digital marketing has geared up in Indian Education Sector and has made education engaging, entertaining and exploring. It enables learning with a pedigree of learning out of leisure with creativity, fun and entertainment on cards via the wonderful Apps, podcasts, video, interactive software, e books and online interactive electronic boards

FACTORS PROMOTING THE USE OF DIGITAL TECHNOLOGIES IN EDUCATION

Digital Skills and Literacy

Nowadays, modern education (learning) frameworks requires the students and faculties to acquire or possess multi-skills, including digital literacy required for work and citizenship, self-education, life-long learning and acquaintance (Urbancikova et al., 2017;Barton& Dexter, 2020; Lin & Wang, 2021; Ma et al., 2021; OECD, 2021; Okoye et al., 2021; UNESCO, 2014, 2021b). Those multi-skills which include creativity, problem-solving skills, critical thinking and analysis, among others, enable students to learn and attain sophisticated (learning) competencies that are necessary for prosperity, and effective time and content management (Seyfried& Reith, 2019; UNESCO, 2015, 2020b; Okoye et al., 2021). Moreover, the stated competencies are facilitated in a bid to allow the students to compete in a vying education environment and market in which they are held to have a competitive edge (UN, 2021; UNESCO, 2014, 2015, 2016). Consequently, many countries strategize different initiatives for investing on digital technologies which, all in turn, are aimed to support and develop the stated competencies, or yet digital learning skills for the stakeholders per se (Toit&Verhoef, 2018; Munro, 2018; INEE, 2019; Martens et al., 2020; CONECTA, 2021a; Garcez et al., 2021; Mikheev et al., 2021; UNESCO, 2021b).

Digital Technology and Infrastructural Investment

The integration of digital technologies in education requires great investment coupled with capital and human resources (Haruna et al., 2019; CONECTA, 2021a, b). Many countries have failed to afford not only the resources that are needed for the so-called TEL-based education (digitized-education), but also in consequence, have failed to integrate fully, digital technologies in the different educational ecosystem or contexts. While many developed countries have invested in digital technologies, many developing nations face an arduous and ominous task of doing so, primarily due to the inherent costs (Tsegay, 2016; IEEE, 2020b; Sánchez-Cruz et al., 2021). In Europe, for example, many countries have set aside large amounts of funds and resources for investing in and supporting the attainment/integration of digital technologies in education (European Commission, 2018). In particular, the European Commission (2018) has been supporting digital technologies in education, policy, and initiatives by funding research and innovations aimed to foster the scaling up of the teaching and learning processes. Noteworthy, under the Horizon 2020 Framework, Seventh Framework Programmes for Research and Technical Development (FP7), and Competitiveness and Innovation Framework Programme (CIP); the European Commission budgeted 80 billion Euros to support the conducting of research and fostering of innovation in a digital-aided manner from 2014 to 2020. Previously, the European Commission have also invested a significant amount of 183 million Euros into supporting research and innovation in TEL from 2007 to 2013 (European Commission, 2018). Prior studies have also reported that for the past few years, up until 2014, the United States have instilled and spent more than \$3 trillion (USD) to facilitate digital technologies for education, spending around \$809.6 billion per year towards the availability and use of digital technologies in classrooms (Fredrickson et al, 2014). Those type of investment, perhaps, may have contributed to a significant transformation of the educational system in the US, in comparison to the other countries or regions, by ensuring that digital technologies are effectively implemented in education, especially during the recent pandemic (Aguilera-Hermida et al., 2021). Nevertheless, although, the existing studies indicated that a well-funded campaign to promote virtual education has succeeded in broadening the scope and expanding the reach of digital/educational technologies across the US, and the recent global pandemic has created a new need for virtual technologies, particularly in education (Boninger et al., 2019, 2020; Molnar &Boninger, 2020). It is noteworthy to mention that the fact remained that little to no research have been done to uncover the educational efficacy. For instance, studies have questioned the transformative practices of the digital technologies at different levels of education in practice (Cuban, 2020, 2021; Molnar &Boninger, 2020). Ranging from assessment and classroom teaching and learning, to commercial implications of the virtual education (Cuban, 2020, 2021; Molnar &Boninger, 2020), which portentously can form an important future areas of research, both in theory and in practice, particularly as it concerns unveling the educational efficacy, interconnectedness, or deficiencies between TEL-based education and the educators' funding campaigns or instructional infrastructures.

Digital Technologies Transformation and Evolution

With transformative education being at the center of many HEIs goals (Cantón, 2018; Takayanagui, 2017; Winthrop & Barton, 2018), the National Educational Evaluation Policy Gazette in Mexico (INEE), for instance, noted that "digital technology" has spurred particularly the educators to consume, innovate, and transfer knowledge/practices that transcends the teachers and students into becoming global voices (INEE, 2019). Thus, the level and/or impact of digital technology literacy is much conditioned by the availability of digital tools, and vice versa. For example, many countries that are considered "high-tech" by virtue of their technological development and/or extent of their application, have citizens with higher digital technology literacy levels than their counterparts in low-tech settings (Haruna et al., 2019; Pan & Fan,

2020; Ding, 2020). As such, countries that invest in digital technologies tend to use them in diverse socio-economic or life spheres, including for teaching and learning purposes, as their acquired or manifested skills can critically promote educational innovations (OECD, 2016). To support this important development, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has conducted a seminar aimed to capacitate educators from Asian and European countries in order to equip them with relevant knowledge and skills to apply digital technologies (e.g., web-based or online learning, massively open online courses (MOOCs)) for improving learning outcomes in HEIs (UNESCO, 2018), and to note, in preparedness to the recent time of the pandemic or post-pandemic education (UNESCO, 2021a, 2021b).

Digital Technologies for Learning in Urban–Rural Context

Although high-tech countries have made a massive investment in digital technologies in education and its practices, their counterparts in low-tech settings still struggle to transform the underlying education systems to cope with the (state-of-the-art) globalisation and digitally-savvy generation's learning and life-style (Lakkala&Ilomäki, 2015; UNESCO, 2015). This includes the critical or yet ample need for adequate TEL-based learning, due to poor resources at their (low-tech) disposal. On the other hand, notwithstanding that high-tech nations have invested immensely in digital technologies, their applications in real-time encounters various challenges due to the narrow impact of digital technologies in transformation of the educational ecosystem at large (CONECTA, 2021a; OECD, 2015, 2016, 2021). Despite the OECD's Innovation Strategy and emphasis on investing in infrastructures such as hardware and software; the potentiality of improving the stakeholders' for example teachers and learners) digital literacy skills, enhancing educators' professional development, reforming instructional methods, production of customized software and courseware, among many others, are yet to get full consideration (OECD, 2016). Apart from having different initiatives and strategies for educational transformation or process, the counterparts in low-tech settings, have faced challenges including the shortage of funds for investing in digital technologies, low digital literacy skills by the stakeholders, and limited expertise in the use of digital technologies for education (Haruna et al., 2019). Furthermore, Haruna et al. (2019) notes that in low-tech settings, it seems that the stakeholders are not ready (or sometimes reluctant) to initiate the much-needed transformation to Technology-Enhanced Learning (TEL) due to the lack of awareness, limited infrastructures, such as connectivity and network, and limited internet bandwidth (; UNESCO, 2015;IEEE, 2020b; Mercader&Gairín, 2020). However, in some cases, the digital infrastructures and the linked products/devices are not designed to be operated in low-tech settings. As a result, the low-tech settings per se, are forced to improvise in the use of ready-made products offered by the developed nations which may be used in high-tech settings with repercussions (Lakkala & Ilomäki, 2015; UNESCO, 2015). Additionally, due to dire economic straits prevailing in the low-tech settings, some countries may fail to afford the costs related to procurement and deployment of digital devices such as laptops, computers, mobile phones, tablets, and internet subscriptions for teaching and learning purposes (Parliamentary Office of Science & Technology, 2006; Swarts & Wachira, 2010)..

Digital Technologies in Education

Digital technologies include electronic devices, soft-ware and any online tools that could be used to enhance students' learning processand overall learning environment (Müller & Mildenberger,2021.)Digital technologies, by Selwyn et al (2016) can include but not limited to: computers, tablets, smart phones, FaceBook, Moodle, online library services, Google, YouTube, writing essays on Microsoft Word, etc. Digital technology also enables people to access the internet not just from home but in any location through portable devices. This is at the base of the review analysis, also sustained by the taxonomy for web environment Communication Technologies proposed by Batista, Morais and Ramos (2016) which integrates other taxonomies for social software's and media sharing (Conole & Alevizou, 2010). Digital technologies supporting learning in higher education includes the following categories and examples of tools given by Pinto and Leite. (2020) are as follows

- Learning Management Systems (LMS): Blackboard, Moodle, WebCT, Platforms supporting online courses, and so on
- Publish and Share tools: Blogs, Wikis, Flickr, YouTube, Podcast, Social Bookmarking, e- portfolio, Digital storytelling, e-books, Video lectures, and so on
- Collaborative systems: Google Docs, Social Bookmarking, Mind Maps, Wikis, Blogsand so on .
- Social networking: Facebook, Twitter, Hi5, LinkedIn, Ning, Academia.edu, and so on
- Interpersonal Communication tools: email, MSN, Skype, Forums, Video-conferencing, etc.
- Content Aggregation tools: RSS feeds, NetVibes, Google Reader, and so on
- 3D Virtual Worlds: Second Life, Habbo, Augmented reality, Games, Virtual labs, and so on .
- Assessment and Feedback systems: Electronic marking, Clickers, Audio feedback, Computer note taking, and so on
- Mobile tools: mobile applications internet based.
- Information and Communication Technologies (ICT): software or applications internet based (this category is used under two conditions: when the paper specifically refers to ICT, or when the paper does not specify a technology or set of technologies under study, or references specifically to information technology.

CONCLUSIONS

Today the rapid advances in technology are reshaping our society, social institutions and schools. Modern technologies have vastly increased our capacity to know and do things and to communicate and collaborate with others. They allow us to transmit information quickly and widely, linking distant places and diverse areas of endeavor in productive new ways. These advances allow us to form and sustain communities for work, play and learning in ways unimaginable just a decade ago. The students of today have a wide range of new technology open and available to them. This information changes the relationship between people and knowledge. As you can see when technology is applied to learner's lives a positive outcome arises. By adapting technology for education teachers, students and parents alike will see positive improvements in many different categories such as: academic performance, motivation, critical thinking skills, Literacy, attitudes and real life work skills.

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