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THE HISTORY OF PENETRATION OF DIGITAL TECHNOLOGY IN EDUCATION

Muydinjonov Ziyodjon Rafiqjon o‘g‘li
Teacher, Kokand State Pedagogical Institute

Muydinjonov Davlatjon Rafiqjon o‘g‘li
Teacher, Kokand State Pedagogical Institute

Annotation:
Digital technology and literacy can heighten the transformation of teaching and learning in higher education institutions. This study uncovers the extent to which digital technologies have been used to advance the teaching and learning process in higher education institutions, and the barriers and bottlenecks to why it may not have been effectively implemented across the higher education institutions. The study used selected countries based on the main focus of the educators, commercial, and financial investors; to show the level of impact/implications of computer technologies on the teaching and learning processes.

Keywords: digital technology, transformation, barriers, educators, commercial, and financial investors.
Today, modern educational technologies and the underlying models and practices have become an integral part of the teaching and learning process, and have showed rapid (innovative) growth within the higher education domain. As a result, many higher educational institutions higher education institutions strive to invest in digital technologies to help support the various teaching and learning processes and curriculum. Didactically, existing studies profess “digital technologies” to be one of the enabling tools that teachers, or yet higher education institutions, can apply to facilitate the teaching–learning processes, and improve/transform both the faculties’ and students' learning experiences and engagement. The digital technology have also been reported to positively impact higher education at a wider scale by increasingly providing access to learning, offering of equal learning opportunities for all, and promoting life-long learning. However, in this digitally-savvy age or generation of the twenty-first century; digital technologies are evolving at an unprecedented rate, although there is evidence that the pedagogical changes or transformation are slow. In consequence, educators must consider the role and challenges that are eminent or pertinent to the use of those new and emerging technologies for learning. For example, the Technology-Enhanced Learning notion or initiatives have spanned the creation of several tools and systems that are used to facilitate the teaching–learning processes across the various HEIs. This includes, to name but a few, emergence of state-of-the-art learning tools or platforms such as: Flipped classrooms, Augmented reality (AR), Virtual reality (VR), Learning Management Systems, as well as, learning elements or components like Serious games and gamified learning platforms, Indeed, the aforenoted factors have not only been a major challenge for educators in Latin America, particularly at a time or in preparedness to the post-pandemic education era, when it has become an inevitable requirement for highter education institutions to ensure that the different educational services and programs for the stakeholders (e.g., teachers, students) are sustained. The aim must focus on acceleration of education/learning for all, irrespective of background or geographical location, through investment in world-class digital or technological solutions. Having said that, it becomes clear that modest digital literacy skills and technologies (e.g., lack of modernization or difficulty in accessing the

most basic infrastructures such as internet, and ICT training/development will inadvertently result in the higher education institutions not being adequately prepared to participate in both the educational and labor market. Thus, leading to a limited or inadequate response to the educational needs of the region, particularly in terms of institutional, socio-technical, communal, productivity, or commerce. The above limitations would only heighten the disparaging demographic and social conditions that are being faced in the region. Henceforth, teachers and students who tend to be the direct consumers of the infrastructures/technological provisions need to be provided with hands-on practical, valuable, real-life work-related digital skills and literacy, to compete in the modern-day educational and labor market at large.

The research questions of this study are as follows:

What are the reach, barriers, and bottlenecks to the use of digital technologies upon teaching and learning process in higher education institution?

How does the identified reach, barriers and bottlenecks differ across the some countries?

How can the findings be used to support the pedagogical practices, decision-making, and governance in higher education institution?

Based on the stated research questions and objectives, this study makes the following contributions to knowledge:

It provides an empirical study of prevailing factors that impacts the use of digital technologies upon facilitating the teaching and learning processes across higher education institution.

It determines the reach and barriers to use of digital technologies for teaching and learning higher education institution.

It uncovers potential bottlenecks on why digital technologies may not be effectively implemented in the higher educational institutions.

It demonstrates the benefits of data-structure approach such as the Text mining technique and its application within the educational domain or context, to understand the impact of digital technologies for teaching and learning.

It provides information on the state-of-the-art and implications of using the digital technologies to support the different pedagogical practices, decision-making strategies, and operational policies or regulations for the educators.

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 acquittance. 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. 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.

The integration of digital technologies in education requires great investment coupled with capital and human resources. 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. 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. In particular, the European Commission 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. Seventh Framework Programmes for Research and Technical Development, and Competitiveness and Innovation Framework Programme,; 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.

In some countries, several projects have been developed that focus on embracing the role of digital technologies in sustaining the teaching and learning processes (i.e., technology-mediated education), and elimination of the bias or preconceptions of adopting new educational technologies for learning. As an example, the Students4Change project was a program developed and implemented in which was supported with funds from the European Union within its Erasmus + Capacity Building in the field of Higher Education program. The program was aimed at development of competences in entrepreneurship and social innovation as part of the curriculum plan in higher education institution, that allows students to identify and propose solutions to the social problems that afflict the region.

For the survey instrument, three main factors or constructs were considered whilst designing and administering the questionnaire. The study looked at the impact of digital technologies for teaching and learning process in some countries by considering, (i) the demographic information and reach, (ii) the extent or barriers in use of digital technologies for teaching and learning, and (iii) the bottlenecks on why digital technologies may not be effectively implemented in the higher institutions. It is important to mention that by "reach" the authors refer to demographic distribution or extent to which digital technologies have been used to harness teaching and learning processes in higher education institution. Whereas, "barriers" refers to both the external and internal obstacles such as limited resources, lack of technical capabilities and support, or social status quo that could affect the integration of digital technologies for learning in the different higher education institution settings. By "bottleneck" we refer to the several factors in terms of using or adopting the digital technologies for teaching and learning that could cause the process to slow down or affects the practical application and/or performance of those technologies.

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