

New Developments and Emerging Technologies in Postsecondary Education

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Abstract: *In addition to using current trends and cutting-edge technologies in higher education, this research paper shows the advantages of continuing education. Understanding is a multi-layered, intricate process of seeing an object's characteristics and highlighting key features of it. With regard to technological developments in particular, education is a complex system that necessitates numerous viewpoints and levels of study to comprehend its contexts, dynamics, and actor interactions. The purpose of this article is to highlight some of the most promising trends in blended learning implementations in higher education, as well as the technological capabilities and the contexts in which they are used. The results show several capabilities that digital educational technologies share. Digital tools or platforms, in particular that enable human-machine interaction may improve automated procedures used in blended learning delivery methods. Digital tools like video capsules and sophisticated tutoring systems could make learning and teaching more effective in this situation. First, one by making self-paced online learning activities more accessible to more students. Second one by providing each student with a personalized learning route, which enhances extra-curricular activities and feedback. When learning goals are aligned with technology-based implementations, educational technology capabilities offer complementary insights to help determine the optimum strategy. To verify these findings practically, more study will be needed.*

Keywords: innovation, technology, higher education, trends, effective teaching

I. INTRODUCTION

Online education has been proposed as a revolutionary answer to several educational challenges of inequality, owing to recent technological advances (Allen & Seaman, 2014). It has long been expected that implementing online learning environments will improve university accessibility. This expectation has also served as support for other expansionist proposals, such as the idea that online learning must become the norm in the higher education sector (Bradshaw, 2014). The most notable of them are improved learning resource distribution, increased learning accessibility, shared learning materials, increased learning depth, and a social component to learning. Technology and the internet have a clear educational potential, and they can help meet the expanding need for post-secondary education, skills, and training. Over the past 20 years, online education has grown rapidly in many countries, coinciding with the widespread distribution of arguments like those (Allen & Seaman, 2013, 2014). This article challenges such problematic statements about the current state of online higher education and makes the case that these claims should be thoroughly investigated before online higher education shifts its emphasis from making higher education more accessible. Additionally, attempts to build innovative learning models for innovative learning involve handling and preserving this type of intangible asset for administrative purposes, such as reports and records pertaining to knowledge and information patterns (Anshari and Lim 2016).

There is a trend toward the convergence of sustainability and digital imperatives in practice, as noted by George et al. (2021), but systematic and rigorous academic research that rethinks management models based on digital technologies for sustainable development, particularly in the context of higher education, is lacking (Pu et al., 2022). More studies and viewpoints on it are necessary (Eltawil et al., 2021). Therefore, this study intends to analyze how DT might help to



sustainability in higher education through a hybrid method that involves both a quantitative bibliometric evaluation and a qualitative content analysis.

Information technologies

There is a trend toward the convergence of sustainability and digital imperatives in practice, as noted by George et al. (2021), but systematic and rigorous academic research that rethinks management models based on digital technologies for sustainable development, particularly in the context of higher education, is lacking (Pu et al., 2022). More studies and viewpoints on it are necessary (Eltawil et al., 2021). Therefore, this study intends to analyze how DT might help to sustainability in higher education through a hybrid method that involves both a quantitative bibliometric evaluation and a qualitative content analysis. On the one hand, computers are part of contemporary culture, and on the other, they are acknowledged as a major factor in the expansion of the global economy (Franco et al., 2019). Furthermore, the rapid advancement of new technologies, which encompasses a wide range of approaches, strategies, and subjects, has a critical impact on how effective is the educational system. When discussing the process of education and learning new information, we have always discussed traditional learning, learning by audio, video, electronic, and distant learning, as well as today's mobile learning. Teachers and professors adjust their roles and positions in the educational process in response to new technologies, but the fundamental purpose of education remains paramount. The lecturer is still there to guide and teach students critical thinking, social behavior, work discipline, and personal responsibility, which leads them toward model recognition and the mentor's work style. Various information technologies used in interpretation of education shown below in figure 1.



Fig. 1. Various information technologies

In other words, the lecturer develops and supports curiosity, which leads students toward conclusions and, eventually, scientific contribution, even though globalization in the field of informatics allows students to visit distant museums and archaeological sites and communicate via video conferences (Mahmud 2017). As a result, new technologies significantly aid in the development of innovative learning methods since they have a constant impact on all facets of life in Serbia and throughout the world, including education. This is especially true as the Internet continues to grow. This technology is definitely the most advanced technology that has been devised in the history of human civilization.

Adaptability to the new way of (digital) learning

Computer science, or modern information and communication technology, has affected every aspect of life and work, as well as leisure activities, approaches and frameworks used in all levels of education, and the assimilation of new knowledge. For this reason, the information revolution can be seen as primarily sociological and ethical in nature as well as technological (Radu 2016).

Effective use of information and communications technology allowed for a new way to organize scientific and educational work, which is part of the educational process. This methodology prioritizes and accelerates the advancement of each student's unique skills and passions. It also facilitates stronger bonds between students and the quicker and more effective transmission, transfer, and assimilation of knowledge. With the potential to both enhance and radically alter instruction, contemporary educational technology have become an essential component of the



teaching process. On the other hand, keep in mind that "mobile learning" is actually a form of electronic and distance learning (d-Learning and e-Learning).

Experts therefore contend that allowing students to establish their own conceptions of knowledge acquisition is essential. According to these theoretical frameworks, multimedia influences and semantically rich information transfer are crucial for providing students with the opportunity to realize their own needs, which allows them to pick up new skills, habits, and attitudes as well as gain new knowledge (Tasdemir & Gazo 2020). When it comes to application, a lot of experts support teachers' ongoing innovation of their knowledge, believing that they should always be learning new concepts, ideas, and methods. Furthermore, it is preferable to adopt new perspectives and a modified role in the educational process as a result of ICT's influence. Because of the enhanced mobility brought about by computer and telecommunication technology, networking and communication are now known everywhere and at all times. Over the past ten years, technological advancements have expanded the content of numerous instructional materials (Zeegar & Francis 2014) shown below in figure 2.

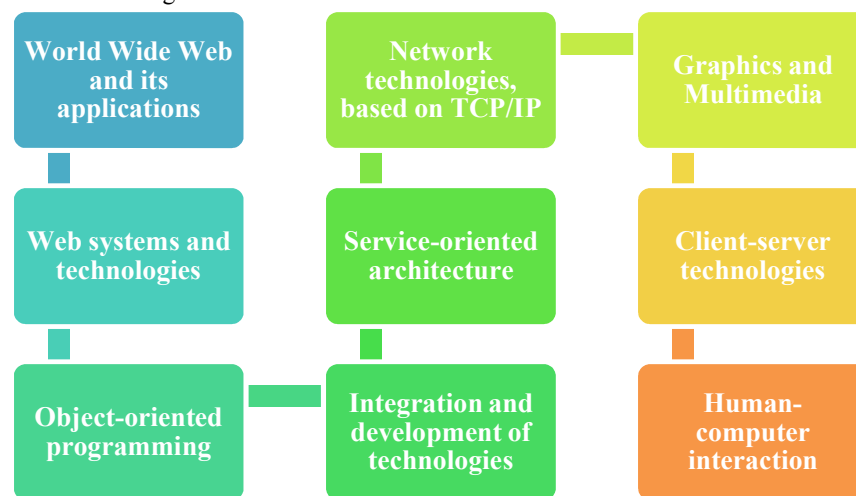


Fig.2. Technological advancements for expansion the content of numerous instructional materials

The growth in the number of information technology study fields and practical and theoretical programs was mostly attributed to the Internet and the Web. On the other hand, labor supply may present a unique issue in addition to quality. The availability and design of study programs will determine how well educational programs are implemented for upcoming IT professionals. The goal of the IT training program should be to provide students with the knowledge and abilities to be as follows in figure 3.



Fig.3. Goal of IT training programs

It is feasible to develop various programs for various student groups under specific circumstances and with appropriate modifications specific to the IT area, with particular attention to the following components of the application of entrepreneurship (Zeeshan et al. 2022). The management and expansion of SMEs, as well as business launches and new venture formation, are the main areas of concentration for entrepreneurship in economics and business schools.



Economics students gain experience collaborating with students in other disciplines, such as engineering and scientific research. In the field of science and technology studies, entrepreneurship is particularly focused on the use of intellectual property, starting new businesses, and venturing. It also includes courses on management strategies, marketing, commercializing, and selling technology-based ideas, patenting and protecting technology-based ideas, and funding and expanding high-tech ventures internationally. Social entrepreneurship, or the growth of an area that offers a chance for community betterment, is the focus for humanities students. The focus of entrepreneurship in the creative arts and design is on opportunities that arise from working creatively, educating graduates for self-employment or freelancing, or starting small businesses and initiatives. It is feasible to develop a suitable plan of actions that would modify the aforementioned components to new IT-specific material while still honoring the distinctions that now exist between entrepreneurship as a general term and IT entrepreneurship as a particular term.

The importance of the Internet in distance learning

Young people learn how to use modern technology in an engaging and enjoyable way by working on computers and browsing the Internet. This will undoubtedly help them in their academic pursuits and leisure time. However, as more and more human endeavors—such as education, science, trade, and entertainment—connect to the Internet, it is clear that the Internet is becoming a more significant and impactful part of people's lives and careers on a personal, societal, and political level. It has a huge impact on schooling and upbringing as a result. One of the virtual institutions, the Internet is a major channel for business, education, and communication (Ali et al 2014). Because the virtual world is becoming more and more alluring and demanding compared to the traditional educational system, the Internet presents a serious challenge to the educational process. Paper forms have been superseded by electronic distance learning, which goes by the new moniker of electronic learning (e-Learning). Because all instructional materials are distributed to users electronically in this format, email, the File Transfer Protocol (FTP), and the Hypertext Transfer Protocol (HTTP) are utilized. Additionally, the user uses a specific website called a portal to email all completed assessments back to the educational institution, logging the student's responses into a database. Mobile learning, often known as m-learning, is an electronic learning approach that leverages personal digital assistants (PDAs), mobile phones, tablets, and smart phones to facilitate access to learning resources.

E-learning is commonly defined as learning that may occur "anytime, anywhere," provided that one has access to a computer and the Internet. These connections are not necessary for mobile learning. A wireless network and a PDA or cell phone are all that the student needs (Franco et al. 2019). Information technology has been included into university curricula. It is thought that there is no single, accepted definition of information technology, making it difficult to define the idea. According to Zeegar and Francis (2014), information technology is a scientific discipline that studies systemic approaches in the selection, development, application, integration, and administration of secure computer technologies. The ultimate goal of these technologies is to help users achieve their personal, organizational, and social goals.

Interdependence of ICT and management in the education process

The use of computers facilitates the rapid, simple, effective, and affordable exchange of a wide range of data and information, not just in the corporate world but also in management education. The fact that it facilitates productive dialogue in both internal and external settings is particularly significant. Learning and increasing one's level of knowledge through the Internet, as a significant channel for knowledge dissemination, offers several benefits, such as quick distribution, WWW access for participants, the ability to incorporate hypermedia materials, group and individual use of the service, and the potential to link multimedia content. Information technologies significantly affect the effectiveness of business management indirectly through information systems. However, the management will have a solid information base for management, meaning the process of managing the business will be more effective, if the information system is quick, dependable, and complete in the sense that it guarantees the timely development of reports on the performance of the company. Through it, businesses efficiently manage their day-to-day operations while also offering enhanced reporting to assist in decision-making. Information technology (hardware, software, data, and communications), people, and processes make up the components of an information system. Employees carry out their



work responsibilities in conjunction with the software, which has a set of business rules and significant codified knowledge about the operation of business processes (Febrian et al. 2020). Depending on their intended function, information systems that businesses employ to boost productivity are typically categorized into the following groups (Ali et al., 2023).

- (1) Decision Support Systems (DSS) for decision support;
- (2) Transaction Processing Systems (TPS) for transaction processing process support;
- (3) Knowledge Management Systems (KMS) for knowledge management;
- (4) Office Automation System (OAS) for information system; and
- (5) Management Information System (MIS) for management support based on automation of report creation.

However, because earnings in the ICT sector are more reliant on global competition than salaries in other sectors, students' enthusiasm in the field is waning in industrialized nations. However, it should be remembered that the local IT industry is small and that businesses in this field are primarily concerned with the international market. Individuals lack the financial capacity necessary to compete in the global market, which is why the majority of these businesses are large ones. Global tech corporations have been shifting their manufacturing and resource locations from developed to developing nations in recent years. Moving did not, however, happen in every branch. On the one hand, despite legal prohibitions, the manufacturing of extremely valuable and security-sensitive products, like rocket systems and space exploration technologies, has continued unabated. But, the creation of financial apps for banking, trade apps for online commerce, and payment apps for money transfers is typically moved to less developed nations (Hammer & Lewis, 2023). However, networking technology is now a necessary teaching element in academic programs at higher education institutions. These modifications are divided into two groups: pedagogical and technological, both of which have a big influence on how IT professionals are taught (UNESCO 2019).

it's crucial to take into account all technological advancements while creating an information technology curriculum. Additionally, as the emphasis moves to the student, learning objectives, and suitable competencies, the teaching methodology is also evolving. Many aspects that affect the planned training programs' effectiveness should be considered in order to attain quality in the education of new IT specialists and operators. The degree to which favorable conditions need to be established or modified is indicated by the division of many success elements into multiple major categories. Throughout the entire process, particular emphasis is given to the caliber of the educational program-that is, the modules and the caliber of the teachers. It is undoubtedly the most delicate area of the overall program or strategy because it may involve a variety of arbitrary judgments and viewpoints. The manager's leadership qualities and entrepreneurial spirit are influenced by the caliber of his schooling. On the other hand, a leader who embodies positive energy during the organization-building phase must possess unique personality traits, be able to adjust to changing conditions, solve problems quickly, embrace change as a challenge, and be able to foster a culture of trust in the organization's unstructured, fluid environment. Additionally, a leader must have a common goal and a unique mission, which implies that staff members must be prepared to work together as a team to solve any problems that arise (Colas-Bravo et al. 2023).

However, the nature of pedagogy is also impacted by technology. This suggests a shift from the previously recognized "didactic triangle" (teacher, content, and student) to the "didactic quadrilateral," which adds teaching technology to the earlier triangle. This triangle has evolved over time to become dominated by computers, software, the Internet, and networking. In this regard, the manner that new information technologies are used to teach has been greatly enhanced by demonstration software, computer projections, and individual laboratory stations shown below in figure 4.



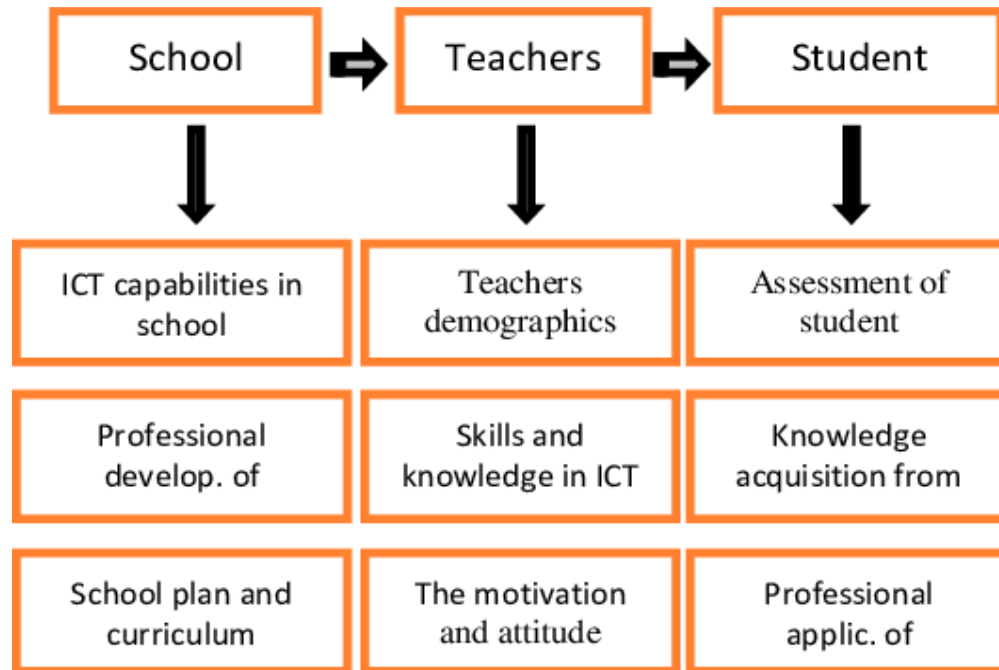


Fig. 4. Demonstration of didactic triangle, software, computer projections and individual laboratory stations

New multidisciplinary subjects/modules

Three major categories of labor may be identified in the contemporary organizational structure of an ICT company that produces applications: programmers, analysts, and workers in the broadest sense. The first team of workers works with code, which was formerly referred to as programming but is now more commonly called development. Students from the faculties of mathematics, electrical engineering, and organizational sciences make up the majority of the workforce in this group or industry. These days, developers are more frequently used to refer to former programmers. Analysts make up another set of workers; they understand customer requirements, outline the responsibilities of programmers, and test the programs that are created. Instead of creating apps, this group acts as a conduit between clients who want them and IT professionals who create (code) the desired application. Workers in this field typically hold positions as project managers (PM), business analysts (BA), quality assurance (QA), product managers (Product Managers), and employees of the faculties of organizational sciences and economics.

To enhance the effectiveness of instruction, it is preferable to organize lesson plans such that each module covers subjects or content that aligns with the demands of certain positions found in contemporary IT firms. The goal is to develop instructional modules that meet the current demands of the global market while keeping in mind the responsibilities that have been recognized inside the IT organization. On the one hand, the aforementioned roles (BA, QA) call for knowledge that, given the structure of higher education today, cannot be acquired by a single faculty member. Conversely, the current gap that exists between the educational program of specific faculties and the requirements of a position in an IT firm can be efficiently bridged by adding new teaching units (courses/subjects) that offer the necessary, multidisciplinary expertise. This implies that, practically speaking, it is necessary to develop a number of new subjects that would impart knowledge needed for specific IT company workplaces and that, under the current system, are taught at many faculties. Simultaneously, there exists a phenomenon wherein specific knowledge exists within one or more subjects, but is not structurally arranged into a cohesive whole. Consequently, modern software development practices and business cannot reap the full benefits of this knowledge.



II. CONCLUSION

The application of information technology is different from other computer sciences. Information technologies are more applied, that is, they are concentrated on system infrastructure and the complete application of technology, in contrast to other computer disciplines, which are mainly theoretical and not adequately relevant. Similar to the explosive rise in Internet users during the final ten years of the twentieth century, the number of wireless networks has increased recently due to demands for anytime, anywhere access to a fully networked service. The so-called start-up enterprises are responsible for the unique and dynamic expansion of information technology that they are witnessing. It works to implement worldwide standards in the fields of science education, education development, and other forms of education. In summary, these efforts have a major role in the growth of both economic and non-economic activities, or society at large. In the domains of the social superstructure, interconnection and openness to global trends undoubtedly necessitate strategic factors, namely the presence of distinct national objectives and values.

Keeping that larger perspective in mind, the ICT sector plays a significant role in the growth of the economy and society, particularly in the areas of higher education and quickly expanding start-up businesses. It is especially necessary for ICT experts to have an effective idea of education to understand the technological and pedagogical level and predispositions. In light of advancements in technology, efficient networking is stressed. The ability to adjust to sudden changes in the environment is crucial for the efficient use of ICT technology in manager education. As a result, identifying both positive and negative impacts and appropriately handling them in educational process models constitutes the fundamental responsibility of educators. In today's chaotic and crisis-ridden world, the manner and degree to which modern managers are educated will depend more and more on the use of information and communication technology.

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