The Role of Digital Transformation and Artificial Intelligence in Higher Education

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Review Article

ABSTRACT

Education plays a crucial role in the economic, social, cultural, and political development of nations. With the rapid advancement of technologies, learning and teaching methods are continuously evolving. Innovations such as the Internet of Things (IoT), virtual reality, augmented reality, the metaverse, digital twins, generative artificial intelligence, and cloud computing are transforming personalized and interactive learning experiences. Effective teaching strategies now offer high-quality, tailored learning pathways that leverage smart technologies. E-learning and intelligent learning have emerged as significant trends in educational technology, creating engaging environments that provide digital content and foster collaboration between educators and students. Digital transformation has become a central theme in this evolution, with AI and IoT poised to revolutionize education. Recent years have seen digital innovations applied across various sectors, including healthcare, agriculture, and transportation, with higher

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education facing unique challenges due to the diversity and complexity of its programs. The IoT facilitates the creation of smart classrooms, while AI enhances learning and teaching methodologies. This paper aims to highlight the critical role of digital transformation and artificial intelligence in advancing higher education, exploring both their benefits and the challenges they present.

Keywords: Higher education; counterfeit insights; AI change; generative AI.

1. INTRODUCTION

Digital transformation of education is the way in which advanced innovations and devices are leveraged to advance learning, access to knowledge, and communication within the educational environment. This may include the use of computers, tablets, smartphones, software, online courses, web assets, and other advanced assets. This manuscript is important to the scholarly community because it addresses the critical intersection of digital transformation and higher education, and highlights the transformative potential of technologies such as artificial intelligence and the Internet of Things. By providing a comprehensive overview of how these developments are enhancing learning environments and educational outcomes, the paper contributes valuable insights into the ongoing discourse on educational innovation. The main objectives of this paper are summarized as follows:

- Clarify the role, importance and applications of digital technology and digital transformation such as artificial intelligence and the Internet of Things in enhancing higher education
- Review the benefits of digital technology in higher education
- Indicate the challenges facing digital technology in the higher education stage.

2. METHODOLOGY

The study drew on information from other studies and research conducted by many people, looked at different types of data and focused on important digital technology and how it helps in higher education. The information was collected from published scientific articles that talked about digital education based on artificial intelligence and why it is important to invest in digital technology to improve education.

3. RESULTS AND DISCUSSION

3.1 Digital Transformation

3.1.1 The concept of digital transformation

The move to a computerized economy offers potential for feasible financial development at tall levels. To realize this, computerization of machine control and generation forms is fundamental [1]. In any case, this issue can as it were be accomplished through advanced change from conventional paper-based information [2]. In this manner, digital transformation is one of the foremost critical issues for victory and keeping up with advancement [3]. Computerized change is happening and will influence all callings and areas, from horticulture to industry and instruction [4-5]. In common, computerized transformation in instruction, particularly higher instruction, is one of the foremost challenging issues due to the differing qualities of preparing programs, their length, themes, and the number of members [6]. Computerized change in higher instruction educate will specifically influence tens of thousands of understudies and instructors. From a approach point of view, this requires tremendous assets for speculation and modernization of IT framework, which postures a major challenge, particularly for higher instruction teach in creating nations [7-8].

Digital transformation is the integration of advanced innovations in all segments of an organization, taking advantage of advances to drastically alter the way it works and its commerce show, present modern values to its clients, quicken trade forms [9].

Digital transformation is additionally changing the culture of organizations, requiring organizations to alter and always explore with unused things [10]. In reality, there's no clear and specific definition of computerized change since the method of advanced change for each circle and organization is distinctive.

The comes about of the overview appeared that computerized change is an unavoidable drift in all social circles, such as government, industry, communications, wellbeing, instruction, etc. [11-12].

3.1.2 Digital transformation in higher education

In general education, especially in training and higher education, digital changes are happening. This means there are fewer lectures and more focus on helping students learn on their own. The goal is to let students' study whenever and wherever they want, personalize their learning, build a community of learners, and encourage learning for life [13].

The Internet of Things (IoT), cloud computing, artificial intelligence (AI), and the growth of Big Data technology are changing how digital education systems are built [14].

3.1.3 Digital transformation applications

3.1.3.1 Internet of things (IoT)

It is characterized as a innovation that permits all things, counting gadgets, applications, arrangements and individuals, to put through based on the foundation of the web. Within the future, all gadgets will be prepared with M_2M modules that can consequently build up organize associations, communicate with others [15] and apply them in all circles to serve humankind [16].

3.1.3.2 Big data analytics

IN Industry 4.0 frameworks, hundreds of billions of sensors and IoT gadgets give a tremendous sum of information with different information sorts such as content, voice, picture, etc. Conventional information handling innovations are not pertinent. The huge information preparing innovation permits analyzing, preparing and making modern administrations and values [17,18].

3.1.3.3 Cloud computing

This innovation has propelled and overwhelmed nearly all regions within the final a few decades. They permit giving all things, such as administrations, from framework and stages to computer program [19]. This opens up arrangements for companies to execute

foundation optimization methodologies to spare costs and business assets.

3.1.3.4 Artificial intelligence (AI)

Industry 4.0 frameworks are prepared with intelligence to reply and bargain proactively with circumstances. Subsequently, fake insights will be one of the foremost critical innovations of Industry 4.0. Manufactured insights, particularly profound machine learning, permits mechanical applications and gadgets to be able to self-learn, analyze circumstances and make choices without human mediation [20]. In higher instruction, fake insights can analyze and predict enrollment [21], preparing callings and labor showcase patterns [22]. Moreover, counterfeit insights can personalize learning and give ponder exhortation to understudies [23]. Within the instructive management sector, counterfeit insights can foresee the wants of instructors, materials, preparing gear, optimize classroom assets, address lobbies and family communication [24,25].

The fabulous development of generative Counterfeit Insights (AI) devices like ChatGPT since late 2022 has brought AI to the bleeding edge of all talks about almost innovation and its effect on the economy and society [26-27]. There are concerns approximately long-term of work and the antagonistic social results of computerization which will lead to a jobless future [28-29], whereas companies investigate how to advantage from generative AI speculation [30-31].

In higher instruction, the quick selection of ChatGPT brings fervor almost openings for learning and concerns almost challenges such as understudies cheating on their assignments [32], for occasion inquiring ChatGPT to right away compose a paper approximately any point [33]. Whereas the beginning response was forbidding generative AI, a few organizations have created rules approximately the useful use of such instruments in higher instruction teach (HEIs), such as colleges or colleges. The Russel Bunch of colleges within the UK created five standards, emphasizing the require for students and staff to gotten to be AI-literate adjusting and teaching and appraisal to consolidate the moral utilize of generative

The UNESCO direction proposes control of generative AI devices by government offices and

approval of the moral and academic angles of those instruments by instruction teach [34].

Advances in (AI) innovation: With its persistent progresses, AI has numerous promising trade applications and is anticipated to convert our lives, commerce, and society [35]. Fake intelligence as a field includes a 70year history, with different waves of progress taken after by periods of challenges called AI winters. It could be a different field of investigate and hone related to making and assessing cleverly frameworks [36] with different issues (e.g., thinking, forecast, arranging, vision, dialect understanding), approaches, innovations, and applications [37]. One prevalent approach has been making rulebased systems that encode information of specialists, e.g., rules almost making a restorative conclusion, but those frameworks have considerable impediments. Rather than capturing information in program, the approach that demonstrated most productive is planning calculations that learn from information and preparing them with huge amounts of information on effective computers this is the machine learning approach. Different approaches to learning are utilized depending on the issue: administered learning, unsupervised learning, support learning, and others.

Dimensions of AI change in HEI: As as of now specified, the oddity of generative AI lies within the "generative" viewpoint of its title. Generative AI apparatuses encourage the creation of unused substance. From an financial point of view, generative AI brings down the fetched of information work, particularly information creation assignments. Changing the financial matters of information forms in markets and organizations can be transformative [38]. Usually especially genuine in higher instruction since HEIs are organizations that oversee information: they make unused information through inquire about, convey information to understudies through instructing, and evaluate learning by asking students to do a few information works, for occasion, type in papers. Within the last mentioned, composing an exposition gets to be a zerocost task that takes a couple of seconds and does not require any nature with the subject. In pith, these apparatuses give a modern interface to information, associated to a progressed look motor that employments as input all data accessible on the internet and produces as yield a ready to use reply rather than sources of data [39].

Student learning: AI can back understudy learning by supporting teaches who instructor by supporting understudies straightforwardly. Engaging instructors and understudies ought to be the essential objective. AI has the potential to convert educating by supporting educates. Educates might utilize AI as a back to plan programs or courses, make modern instruction fabric and assignments, convey superior instruction that increments understudy engagement and inspiration for learning, and evaluate learning more inventively and truly. Workforce can to utilize AI to mechanize timeconsuming authoritative errands so that they can center on imagination and development in instructing and inquire about. AI and other Industry 4.0 innovations, such as the Web of Things, can empower shrewd classrooms and the advanced change of instruction administration, educating, and learning [40].

Academic keenness issues: There's critical concern that ChatGPT would encourage tall levels of cheating in higher instruction, undermining learning and scholastic trustworthiness [41]. Be that as it may, there was as of now significant cheating some time recently ChatGPT. One think about found that 15% of understudies had utilized an essay process, an internet benefit where understudies pay for individuals to type in papers for them [42]. Another ponder at an Australian designing college found that 50% of questions inquired on Chegg (the biggest homework offer assistance location) were replied inside 90 minutes [43].

Faculty investigate and quickened logical disclosure: AI, such as machine learning methods, is progressively utilized in science inquire about, and analysts are energized around its potential [44]. Still, they are moreover concerned approximately the quality of work and reproducibility of comes about [45]. In case utilized accurately, generative AI can back insightfully work and staff inquire about efficiency [46]. Such instruments can bolster issue detailing, information collection and examination, and composing [47]. Those incorporate assignments such as inquire about conceptualizing, distinguishing investigate questions, speculation era [48], summarizing or conducting a writing audit, making charts from information, drafting parts of compositions and others.

Be that as it may, all those employments come with challenges such as AI visualizations (making

up stuff), exactness, completeness, quality, and others. Additionally, the ease of making substance utilizing generative AI apparatuses may increment scholastic wrongdoing or the mass generation of low-quality papers flooding diaries and the set up peer review handle. Both would have critical negative results for insightful distributing and investigate, and diaries are upgrading their publication approaches. For occurrence, Science diaries don't acknowledge content composed by AI apparatuses [49].

Administration and operations: Regulation learning: In spite of the fact that our survey of the writing on AI in higher instruction finds that the most center is understudy learning and instructing, other HEI regions can advantage from AI [50]. AI and information can offer assistance move forward the adequacy and lower the working costs of all zones within the college, such as organization of the HEI, counting divisions and schools; affirmations to progress enrollments; scholastic exhorting to direct understudies and career prompting [51], internships and work situation of understudies; graduated class relations; IT, human assets, games, offices, and operations [52].

4. CONCLUSION

Digital transformation and AI are revolutionizing higher education by making learning more personalized, accessible, and efficient. These technologies not only enhance the student experience but also streamline administrative processes and support research activities. As institutions continue to embrace these advancements, they will be better equipped to meet the evolving needs of students and the demands of the future workforce.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://prh.mbimph.com/review-history/3948