



DIGITAL TRANSFORMATION IN EDUCATION: EMERGING MARKETS AND OPPORTUNITIES

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Digital Transformation in Education: Emerging Markets and Opportunities

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**Digital Transformation in Education:
Emerging Markets and Opportunities**

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FOREWORD

The intervention of digital technologies, including Artificial Intelligence, Blockchain, Robotics, Augment Reality, and Crowdsourcing in the education sector have radically transformed institutions. It has paved the way for the digital transformation of academia. Gone are the days when students used to sit in the classroom and learn solely by listening to lectures. In today's fast-paced life, collaborative and interactive learning has become essential. The phrase “digital transformation” has become so ubiquitous in many industries, yet it has stayed comparatively less common in education. However, the COVID-19 outbreak and its expansion have placed the necessity of digital transformation into sharp relief because practically all educational institutions had to implement it to some extent. Digital transformation is both a physical alteration and a philosophical shift that strives to establish a learning environment where everything links to meet the continuously changing demands of students, teachers, and institutions.

This book titled “Digital Transformation in Education: Emerging Markets and Opportunities” reflects the need for digital pedagogy and signifies the true essence of social impact learning during distress in the real sense. I congratulate the esteemed writers for having penned their thoughts on shortcomings and new emerging global educational integrations during the pandemic so vividly. Because of the revolutionary and overpowering character of digital technology, the authors look into it and report on the changing educational environment that is taking place globally. The writers embrace and benefit from such a medium as they bet on its potential to improve education while looking for creative and inspiring procedures and techniques that can alter how students approach their pursuit of education.

With the rising usage of online courses and video conferencing technologies, educational institutions have begun to understand the relevance of digital transformation in the education sector. Educational institutions view technology as a chance to improve teaching strategies and establish effective connections with students. Nowadays, everyone has a smart gadget, including a smartphone, a computer, a laptop, or a tablet. A key strategy for improving student learning is to understand how to use technology to improve teaching approaches. Both students and teachers can improve their abilities to design an interesting educational process with the digitization of the learning process. You may alter your educational institution in a variety of ways, from online learning to smart classrooms, performance analysis of your students, individualized learning, and online exams.

The pandemic has given academia a fantastic learning opportunity. It made us reevaluate our presumptions wherein all academic stakeholders accepted new digital ways of working and learning. It inspired us to reconsider the essential elements of the educational process. Digital transformation has created a significant impact by allowing students and educators to reassess the effectiveness of the digital tools they use in the classroom. New levels of innovation and collaboration are being sparked by the use of these digital tools to create a campus with endless learning opportunities. Thus, it is time to move on and develop future educational initiatives using the lessons we have learned over the last two pandemic years.

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This book provides precisely such a road map for the future of education, summarizing what we have learned and made recommendations for potential changes that could be made to education in the future to better meet the requirements of an even wider spectrum of students.

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PREFACE

The widespread digitalization of all aspects of life including the disruption caused by the Internet and the invasion by artificial intelligence necessitates rethinking educational transformation processes. The broader purpose of the digital transformation of education is to develop an effective educational system that fits the needs of the digital economy and guarantees easy access and understanding to the education stakeholders. A variety of technologies that are contributing to changing the face of education include telecommunication technologies that enable the creation of next-generation communication networks; artificial intelligence and big data processing technologies; cloud technologies; virtual and augmented reality; Internet of Things (IoT); and blockchain technologies. With the advent of these technologies and their subsequent implementation, the education sector has witnessed a radical transformation that has opened new avenues of growth, opportunities, and emerging markets that seek to benefit not only education stakeholders but also the entire humankind.

“Fun,” “interesting,” “engaging,” “effective,” “meaningful,” “crucial,” “powerful,” “empowering,” and “real” are the words that teachers desire to hear about their classes. Its goal is to provide instruction that benefits students' lives somehow. Rapid digitalization has altered many aspects of life over the past ten years, and education is no exception. Teacher-centered instruction has a long and illustrious history in education. However, as students take more responsibility for their education and use technology to obtain knowledge, the role of the teacher has altered in many classrooms to one of advising and directing as students take more responsibility for their education and do so. Around the world, schools and institutions are starting to evaluate their learning environments in order to support this new approach to education, encourage more contact and small group work, and employ technology as a knowledge enabler. In order to ensure that students learn in a useful and relevant way today, education technology (ET) and information communication technology (ICT) are essential.

Our book “**Digital Transformation in Education and Artificial Intelligence: Emerging Markets and Opportunities**” provides a comprehensive understanding of the emergence and evolution of digital technologies and artificial intelligence in the field of education. It also aims to shed light on the various advantages and drawbacks of the same, along with the opportunities and markets that are emerging because of such a digital education transition. In this book, a group of distinguished contributors discusses the issues that our educational institutions are currently facing as well as the role that technology and innovation have played in the global revolution in education. The essential requirement for educators at all levels to obtain a complete understanding of the technology-based teaching and learning tools at their disposal in order to best support student learning is the main theme of this book. For policymakers, practitioners, academics, researchers, and university and college students, this book is a great resource. Topics covered in this book such as:

Chapter 1 critically discusses the few adoptions of blockchain in education that have been carried out by HEIs and businesses.

Chapter 2 explores the factors affecting technostress levels among teachers and students caused due to the sudden shift from classroom teaching to online teaching.

Chapter 3 has endeavoured to evaluate some of the most crucial concerns in contemporary higher education and made appropriate recommendations.

Chapter 4 highlights a global standpoint on the technological outbreak in the education sector. It investigates copious advantages and opportunities of digital learning and significantly focuses on different technologies deployed for its implementation and improvement.

Chapter 5 focuses on emerging trends in education, including the incorporation of new technologies. Among the technologies covered in no particular order of importance are virtual reality, augmented reality, mobile learning devices, and the internet of things.

Chapter 6 has identified the challenges and opportunities associated with online/blended teaching learning in a pure educational setting.

Chapter 7 gives us more insight into how conversational AI will further transform education in the future.

Chapter 8 discusses the value of blended learning in the context of the pandemic, as well as the many obstacles that come with it.

Chapter 9 looks at the benefits and drawbacks of using a digital classroom, as well as the key obstacles it poses.

Chapter 10 examines how future online learning environments may alter how teachers impart knowledge to students and how students learn.

Chapter 11 delves into the unique characteristics of digital education, as well as the current level of its implementation, expected outcomes, and related problems, hence a transformation study has demonstrated the fundamentals of e-education with its implementation in modern society.

Chapter 12 discusses AI in education, its history, opportunities, and challenges.

We would like to take this opportunity to express our gratitude to the contributors for their contributions to this book. All of the chapters were chosen *via* a peer review process. We hope that readers will gain a lot of understanding of the role of technology in education from a variety of viewpoints and studies and they will find this book useful.

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CHAPTER 1

Exploring Blockchain Technology and Digital Certificates in the Education Sector

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Abstract: As the fourth industrial revolution is in play across the globe, emerging technologies such as blockchain are increasingly affecting how students' digital academic documents and certificates are issued and distributed. Higher Education Institutions (HEIs), students, employers, and other stakeholders in the educational sector face challenges regarding the falsification of academic records and digital certificates. However, relatively few adoptions of blockchain in education have been carried out by HEIs and businesses. Blockchain promises credibility, immutability, security, and consensus in light of issuing digital certificates and keeping academic records. Although blockchain comes with implementation challenges such as legal framework, scalability, and limited expertise, key stakeholders, including governments, academia, and businesses, must collaborate to explore and ensure the usage of blockchain-oriented educational solutions in the issuance of digital certifications around the world.

Keywords: Algorithms, Blockchain, Blockchain management, Collaboration, Consensus, Credentialing, Digital certificates, Digital learning, Diplomas, Education, Immutability, Innovation, Interoperability, Ledger, Legacy system, Scalability, Students, Tamper-proof, Technology, Universities.

INTRODUCTION

Now more than ever, every person has to opt for several educational programmes during their lives and acquires knowledge, abilities, and pedagogical certifications from numerous educational and skill development organisations around the globe, including the employers they work for. Thus, universities and employers seeking to recruit talents will want to have access to a complete record of those certificates that can be authentically confirmed due to instances of fraudulent certifications. Three men, one of whom was a Delhi University graduate, were detained in 2018 on the suspicion of operating a Pan-Indian fake degree fraud that involved the sale

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of about 50,000 counterfeit diplomas from universities and school boards (Outlook India, 2018). Furthermore, the Central Bank of Ghana (BoG) has acknowledged that two employees who applied for employment at the bank using “false certificates” have been dismissed (Frimpong, 2022). Due to these instances, a more secure platform must be used to issue tamper-proof, globally verifiable certifications (Capece *et al.*, 2020; Jayalakshmi, 2021). Thus, issuing digital certificates on blockchain-supported systems in the educational sector.

Due to the advent of our technology-driven 21st century, blockchain has come to dominate the discourse of emerging technologies. This technology has received a lot of attention (Yuan & Wang, 2018). More recently, it has been hailed as a data storage opportunity with the potential to have a significant positive effect on several underserved sectors, including manufacturing (Abeyratne & Monfared, 2016; Leng *et al.*, 2020; Lohmer & Lasch, 2020), and healthcare (Hölbl *et al.*, 2018; Hasselgren *et al.*, 2020), and education (Han *et al.*, 2018; Bhaskar *et al.*, 2020; Kwok & Treiblmaier, 2022). More importantly, digital certification issuance by higher education institutions comes with benefits such as immutability, consensus, security, and transparency. According to Devine (2015), student's academic records will become freely accessible to businesses and universities *via* blockchain, opening up new prospects for personal and institutional growth. In this blockchain integration, projections of the future potential of students might be made using the approved educational timeline and students' learning trajectories. This empowers students to possess and share their academic progress with employers for internships (Son-Turan, 2022). Employers will also find data on students more precise and a legitimate reflection of students' academic records and progress for talent acquisition.

However, there are still relatively few educational institutions that embrace blockchain technology due to its early stages of adoption in the education industry. The University of Nicosia in Cyprus and the Massachusetts Institute of Technology in the United States are currently using blockchain systems for credentialing and issuance of digital certificates (Levitskaya *et al.*, 2022). In order to make issued digital certificates tamper-proof and globally verifiable by students, employers, universities, and other stakeholders, it is recommended that their credential systems should be powered by a blockchain architecture (Asharaf & Adarsh, 2017; Karamitsos *et al.*, 2022).

This book chapter will strive to explore blockchain technology and digital certificates in the education sector due to the relatively high potential of the technology and, on the other hand, the relatively scanty research on blockchain and digital certifications, specifically in the sector (Dangi *et al.*, 2022; Kuleto *et al.*, 2022). The chapter will seek to discuss the concept of blockchain in the global

educational context. Blockchain use cases, particularly concerning digital certifications will also be covered in this chapter. Finally, with recommendations required to ease blockchain adaption, the implementation difficulties of blockchain in the education sector will be addressed.

LITERATURE

Blockchain Technology

According to a basic definition of the term “blockchain,” we are speaking about a chain of blocks. Blockchain is still widely misunderstood despite quickly entering the lexicon of technology. Blockchain simply refers to a chain of ‘blocks’ capable of storing information such as date, time, and actors in a transaction (Zheng *et al.*, 2017; Thakre *et al.*, 2022). Below is an explanation of blockchain, specifically in relation to the educational sector.

Blockchain refers to a distributed record-keeping system that provides a structure for institutions, college students, and firms the capacity to engage by sharing information of choice across the global educational space. Here, each participant in the system owns their respective data, and validations are collectively done upon any modifications of data. The system also provides all participants with the privilege to digitally store academic records, assets, agreements, and personal identities as information. Information on the platform is tamper-proof and parties can have access to transaction histories since information is open, indelible, and searchable (Badidi, 2022; Chen *et al.*, 2022). The creation of a new ‘block’ is affected whenever an agreed modification is made to existing information.

According to Grech and Camilleri (2017) and Nawari and Ravindran (2019), carefully selected protocols on the system intentionally regulate, monitor, record, confirm, and share all additions and changes made. Trust is found in the principles of cryptography that secures the platform from external attacks (Costa *et al.*, 2022).

Types of Blockchain

According to Zheng *et al.* (2017), blockchains can be categorized as public, private, or permission type. Anyone can sign up for and participate in a public blockchain. This category of blockchain offers decentralization, democratization, and authority-free operations. In contrast to public blockchains, permissioned blockchains only permit verified and invited members who have been thoroughly checked out before entering the network. In contrast to permissioned blockchains, which are the second kind of blockchains, private blockchains are owned and managed by a single entity (Zeng *et al.* 2017; Huo *et al.*, 2022). Table 1

The Dark Side of Digitization in Higher Education Causing Technostress

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Abstract: The education sector has faced tremendous changes in its system in the past two years. Pedagogies and teaching approaches have undergone a significant shift. The educational institutions provided necessary changes in their system to meet the dynamic needs of going online. These changes were made to serve the students and provide them with quality education. However, these sudden technological changes and updating processes have impacted mental health, causing technostress. Thus, the study aims to explore the factors affecting technostress levels among teachers and students caused due to the sudden shift from classroom teaching to online teaching. The study involved an exploratory research design and conducted in-depth interviews taken with teachers and students working in private higher education institutions. The data collected were transcribed and analyzed through word clouds, thematic analysis, and document analysis. Through analysis, two broad categories were identified - teachers' and students' concerns. The top concerns comprised – a lack of technical knowledge and support, network concerns, job insecurity, and work-life imbalance. The study has two significant implications-first, it will guide policymakers to formulate policies for helping students and teachers deal with their mental health and fears. Second, the study adds value to ongoing literature in the educational sector.

Keywords: COVID-19, Dark side, Digital invasions, Digitization, Exploratory, Higher education, In-depth interview, Online classrooms, Online lectures, Organizational change, Qualitative study, Students, Teachers, Technology, Technology acceptance, Technology usage, Techno-stress, University.

INTRODUCTION

Teaching has always been a noble profession. A teacher teaches in the classroom and influences students' goals, thought processes, and belief systems in the long run (Urhahne, & Wijnia, 2021; Hascher & Waber, 2021; Srivastava & Dhar, 2019). However, in an era of this remote working and work-from-home scenario,

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the personal touch of the teaching profession has gone missing (Varanasi *et al.*, 2021). Teachers are made to use technological instruments to teach their students. Not only taking classes but interacting with students, handling mischievous activities, managing disturbances, understanding technical glitches, and then completing their assigned tasks simultaneously (Christian, Purwanto & Wibowo, 2020). All of these changes were pretty sudden for most teachers, and the stress caused due to the sudden intervention of technology into work is concerning (Mehroliya, *et al.*, 2021; Saloviita & Pakarinen, 2021). Researchers have also found that attitude directs individual behaviour toward acceptance of a technology (Hussein, 2017; Phua *et al.*, 2012; Srivastava & Dhar, 2016). Individuals develop attitudes toward the use of technology for their job completion and performance, and then they accept and use technology (Srivastava & Dhar 2016).

However, in the current scenario, teachers are made to use technology, including desktops and laptops, different apps and software, mics, and so on, to organize a single class. Suddenly, the onus has fell on the teachers to complete the courses. Adding to their trauma, the technological disturbances and mischievous students are worsening their situation, thus causing technostress. Carnegie, Guthrie, & Martin-Sardesai, (2021) pointed out that “A better level of risk communication allows stakeholders to be more aware of potential material changes. Arguably, the disclosure of risk information improves stakeholder’s understanding because an organization can directly communicate the various risks. This higher transparency level will make it easier for external users to interpret the organization's risks” (p.65). Thus, it is clear that a lack of communication about new technology and organizational change-based new technology intervention can lead to stress among teachers. Similarly, techno-stress was considered a modern adaptation disorder due to failure in vigorously coping with new technologies (Brod, 1982, as cited in Çoklar, Efiltili, & Sahin, 2017). However, even though a few studies emphasised on techno stress among teachers, below given research questions remains to have less clarity. Addressing those gaps, the research questions discussed in this study are:

1. What were the institutional factors that led to the development of technostress?
2. What were the individual-level factors that caused technostress among teachers and students?
3. Whether technology over invasion is a reason for technostress in post covid scenario?

Based on the literature review published in the last two years, many studies examined models on how to manage this uncertain situation. However, very few

acknowledged the relevance of the exploratory research. Further, due to more emphasis on the cross-sectional study, more understanding was shared quantitatively. Thus, based on the technology acceptance model, this study aims to fill the gaps and evaluate the factors affecting technostress in higher education institutions.

LITERATURE REVIEW

Technology Acceptance Model

Technology acceptance theory (TAM) can be explained as “individual response to technology (adoption or rejection) is a result of the individual's perception towards usefulness and ease of using technology” (as cited in Srivastava and Dhar 2016, p. 78). This theory is concerned with dilemmas and confusions individuals have while using and accepting technology at work. Individuals have doubts about using new technology at work (Murillo, Novoa-Hernández, & Rodríguez, 2021; Srivastava & Dhar, 2016). Their confidence in their existing skills and fear of using new ones restore them from getting new technology wholeheartedly. Due to this, they fail to learn and utilize technology at work or with confidence. However, the intention can be shifted more into the positive side if the supervisor or the leader at work promotes technology usage. When leaders pose examples by using technology and experimenting with it, the apprehensions and hesitance among individuals can be eliminated in the long run. Further, it could instill a positive attitude toward technology acceptance and usage (Alfadda, & Mahdi, 2021; Srivastava and Dhar, 2016; Cheung & Vogel, 2013).

Technostress

Stress is a neurological phenomenon. Studies consider stress as an outcome of factors causing stress, namely stressors (Alfadda, & Mahdi, 2021; Srivastava and Dhar, 2016; Cheung & Vogel, 2013). Traditionally, the role played by an individual and the tasks assigned to them were significant stressors. However, the intervention of information and communication technologies (ICT) in everyday work has also been considered a stressor (Tarafdar *et al.*, 2011). Thus, technostress can be defined as a modern-day illness experienced by individuals who cannot cope with ICT healthily (Brod, 1982). In other words, techno-stress is the price paid for using technology (Çoklar *et al.*, 2016; Borle, Reichel, & Voelter-Mahlknecht, 2021).

The utilization of ICTs in today's information-driven society is essential. Without ICT, no meaningful professional and economic growth and development can be accomplished. Several benefits, such as increased productivity, efficiency, accuracy, space economy, and reduction in labour and routine, are derivable from

Pros and Cons of Artificial Intelligence in Education: A Review

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Abstract: The COVID-19 pandemic has truly become a watershed in the global education scenario, resulting in an unprecedented surge in the advancement of educational technology. The usage of Artificial Intelligence (AI), whose reach is expanding in the post-pandemic era is one such quickly rising trend in the education industry. To put it simply, it is the field of study dealing with machines that have human-like intelligence and other traits like adaptability, problem-solving, and learning. The use of artificial intelligence is working as a relief for teachers from their tedious administrative work such as grading student assignments, and on the other hand, it provides personalized and customized learning experiences to the learners based on their own needs and interests, which in turn, facilitates effective learning. However, the application of artificial intelligence in education is not a bed of roses. Apart from the risks of lessening human contact and being a threat to the human workforce, there is another crucial issue - as pointed out by UNESCO - of inclusion and equity, especially in developing countries where neither every school nor every the learner has the means necessary to benefit from the advent of artificial intelligence. This chapter makes an effort to delve into the pros and cons of applying artificial intelligence in education through a qualitative research approach by doing a review of existing literature.

Keywords: Adaptive learning, Artificial intelligence (AI), Automatic grading systems, Chatbot, COVID-19, Distance education, Education, Educational technology, Feedback, Information communication technology (ICT), Intelligent tutoring system (ITS), Learning, Learning management systems (LMS), Machine learning, Pandemic, Personalized learning, Special education, STEM, Virtual reality, Virtual teacher.

INTRODUCTION

COVID-19 pandemic has truly been a watershed in the education sector, ushering in a new era of education, where face-to-face physical learning had to give way

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to complete remote learning which brought about a drastic change in the education system. While all the stakeholders of education faced a challenge, the learners and teachers were mostly forced to adapt to these new ways of interacting and use various tools previously unused to ensure effective teaching-learning is still taking place despite the changing environment. The 2022 EDUCAUSE Horizon Report has hinted at the change being permanent with no immediate possibility of going back to the pre-pandemic “normal” situation (Pelletier *et al.*, 2022). Different countries reacted to this change in various ways. Technologically advanced countries such as the USA, the UK, France, and Australia dealt with the changes by strengthening their e-learning platforms, whereas, comparatively less advanced countries such as Chile, Brazil, and Argentina employed radio and television as means to ensure uninterrupted learning (Babbar & Gupta, 2022). This era saw an increase in the use of innovative technologies in education, and artificial intelligence is one of them. The 2022 EDUCAUSE Horizon Report has identified some key technologies and practices that are to play a significant role in the higher education sector and artificial intelligence for learning analytics and learning tools are included among these key technologies.

In education, the use of artificial intelligence is not a novel concept. The first and most well-known application of artificial intelligence in education is the intelligent tutoring system (ITS). During the 1970s and 1980s, ITS was seen as something that can replace human teachers; however, there were other uses such as encouraging independent learning and assisting class work (Clancey & Hoffman, 2021). These were used following the traditional methods of teaching where the major focus was on teaching factual knowledge and procedural skills by using strategies like drill and practice (McArthur *et al.*, 2005). These ITSs having the ability to adapt to learner's needs were present even in 1991 (Roll & Wylie, 2016). There is a steady rise in research pertaining to artificial intelligence and education with time; especially 2015-2019 accounted for the publication of 70% of all the related papers indexed on the Web of Science and Google Scholar (Chen *et al.*, 2020). Chen *et al.* (2022) concluded that there has been a steady rise in the publication of articles on artificial intelligence in education from 2000 to 2019, especially since 2012. In a study done in Romania, it has been found that artificial intelligence-driven tools and systems are increasingly used by both teachers and students (Pantelimon *et al.*, 2021).

The UNESCO (2019a), in the Beijing Consensus on Artificial Intelligence and Education, has recommended to all its member states to formulate policies related to artificial intelligence and make effective strategies for implementation in education. Yufei *et al.* (2020) observed that the USA, India, and Singapore are at the forefront of devising education reform strategies that will lead to a successful implementation of artificial intelligence in education. In 2019, The National

Artificial Intelligence Research and Development Strategic Plan have been formulated in the USA to come up with concrete strategies for policies and financial support for artificial intelligence implementation. The fourth master plan for ICT in education in Singapore has mentioned establishing a smart learning environment (Yufei *et al.*, 2020). In 2018, India released the National Strategy for Artificial Intelligence where education was identified as one of the five focus sectors where artificial intelligence technology was to be implemented (NITI Aayog, 2021).

Artificial intelligence as an area of study has a history of development. It all started with science fiction in the first part of the 20th century when the authors proposed the idea of intelligent robots thinking and working on their own. Later scientists, philosophers, and mathematicians started to explore the idea more. The coining of the term “Artificial Intelligence” by John McCarthy, a computer and cognitive scientist, and the launch of the field of study both happened at the Dartmouth Conference hosted by John McCarthy and Marvin Minsky in the year 1956. In John McCarthy's words, artificial intelligence is “the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable”(McCarthy, 2007). Instead of seeing artificial intelligence as a single technology, it should be considered an umbrella term inclusive of various technologies and approaches like natural language processing, neural networks, data mining, machine learning, or an algorithm (Baker & Smith, 2019). In Baker and Smith (2019), artificial intelligence is defined as “Computers which perform cognitive tasks, usually associated with human minds, particularly learning and problem-solving” (p. 10). In the case of artificial intelligence, machines have the ability to do tasks that require human or animal intelligence. It refers to machines learning automatically from the existing load of unstructured data such as text, images, *etc* . without the help of human beings and solving problems, and making decisions. Although artificial intelligence as an area of study has its roots in computer science and engineering disciplines, the influence of other disciplines such as philosophy, economics, neuroscience, and cognitive science cannot be denied (Zawacki-Richter *et al.*, 2019).

Experts identify majorly two types of artificial intelligence: “weak or narrow” artificial intelligence and “strong or general” artificial intelligence. According to Baker and Smith (2019), narrow artificial intelligence is “an AI system that can do one human task” whereas general artificial intelligence is “an AI system that can do many tasks as well as a human” (p. 10). From Google Assistant, Apple's Siri, and Amazon's Alexa to self-driving cars we are surrounded by many real-world applications of artificial intelligence. All the aforementioned applications of

Technological Invasion in the Education Sector: A Global Perspective

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Abstract: The technological revolution is dramatically transforming the educational topography of the world, wherein humankind is experiencing drastic alteration from classroom learning to e-learning. The shift has brought a landmark change in the experiences of educators, learners, and administrators and has highlighted the different nuances of digital pedagogy. This study aims to present a global standpoint on the technological outbreak in the education sector. It investigates copious advantages and opportunities of digital learning and significantly focuses on different technologies deployed for its implementation and improvement. Various technologies, such as extended reality, cloud computing, crowdsourcing, blockchain, etc., have brought a phenomenal switch in the educational methodology and have improved the efficiency and effectiveness of the education stakeholders and processes. Additionally, the paper also attempts to draw attention to the variety of initiatives both western and eastern countries undertake to enhance technological adoption in the education sector. In this light, the study serves as a ready reference for education scholars to understand the invasion of digitalization and the related global developments in the education sector.

Keywords: Big data, Covid-19, Digitalization, Digital education, E-learning, Learning, LMS, Metaverse, Machine learning, Online education, Technology, Virtual education, Virtual technologies.

INTRODUCTION

The present 21st century has witnessed strong developments and exponential growth in technology. The last two decades have registered rapid development, with technology encroaching on every nook and corner; and digitalization, becoming a way of living. Laptops, smartphones, and tablets are no longer a foreign concept and are being used in all sectors including the education sector. With the help of these technological tools, the education system is advancing for the sake of betterment, as the students of this generation are not born to be confined by the constraints of simple learning and seek creativity in learning and engagement in education. It is increasingly being realised that nowadays the stud-

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ent's curiosity is wide and cannot be provisioned by the educational systems that were developed earlier. Thus, information and communication technologies have prompted a drastic revolution in the education sector and have led the emerging digital trends in teaching-learning processes.

Education is a foundation for most cognitive transformations which do not remain limited to individuals but also extend to transforming the entire society and the world. Therefore, it is considered a critical and priority sector that defines the future of the nations. There is presently an increasing identification of the potential significance of digitalization and the role of education stakeholders and institutions in adopting and promoting the same not only for educational upliftment but for overall social and economic development. Technological advances have encouraged innovation and distance learning which have proved to immensely benefit all education stakeholders. A variety of technologies are contributing towards transforming the landscape of education which includes virtual and augmented reality, extended reality, Internet of Things (IoT), big data analytics, cloud computing, artificial intelligence-enabled technologies, metaverse, crowdsourcing, machine learning, and blockchain technologies.

The misconceptions of stakeholders regarding the invasion of digitalization in the education industry have changed because they have noticed numerous advantages and opportunities it offers to the developing world. E-learning has promoted self-organisation, self-discipline, and self-directed learning, among many other benefits, which have widened the creativity and knowledge base of students (Babbar & Gupta, 2021). While the students outlined the convenience and flexibility of time and place as the major positives of online education, the educators also appreciated e-learning in terms of the comfort and ease catered in the updation and wide circulation of study material, organisation and processing of student data, and smooth delivery of lectures *via* digital platforms (Babbar & Gupta, 2021; Babbar, Sharma, & Singh, 2022). They accepted this contemporary technological advancement that eased the cloud recording of lessons, established better and more effective connections with tutees, and introduced innovative and creative teaching methods. In light of the foregoing, digital education has also benefited the administrative framework of the education sector by moderating record maintenance, and easily registering online interactions and documentation processes. Digitalised administrative infrastructure has also facilitated the admission process, and enabled faster evaluation and grading procedures (Babbar & Gupta, 2021). Therefore, digital learning posits a variety of opportunities for all stakeholders including students, teachers, researchers, and university administration. In this light, this study aims to answer the following two research questions:

RQ 1- Which digital tools and technologies are being used in the education sector and how they are contributing toward developments in the education sector?

RQ 2- How different countries have adopted digitalization in the education sector?

Thus, after undertaking an extensive review of the literature on the topic, the researchers have attempted to answer in detail the above-mentioned two research questions in the following sections. To build an understanding and present the facts, only authentic information sources have been used such as journal articles, news articles, and government reports. Further, an attempt has been made to study the diverse perspectives of all the education stakeholders including the learners, teachers, and administrative staff. The authors have expressed their viewpoints supplementing with examples from various countries across the globe and calling for the immediate attention of the stakeholders and implementation by the institutions.

DIGITALIZATION TOOLS AND TECHNOLOGIES IN THE EDUCATION SECTOR

With the emergence and introduction of innovative technologies, four paradigms of educational development can be identified. Starting from Education 1.0 which renders a classic expository model wherein the evaluation is primarily reviewed on the basis of oral and written assessments and moving towards Education 4.0 which is an efflorescing paradigm whereby learning techniques are modified and tailored based on real-time learner profiles (Demartini & Benussi, 2017). Internet of Things (IoT), Cloud computing, Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) have emerged as the main technologies enabling and driving education 4.0 (Popenici & Kerr, 2017; Shahroom & Hussin, 2018). The role of students and teachers has also changed during the progression of educational paradigms. Teachers' knowledge is no longer limited to the realm of programmatic content but now they know how this is amalgamated by the students who are nurtured by AI-based learning portals (Almeida & Simoes, 2019). On the other edge, the role of students has also changed dramatically, from largely passive in education 1.0 to increased participation and independence in education 4.0 (Demartini & Benussi, 2017). The fourth paradigm allows students to develop their learning model and speed of learning by the use of advanced programming logic; where big data, cloud computing, and artificial intelligence play a fundamental role (Almeida & Simoes, 2019; Kinshuk, 2016).

The applications of advanced technologies including virtual reality and robotics have lately emerged as dominant methods of education in pioneering initiatives (Hayati & Hashemy, 2013; Martín-Gutiérrez *et al.*, 2017; Sung *et al.*, 2013).

Emerging Use of Technologies in Education

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Abstract: The use of technology in the classroom makes learning more pleasant and simpler. The utilization of technology in the classroom is becoming more prevalent in these modern times, especially in this COVID-19 era. In this chapter, we discuss the emerging trends in education including the incorporation of new technologies. Among the technologies covered in no particular order of importance are virtual reality, augmented reality, mobile learning devices, and the internet of things. We evaluate the potential impact of emerging technologies on university teaching and learning. The technology education tools, including headsets, handsets, computers/laptops, electronic readers and online books, were identified in the literature.

Keywords: Education, Emerging technologies, Internet of things, Virtual learning.

INTRODUCTION

Educating ourselves is the process of acquiring knowledge. It is a never-ending procedure, yet most students use it. Students, educators, and professionals from around the world may collaborate and share knowledge in real time because of technology (Buck, 2013). Students and school-going youngsters are more closely associated with this term than any other demographic. Using technology for teaching makes it both more enjoyable and easier. Technology is having a greater impact on higher education than ever before. Due to the current situation, educational technology tools that were formerly considered cutting-edge or desirable are now essential if classes are to continue as usual without interruption (Buck, 2013). In order to remain competitive, universities must stay abreast of the most recent occurrences in educational technology (edTech), which has a substantial impact on how students access and use course materials (Buck, 2013).

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As a result of this rapid technological advancement, education has undergone a dramatic change as well. Teachers and students must work together more closely with technology in the modern classroom (Kintu *et al.*, 2017). A variety of new teaching approaches have arisen, including e-learning, remote learning, and web-based learning, to mention a few (Farid *et al.*, 2018; IvyPanda, 2021). Beginning in the year 2000, blended learning became the most widely acknowledged pedagogical concept in educational settings (Haq *et al.*, 2018). In comparison to previous centuries, the state of the educational system has improved dramatically. Education in the 21st century is technology-driven, and ideas and inventions have outperformed both machines and muscles in this century's system (IvyPanda, 2021). Comparatively, technology has had a relatively limited impact on education, teaching, and learning (Veletsianos, 2015). No child is left behind because of the lack of literacy, economic issues, and other requirements that can be met through technology. For the sake of this chapter, we will focus on the various educational technologies that have been bolstered by technological advancements.

LITERATURE

Emerging Technologies

There are many ways to define technology, but one of the most common is to think of it as a set of systems built to accomplish a specific task at a specific time and place. Using the term “emerging technologies,” Veletsianos (2010) refers to tools, concepts, innovations, and improvements used in a wide range of instructional environments (including distance education, face-to-face education, and hybrid forms of education) (*e.g.*, instructional, social, and organizational goals). According to Miller, Green, and Putland (2005), technology is still evolving if it is not yet a “must-have.” Until recently, email, for example, was considered a purely optional technology. When it was only available to a select group of employees on a regular basis, it had limited utility as a means of information exchange. If you don't have or use this technology, you are considered to be missing out on a lot of opportunities. However, in the commercial or business sphere, the technology may still be deemed “emerging” if it is widely used in the educational sector. It is expected that ETs will have a profound impact on the way people learn. There is a possibility that certain “old” technologies could resurface in a particular context as disruptive technologies that will be embraced in the future and have some degree of ambiguity and uncertainty associated with them. They also highlight the fact that not all newly developed technologies are necessarily considered emergent technologies (Veletsianos, 2010; Kabugo *et al.*, 2015; Rotolo *et al.*, 2015]. There are many different kinds of digital technologies that can have a disruptive impact on the processes in which

they are employed. These include new or old technologies. In this context, ETs refer to these resources, artifacts, tools, and concepts.

The Role of Emerging Technology in Education

It is becoming a more normal practice for educational institutions all around the globe to make use of computers, tablets, smart whiteboards, and other forms of technology in the classroom setting. Because of advances in technology, it is now feasible to establish a connection to the rest of the world and have access to a vast library of scholarly materials. Coding in computers and other technical abilities not only prepares students for successful employment once they graduate from high school and college but also encourages them to develop even more original goods/products. It has resulted in a considerable rise in the proportion of persons who are able to attend school. Because of technological advancements, students were able to continue their education despite the COVID issue, which prevented them from falling behind academically for an entire year. The devastating pandemic led to the sudden closure of many educational institutions, and as a result, significant changes were made to the system of education delivery, including the use of digital online learning platforms, artificial intelligence-enabled tools, and digital learning tools (Babbar, Sharma, and Singh, 2022). Universities all over the world adopted a variety of strategies to combat the crisis's reverberations. Countries, where online lecture delivery was already well established, improved their infrastructure and methods, while other countries built and launched their own platforms for learning (Babbar and Gupta, 2021). Students' curiosity and motivation to study and read are stimulated as a result of the proliferation of smart classrooms that are now accessible in schools throughout the nation (Buck, 2013). Education is improved through the use of technology, which also makes it more readily available and productive. Education is now more available than it has ever been because of the proliferation of direct internet connections. There is no longer a need, as there once was, to wait for the instructor to conclude a subject before moving on to the next one. They are able to easily acquire new abilities and information anytime they desire thanks to the internet and the various educational applications that are available (Parasanna, 2021). As a result, it is generally acknowledged that developments in technology have made it feasible for students as well as instructors to study, grow, and enhance their technical talents by talking with people working in their profession all over the globe. This is something that was previously impossible. Students now have access to a much wider variety of ideas and situations which have removed all of the educational barriers that previously hindered their ability to study. As a result, students now have access to a much wider variety of ideas and situations than they did in the past (IvyPanda, 2021). Technology may be utilized

Opportunities and Challenges Associated with Online/Blended Teaching-Learning

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Abstract: There is an increasing number of academics supporting the increased use of digital technologies in teaching and learning. The purpose of the chapter is to identify the challenges and opportunities associated with online/blended teaching learning in a pure educational setting. We identify many opportunities that will sustain BL globally. These opportunities include student participation, a rise in students' interest, flexibility, repetitive learning, increased reach, fun, critical thinking, effective use of instructors' time, a personal approach, a tailored training experience, educating future generations of children, improved communication, better-utilizing classes, giving students autonomy, a cost-effective approach, instilling a self-supporting mindset, and the chance to collect data. It also identified several challenges, such as technology investment/cost, working knowledge of the current technology, expensive software, and cognitive burden. It was concluded that BL offers a way to combine online learning's innovative and technological improvements with the engagement and involvement that comes with a traditional classroom setting. To maintain a good momentum in studying a digital world, educators and students need technological support. It is recommended that the integrated Moodle learning management system may be used to build an understanding of technologies in a more holistic and embodied way.

Keywords: Blended, Education, Face-to-face, Learning, Online, Opportunities, Teaching, Technology.

INTRODUCTION

In order to comprehend the contexts, dynamics, and interconnections of its actors, education is a complex system that necessitates numerous points of view and degrees of analysis, particularly in light of technological developments (Castro, 2019). The study of the education sector is necessary because, all nations source their human capital from higher education (Mansi, Sharma & Singh, 2022). There is no doubt that education, particularly university education, is in a period of unc-

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ertainty, transition, and change. Unbundling in higher education has gotten a lot of attention in the last several years, both from practitioners and academics (Bacevic 2019; Czerniewicz *et al.*, 2021; Newfield, 2019). Because of this, prior to COVID-19, the majority of research conducted outside of institutions of distance education focused on the integration of technology into traditional residential provision, with a particular emphasis on how academics perceive online versus face-to-face teaching from an educational point of view (Harrison *et al.*, 2017).

Survey results from academics in the United States demonstrate that more and more academics favour the use of digital technology in teaching and learning despite the continuing discussion over whether online education can equal the quality of face-to-face instruction (Jaschik & Lederman, 2019). New social constructivism has been used in the 21st century so that instructors may connect directly with each student or students can quickly communicate with their teachers and exchange ideas or thoughts with other students (Bordoloi, Das & Das, 2021). Blended learning has risen to prominence in the educational landscape in recent years. A growing number of academics and researchers have turned their attention to blended learning in the wake of its success. A decade ago, there was a gap in traditional face-to-face instruction and a dispersed research context which was addressed by modern technological breakthroughs (Singh, Chohan & Kumar, 2021). Conventional face-to-face learning was limited by a lack of technology in a distributed learning setting. While the old method of teaching and learning is effective, something new is needed to stay up with the rapidly changing world around us. As a result, incorporating ICT into the classroom can help students better connect their classroom learning to today's rapidly evolving technology landscape and expanding global community.

In the future, blended learning, which combines the best aspects of online and face to face teaching methods, is expected to be the most popular teaching method. Computers and online learning necessitate much more than a few computers in the classroom to transform education. Digital learning platforms like Zoom, Google Meet, Cisco WebEx, and other online meetings software have opened up a world of learning opportunities for students, allowing them to acquire the knowledge and skills they need to function well in today's society (Bordoloi *et al.*, 2021). Hence, has two objectives: (a) To identify the opportunities associated with online/blended teaching learning in a pure educational setting; and (b) To uncover the problems that HEIs confront when implementing BL as a modern method of delivering educational services to learners/students. The chapter also looked at the definition of BL, as well as the many forms and characteristics of BL in HEIs. The current chapter focuses on the aforementioned points. One of the most important advantages of blended learning (BL), according to Winstead

(2022), is that it allows students to participate in online discussions, receive feedback from instructors and peers, and gain access to courses whenever they want, from any location. BL also facilitates student evaluations with comprehensive online testing and granular reporting. Teachers like the convenience of automated grading in many learning systems. However, despite its advantages, BL is plagued by a plethora of issues in academic settings (HEIs).

To achieve true blended learning, educators must rethink their traditional roles as information providers and instead take on the role of guides and mentors. Flexible learning spaces, where students can learn in a number of ways and communicate and collaborate with individuals outside their school and perhaps even beyond their country, need to be re-envisioned as classrooms instead of as static places. A student's education should be a lifelong process, not just a one-time event in the classroom. Professional development for current teachers and pre-service education for future teachers are essential to the success of these initiatives. By raising the standard of instruction, it will lessen the likelihood of mistakes being made in the classroom. I hope this chapter will serve as a resource for educators interested in learning more about the benefits of online/blended teaching and learning. Schools that are just starting to employ blended learning may find this resource particularly useful.

I hope that the chapter's talks contribute to the field of curriculum design by providing innovative ideas for adapting hybrid instructions to effectively teach higher-level students. Curriculum designers will use these data during innovation, and future researchers will be able to overlook new viable platforms for delivering music training. It will assist them in understanding how their defined objectives in technological integrations have been met and seeking improvements where necessary.

LITERATURE

Blended Teaching Learning

Online educational information is combined with face-to-face interaction and live instruction to create a personalized learning experience and allow students to reflect on their progress in a variety of ways across a variety of learners (Watson, 2008). Many researchers have characterized blended learning (BL) as a combination of face-to-face and online learning. Students learn more efficiently when they are exposed to a variety of instructional approaches, such as blended learning, which incorporates a variety of teaching modalities. Most blended learning mixes classroom instruction with online learning. To introduce or reinforce concepts, to provide hands-on skills practice, and to give students an opportunity for collaborative work, formal education is being used in a blended

Artificial Intelligence: Future of Advance Learning

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Abstract: Artificial Intelligence is not about making a robotic mind; it is all about reshaping, and redefining the scope of learning and innovation. It is a platform for solving problems with more intelligence and gravity. Digital learning is now an integral part of all educational institutions in unparalleled times, which we all are a part of. In addition to the overall interaction between teachers and students, conversational AI will improve the classroom atmosphere and the learning experience for students. Chatbots with artificial intelligence can be used to teach students to look as if they are in a structured chat conversation by turning a lecture into several messages. The bot will continually evaluate the student's level of understanding and apply the next part of the lecture. AI and Chatbots can make their learning process more engaging and interesting. They will help to reduce the workload for the administrative staff of schools. This will lead to a significant increase in the education sector, recipient interactions between teacher and student, and a climate for higher education. It not only enhances learning but also promotes vision, resilience, and interest among students. This chapter offers theoretical insight into why education Chatbots are the reasoning and economic way to develop talent and success in e-learning. This chapter gives us more insight into how conversational AI will further transform education in the future.

Keywords: Artificial intelligence, Chatbots, Learning, Personalized education, Technology.

INTRODUCTION

The term “artificial intelligence” was first used in a formal sense in 1956 at Dartmouth College in New Hampshire, marking the start of the field. Although research into artificial intelligence (AI) started in the early 1950s, it wasn't until close to the turn of the century that it really began to have an impact on daily life. The emergence of robotic machines, biometric sensors, and virtual assistants, Artificial intelligence (AI) and related fields like robotics, the Internet of Things (IoT), automation, and programming has dominated the industry over the last few

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decades. Today, all professions—students, teachers, researchers, engineers, doctors, service providers, *etc.*— would be lacking without artificial intelligence assistance. The importance of AI in the modern world can be understood by looking at how we live our lives.

The COVID-19 pandemic has forced companies to finally give impetus to their digitalization efforts and leverage emerging technologies such as AI and AR/VR. Although industry leaders in education have been advocating for the move towards digitalization for some time, the COVID-19 pandemic has forced companies to finally give impetus to their digitalization efforts and leverage emerging technologies such as AI and AR/VR. According to the Technavio market study, the AI industry in the US education sector would grow at a CAGR of 48 percent from 2018 to 2022.

In the current educational situation, e-learning plays a significant role. It can transform the entire structure of education and, precisely because of this, it has become one of the researchers' favorite topics. In 2020, e-learning is an enormous trend. The crisis of COVID-19 has changed our way of life. Education, which has been channeled into various formats across schools/institutions, has a new look. In various fields such as mass media, education, information and technology (IT), and distance learning, research on e-learning is being conducted. Researchers are working on different aspects of e-learning. We are constantly trying to learn more, quickly, and more profoundly.

In recent news, AI has been stated in the ominous alerts by academic leaders including Elon Musk and Stephen Hawking about the possible effects on panic about developing Facebook AI in their respective languages. And by 2055, approximately half of today's work could be automated, according to a recent McKinsey World Institute survey. Can 'teaching' be included on this list? Today, Education World looks at the essence of the current position of AI in universities, including a forecast of where we are likely to go (Krishnan *et al*, 2022).

AI is a buzzword now in discussions in eLearning. The next big thing because of eLearning can be enhanced. Many people ask such questions as who uses AI, how can it be used for e-learning, and what is its future. In the e-learning field, artificial intelligence is rising. Global Market Insights in their research study estimates that the education market AI will reach 6 billion USD by 2024.

AI is not limited to the study of computer science but should be incorporated into all other areas of education. All areas of study where incorporation and integration of machine-human interfaces like segmentation, market strategy, consumer behavior, and analytics exist or can exist like economics, sociology, Psychology, Marketing, Communication, *etc.* (Thomas Davenport, 2019), AI plays an

important role in productivity and cost-effectiveness. These economies are revolutionizing and the way we see them is changing by the minute. The digital and dynamic nature of AI also provides the possibility of engaging students, which cannot be found in often outdated documents or fixed environments. In synergy, AI is capable of progressing and accelerating the discovery of new learning borders and the advancement of emerging technologies (Mariappan *et al*, 2022).

In the educational sector, artificial intelligence (AI) is making big changes. What benefited most was the fast adoption of innovations by the younger generation. With the integration of Facebook, Twitter, Skype, and other social media apps, Conversational AI can involve students and provide short but useful information through educational Chatbots. Chatbots are incorporated or exchanged like any other communication with a group and multiple conversations may be held in parallel. Awareness of using one Chatbots is easily passed on to other Chatbots and data requirements are minimal. Reliability of communication, quick and uncomplicated development of iterations, lack of fragmentation of the version, and restricted interface design efforts often give developers advantages (Klopfenstein, Proceedings of 2017). There have been days of students who have been tucked into dark libraries and surrounded by volumes of books and handwritten assignments submitted in well-bound folders to the teachers. The abundance of knowledge in the world is now distilled into a search bar and submissions are clicked away. AI enables teachers to communicate with students as never before (Mariappan & Krishnan, 2022).

There has been a phenomenal rise in the emergence of AI in ways to learn, teach, and higher education integrations. Evolving technologies are changing how we learn as institutions, teachers, and students. The pace of incorporating AI in the education structure including student support and administration will define how the future of universities will behold (Kerr, 2017). As per many past approaches to AI, the focus has been on limited theoretical understandings of various domains. As of today, vast advancements in technology have molded AI into a mean machine tool that adapts, learns, synthesizes, analyzes, and corrects flaws for complex data processing. The impact of progressions made by AI on education inclinations in the recent past has led many universities to use IBM's supercomputer Watson over recent years for learning and student advice algorithm bespoke based redressed round the clock. Today AI is not dependent on just programming but is adopting to inbuilt learning interface and making almost accurate predictions.

AI has evolved and tapped and is incorporating our schedules, work patterns, and personal lives. Machine learning (ML), Deep Learning (DL), Intelligent Personal

Opportunities Associated with Online/Blended Teaching Learning in the Era of Digital Education

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Abstract: Education is both the foundation for a thriving society and the core of what it is to be human. COVID-19 has accelerated the adoption of information technology in educational environments, which is a logical conclusion. As a result of this circumstance, opportunities for the employment of digital methods in education have arisen. Students and educational institutions were forced to convert to online learning methods. Even before COVID-19 began, it was evident that digital education methods would soon be used. Nonetheless, the educational environment had to be rethought as a direct consequence of the pandemic, and we became more conscious of the importance of technology in education. Blended learning combines offline and online education by allowing students to interact with the instructor, study materials, and other students *via* conventional classroom settings and other online platforms. Blended education has immense potential in the long run and is destined to become the mainstream form of teaching since it makes learning easier and more rewarding. Within the current educational system, it is critical to give technology the attention it deserves and to include new pedagogical techniques, such as blended learning, as the last component of the teaching and learning process. The goal of this chapter is to discuss the value of blended learning in the context of the pandemic, as well as the many obstacles that come with it. This chapter aims will discuss further the importance of blended learning for the education system's future.

Keywords: Blended learning, Convergence, Computer assisted learning, Covid-19, Digital literacy, Distant learning, Government schools, Ict-based education, Learning management system (lms), Onformation and communication technology (ict), Onnovative pedagogy, Onformation technology in educational environments, Offline education, Online education, Pedagogical techniques, Private schools, Social ramifications, Student academic performance, Teaching and learning process, Teaching-learning system.

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INTRODUCTION

Although India has been an independent nation for more than 70 years, its educational system has not undergone a significant change, especially when compared to other nations. Following the development of educational technology in education, the University of Illinois was the first institution to launch PLATO, which stands for “Programmed Logic for Automatic Teaching Operations,” in the 1960s. In later years, e-learning and hybrid learning methods were developed and used. Later, in 2006, Bonk and Graham (Bonk and Graham, 2006), in their book *Textbook of Blended Learning*, rebranded hybrid learning as blended learning. This was done in response to the growing popularity of the latter. Numerous earlier studies demonstrate that the blended learning approach has great potential to tackle the new issues presented by an education system that is always evolving. The existing education system in India, which is focused on chalk and talk, has several flaws, which we have uncovered. The challenges now being faced by the educational system in India may require an education in the form of blended learning.

The education systems of industrialised nations make extensive blended learning possible. Several previous studies have proven that it is an effective strategy for improving teaching and learning. In India, Byjus, Moodle, and other comparable learning management systems have recently become accessible. They are costly, therefore, not every institution can afford them. There remains a substantial lag in the implementation of blended learning in every educational institution. The two primary educational institutions in India are government and private schools. Some public schools are run entirely by the government, while others receive outside government funding. A situation in which funding is restricted, resulting in inequality because private schools are becoming overly reformed due to their use of advanced technology, whereas public schools and schools receiving government aid are not advancing to the extent required because of a lack of money and resources. Inadequate financing, a lack of understanding, a lack of infrastructure, and other similar factors contribute to the absence of appropriate implementation of blended learning methodologies in India. However, with an eye on the new normal, it is crucial to be aware of and comprehend the importance of blended learning in India (Atwa *et al.*, 2022).

Blended Learning

Blended learning is an innovative teaching strategy that combines physical and electronic resources simultaneously to maximize the phrase “hybrid learning” . This was first coined by Bonk and Graham in 2006 (Bonk & Graham, 2006). However, before that, it was known by a different name. It currently falls under

the umbrella term “computer-assisted learning” or “ICT-based education” and has been around for quite some time. (Fig. 1).

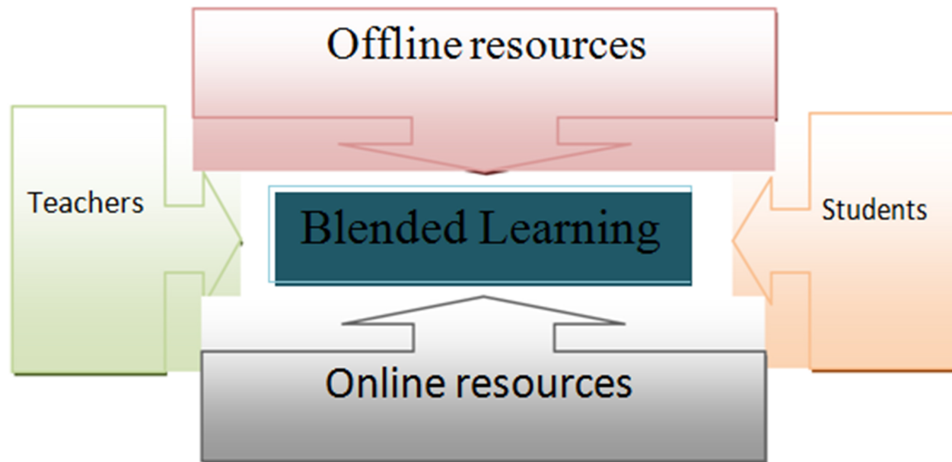


Fig. (1). Blended Learning Technique Source: https://www.researchgate.net/figure/Blended-Learning-technique_fig1_349867324(Sharma & Sarkar, 2020)

The time has come when educational institutions desperately want technological advancements. We have adopted a new normal, including withdrawing from society, isolating ourselves socially, and donning masks. One of the most crucial concerns in this time of increased individualism is the continued development of educational institutions. Blended learning is one potential solution to the problem that must be addressed before an advanced teaching and learning system can be successfully implemented. Blended learning strategies are rather successful in several different nations. The United States of America, China, Japan, and several strategies in the Middle East have all adopted blended learning as their primary instructional teaching, and all have discovered favorable outcomes. Blended learning effectively elicits favorable reactions, optimizes constrained resources, enhances students’ participation in classroom activities, and fosters greater motivation levels among students (National Educational Technology Plan, 2010). Blended learning is regarded as the Third Generation of distant learning (Staker *et al.*, 2011). It has the potential to significantly influence the learning environment and the levels of satisfaction and motivation experienced by students (Zhonggen *et al.*, 2015). There are many models for blended learning strategies: Rotation, Flex, A-la-carte, Face-to-Face Driver, Enriched Virtual, and so on are some of the available options.

CHAPTER 9

The Influx of Digital Technology to Enhance the Classroom Learning Experience

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Abstract: The integration of digital technology has diametrically changed the learning experience. Leveraging technology has been a key way to balance the learning mode. The budding culture of smart classrooms with digitally equipped tools has changed the pattern of education globally. Today it is progressively perplexing for the academic community to fulfil their hunger for knowledge without using technology. The fusion of conventional and digital classrooms is becoming almost impending. However, it is also critical to comprehend the benefits and drawbacks of using digital technology in the classroom. Technology can help to improve education quality, but it isn't enough. The fundamental difficulties are in establishing proper technology usage. While digital technology is becoming more widespread in schools and classrooms, academics and practitioners are still grappling with how to optimize its influence on student learning. The purpose of this paper is to look at the benefits and drawbacks of using a digital classroom, as well as the key obstacles it poses. The methods that will be used will be explanatory. The research will be theoretically grounded, followed by practical experiences and a critical analysis of the literature on digital classrooms.

Keywords: Academic community, Benefits, Conventional, Digital, Drawback, Education quality, Explanatory, Integration, Learning, Practical experience, Smart classroom.

INTRODUCTION

Digital technology plays a crucial role in achieving the goal of sustainable development, especially in the education sector. Nowadays technology has become an indispensable part of classroom learning. The COVID-19 pandemic has led to more or less the integration of digital technology for leveraging the process of learning. Integrating technology into the classroom has helped in “the transformation of the traditional classroom into a modern and digitalized version” (Hiltz & Turoff, 2005; John, & Wheeler, 2015; Blake, 2013; Babbar, & Gupta, 2021). The classroom setup has changed over the past few years, especially dur-

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ing the post-COVID-19 pandemic (Triyason, Tassanaviboon, & Kanthamanon, 2020; Pregowska, Masztalerz, Garlińska, & Osial, 2021). Today digital technologies are an important aspect dominating every discipline. Technology in classes “transforms the way educational content is delivered” (Deng, & Benckendorff, 2020).

Reducing the gap between a traditional classroom and a modern classroom through digital technology acts as an inclusive with buttressing dignity and decorum (Lewis, Cidon, Seto, Chen, & Mahan, 2011; Katz, & Winegardner, 2020). The educational domain mostly engages “information and communication technology in supporting, enhancing and facilitating the classroom learning” (Chen and Tsai, 2021). “Political liability, curriculum framework, infrastructure, teaching staff, public participation, skills, academic outcomes” are the major indicators influencing technology in the classroom (Morris, Park, & Auld, 2022; Chigona & Davids, 2014; Botha, 2015; Gordon, 2013). The traditional classroom more or less restricts the learner from satisfying their thirst for knowledge due to restrictions of time and place. The availability of digital technology within and beyond the classroom enhances the opportunity for the learner to fulfilling their craving for learning more and in a much more interesting manner (Ebersöhn, Loots, Eloff, & Ferreira, 2015). “Digital technology helps to enhance e-learning, distance learning, ubiquitous learning, and mobile learning by establishing the connection between computers, networks, ICT, multi-media, and artificial intelligence” (Harwell, Gunter, Montgomery, Shelton, & West, 2001). Sarker, Wu, Cao, Alam, and Li (2019) stated that digital technology has the potential for enhancing creativity, collaboration, autonomy, and personalization for the desire for learning. Regmi and Jones (2020) contended that the traditional method of teaching can easily be shifted into a modern setup through the mindful use of technology.

However, some scholars claim that digital technology has almost no effect or negative effect on enhancing classroom learning while there is another group that has a different opinion (Singh, 2021; Robin, 2008). In the present era, it is crucial to explore an in-depth understanding of digital technology on the achievements of learners.

LITERATURE REVIEW

The last few years have witnessed a huge increase in the use of digital technology in the classroom (Allcoat, Hatchard, Azmat, Stansfield, Watson, & Mühlenen, 2021; Yates, Starkey, Egerton, & Flueggen, 2021; Koh, & Kan, 2021). Few studies have suggested the pedagogical use of technology, involving the prospect of classroom performance and the ways to interact and deliver information (Shi,

2021; Pakhomova, Komova, Belia, Yivzhenko, & Demidko, 2021; Torbaghan, Sasidharan, Jefferson, & Watkins, 2022). Zaidi, Osmanaj, Ali, and Zaidi (2020) have described the effective transformation of learning through digital platforms as a more personalized approach. With the integration of “digital technology in the classroom”, the role of teachers has enhanced and supported autonomy. Valtonen, Sointu, Kukkonen, Kontkanen, Lambert, and Mäkitalo-Siegl (2017) noted that “multimedia technologies such as audio, video, and linked documents nested in PowerPoint presentations provide learning resources that excite students' attention and support their thought process.” According to Hall-Newton, Rudkowski, Lee, Hogue, and Ratnichkina (2019) ” The usage of Prezi, gives users the option for students and instructors to update presentations online in collaborative classroom situations.” Chou, Chang, and Lu (2012) revealed that “Prezi was a useful digital learning tool for facilitating their learning process”. Digital processing systems that “support active learning, knowledge construction, inquiry, and exploration on the part of the learners as well as allow for remote communication and data sharing between teachers and students” are often referred to as “digital technology in the classroom” (Akgün, Babur, & Albayrak, 2016; Mustapha, Van, Shahverdi, Qureshi, & Khan, 2021; Astuti, Arifin, Mutohhari, & Nurtanto, 2021; Nikou, & Aavakare, 2021). Individuals and technology are frequently arranged in a way that makes instructional activity explicit. A lecture-based education, in which a professor “professes” to an audience of students who listen and take in his material, is favored by technological setup. The physical configuration of the technology in the classroom should correspond to the educational approaches used by the instructor (Scherer, Siddiq, & Tondeur, 2019; Jurayev, 2020). Studies have also claimed that greater use of digital tools in the classroom has declined the attention of students, as they easily get distracted (Al-Furaih, & Al-Awidi, 2021; Bush, Carr, Hall, Saulson, & Scott-Simmons, 2016; Dontre, 2021; Kaloeti, Kurnia, & Tahamata, 2021). Leite, Pinto, Kon, and Meirelles (2021) showed a pattern in the use of digital technology by teachers in the classroom. Studies also portrayed those digital technologies are used in the classroom to “support more transmissive ways of teaching and learning” (Pinto, & Leite, 2020.). This study will provide a roadmap to analyze the in-depth understanding of digital technology in the classroom. The present study intends to answer the following research questions:

1. What is the learning power of the students studying in the digital technology-equipped classroom?
2. How is the learning approach in the technology-equipped classroom getting revolutionized?

CHAPTER 10**Predicting the Future of Education in the Light of Artificial Intelligence****Mohammed Majeed^{1,*}**¹ *Marketing Department, Tamale Technical University, Tamale - Ghana*

Abstract: Despite the fact that there is a growing agreement that artificial intelligence's (AI) the disruptive potential will have a positive influence on most fields; there is a noticeable dearth of academic literature concerning higher education. The goal of this research is to investigate how AI (artificial intelligence) might be used to improve educational practices like teaching and learning in the near future. The purpose of this chapter is to demonstrate whether a significant amount of AI will be required for the future of online platforms. The study examined how future online learning environments may alter how teachers impart knowledge to students and how students learn. The education industry can gain the following advantages from implementing IA: Students can receive additional help from tutors using the following methods: answering questions, removing barriers, personalization, differentiated learning, tutoring, rapid responses, day and night learning, grading, smart content/sense-making content, etc. According to experts, educators and policymakers should start educating kids about the future of work with AI as soon as possible. Early adopters in the field of AI, such as professionals and enterprises, can teach future generations about the importance of artificial intelligence in conjunction with global economic trends. Workshops, seminars, and conferences will be held to educate the public about artificial intelligence and the educational experiences of developed countries. You can take advantage of a pandemic or any other emergency that necessitates the creation of a new company.

Keywords: Artificial intelligence, Education, Learning, Students, Teachers.

INTRODUCTION

Modern technologies are being used by HEIs to improve efficiency, transformation, comprehensiveness, and the social experience they provide students and faculty alike. It is imperative that higher education institutions (HEIs) adjust their existing organizational models to meet the problems of digital equity (John, 2017) and the changing nature of employment. Higher education

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institutions must also contend with issues of money, demography, reputation, and competitiveness (Palanivel, 2020). Their achievement necessitates a shift in the way kids are taught and educated. Higher education institutions continue to lag behind the rest of the world in implementing newer, more sophisticated technologies. Increasing digital fluency and ensuring digital equity are two of the most major hurdles to limiting the adoption of technology in higher education. It must find ways to adapt technology in order to attract students and teachers, operations, and reduce expenses. The use of these tools is critical in the move away from traditional schooling toward smart schooling. Smart education is one of the most important aspects of the smart environment (Palanivel, 2020). The scientific and technical community sees AI as having a bright future as a tool to help people collaborate on projects and share knowledge and ideas through the use of both soft and hard technologies (Housman, 2018). Automated and repetitive jobs are two of the most frequently discussed AI capabilities (Zhang & Ji, 2018). As a result, AI has the unique capacity to learn from the commands and jobs it does repeatedly in order to develop a course of action consisting of decisions and other potential solutions (Ghahramani, 2015). As a result, it should come as no surprise that AI will fundamentally alter the way higher education institutions operate. There's no doubt that artificial intelligence has the potential to revolutionize human life. It's a rapidly expanding field of technology that has the possibility to drastically transform our social connections (Bostrum, 2017). In education, AI has already begun implementing new teaching and learning solutions that are presently being tested and restructured in many situations (Bostrum, 2017). Advanced infrastructures and a vibrant innovation ecosystem are necessary for AI to thrive.

There have long been educational resources based on AI, and the use of AI in education is on the rise (Roll & Wylie, 2016; Zhang & Ji, 2018). Market adoption is also being boosted by the growing demand for multilingual translators and AI's capacity for improving the educational experience. However, its necessity is now more apparent than ever before to students, educators, and anybody else involved in the education industry. There are many ways in which AI can be integrated into education, and this chapter aims to shed light on how this will affect the future of education. AI can be a powerful tool for educators as they adapt their teaching methods to the new paradigm in educational technology (EdTech).

Academics and practitioners alike will benefit from this chapter. The chapter reveals that education is no longer merely an intervention knowledge transmission activity, but rather an experiential learning process. Digitalization of education will also necessitate artificial intelligence, machine learning, and virtual learning, all of which will be supported by technology. In the future, teachers would use

new training to think about how it could create better learning systems, which would have a major impact on teaching.

LITERATURE

Artificial Intelligence

The term “AI” is commonly used to refer to the capability of machines to reason and act like humans. AI refers to the efforts that are being made by computerized systems to emulate the human mind and behaviors (Wartman & Combs, 2018). Various AI-enabled solutions and services are used in the education sector to enhance teachers and students’ learning experiences, such as information delivery, performance-based evaluation and classification, and smart tutorial solutions (Verified Market Research, 2022). Artificial intelligence (AI) is a system that thinks, interprets human language and can solve complex problems, detect health issues and keep automobiles on the road. It can also play chess, paint impressionist impersonations, and learn new languages. An artificial intelligence system (sometimes known as an AI system) is a type of computer programme that can do activities that are often associated with intelligent people. It's difficult to define intelligence in this way, and it's also awkwardly tautological, so artificial intelligence is now commonly defined as the activity of creating devices that are able to respond correctly and with foresight to the environment in which they are situated (Tuomi, 2018). Through its result-oriented approach, the use of artificial intelligence in education has revolutionized the field. The need for AI in the education industry is being driven up by its use in addressing difficulties including language processing, reasoning, planning, and cognitive modeling. Artificial intelligence (AI) can aid in the organization and synthesis of knowledge to support the distribution of content in another learning technique (Grivokostopoulou *et al.*, 2017). In the public sector, AI has emerged as a *viable* solution to a variety of problems, since it has become the go-to strategy in the future (Awwad & Zidan, 2021). When the consumer is the primary focus of an efficient service, AI has been found to improve the environment. As a result, the quality of the product and client happiness will rise (Abdeldayem & Aldulaimi, 2020). The public sector will benefit from AI's contributions to speed, accuracy, process completion, and data. When viewed from this angle, the fundamental concept of artificial intelligence can be stated as the deft replication of human behavior or the human mind carried out by machines or by computer programs (Mohammed & Watson, 2019). According to Timms (2016), the idea that artificial intelligence would emerge within the computing layout that is used at home may be an illusion caused by the existing system. Timms (2016) argues that this may be the case. It could enter our lives in a variety of guises and take on a

CHAPTER 11**Revolutionizing the Modern Education through Digital Transformation: Challenges and Solutions****Navita Mahajan^{1,*}**¹ *Amity International Business School, Amity University, Noida, India*

Abstract: In today's world, digitalization is an instrument but apart from that, a way to survive that unlocks new opportunities such as knowledge without any time constraint with continuous education. The digital revolution necessitates integrating data and ways to improve a company's basic business operations to efficiently meet customer expectations. The entire academic fraternity is the target consumer in the educational sector. Digitalization in education is directly linked to a new way of doing things in a digital environment around the world, as well as the development of millennials who were born and taught in that milieu. This present study delves into the unique characteristics of digital education, as well as the current level of its implementation, expected outcomes, and related problems, hence a transformation study has demonstrated the fundamentals of e-education with its implementation in modern society. The study has critically evaluated the benefits and challenges with reference to current transformation and the effectiveness of this kind of teaching-learning process. The study is based on secondary research that has covered information regarding the benefits of employing electronic educational tools in teaching. The study concludes with some prominent solutions to make this transformation more visible and user-friendly. The implication of the study suggests its benefit for all the stakeholders involved in the e-learning process transition right at the state, private or institutional bodies level for the policy frameworks, model designs, and dissemination through such digital models.

Keywords: Applications, Challenges, Classroom, Colleges, Computers, Covid-19, Data, Digital, Education, Educational resources, Electronic, Higher education, Institutions, Learning, Pandemic, Schools, Students, Teaching, Technology, Transformation,.

INTRODUCTION

Novel educational applications have arisen because of technological enhancements. Classrooms are becoming more participative. The education sector is undergoing a drastic transition and transformation in teaching and offering new

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solutions to the academic world (Zain,2021) According to the latest studies, India's education system is becoming more digital, and traditional classroom practices are being phased out. The educational structure in India has gained creative abilities to get to the end goal and make it. The use of a reformist approach to problem-solving is a good example of this.

To be more specific, in India, the digitalization cycle in the sphere of education is rapidly increasing. Science and innovation at a fast pace are being utilized by private schools to meet the educational requirements of GenNext students. In rural India, computerized tools are increasingly used to improve educational arrangements. (Fig. 1).

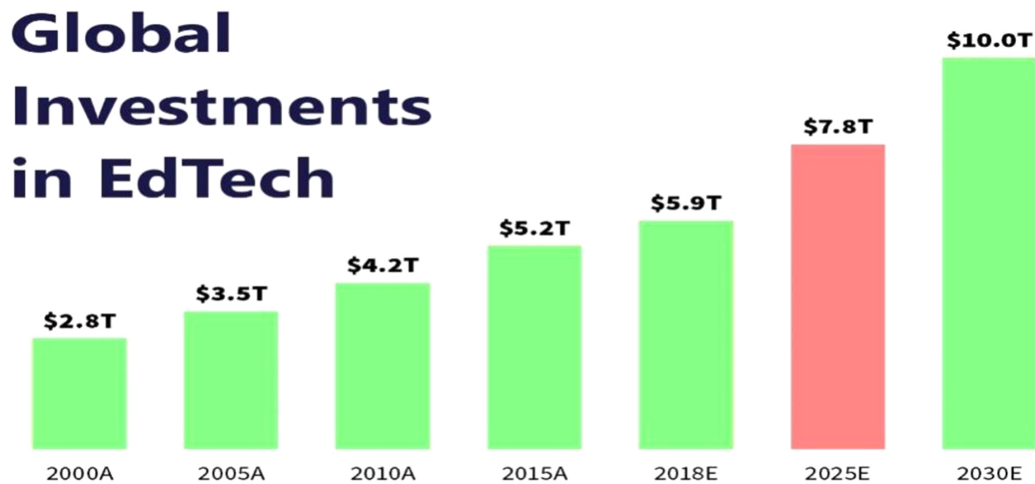


Fig. (1). Global Investment in EdTech.

Source:<https://mintymint.net/blog/tech/digital-ransformation-in-education-on-industry/>

Participation in online learning, forward-thinking circumstances for mentors to alter instructional practices and develop new coordinated effort models, methodologies and digital education are creating new learning opportunities. Furthermore, a 21st-century approach to student accomplishment requires students to be powerful in demonstrating abilities along with communicating ideas concluded with unique narration. Preservative learning with technology is indistinguishably associated with educationalization, which means the imposition of intensifying cultural complications. This leads to an important parameter to consider how current educational institution decisions may influence students (Teräs & Suoranta, J. *et al*, 2020).

A pressing issue in modern education is the system's modernization, which must adapt to the technical as well as digital economy. Imparting education to academicians through digital transformation channelization is the key aspect of the education system's revival and rejuvenation, necessitating the creation of mechanisms for its digital transformation (Bogdandy & Tamas, *et al.* 2020). A pressing issue in modern education is the system's modernization, adapting to a digitalized economy. The digital transformation process must involve an active role by academicians/staff and others that would transform belief in the profession as well (Voronin & Saienko, *et al.* 2020). It is estimated that 1.5 million additional digitized positions would exist around the world by 2020 (Watermeyer & Crick, *et al.*, 2021).

Regardless, 90 percent of educational organizations now have IT abilities. Deficiency exists with 75% of instructors and students believing that there is a gap in their ability to educate (Shugar, & Burr *et al.* 2020) and fulfill the skills requirements of the IT workforce. Higher education is projected to be transformed by digital learning technologies. Higher education institutions can take advantage of the online transition to make education available to people from all walks of life, which will train them with the required tools, techniques, and abilities to address prevailing global issues (such as poor health, poverty, income discrimination, and ecological upheavals) from a transdisciplinary viewpoint (Kaputa & Loučanová, *et al.*, 2022). As the use of technology in everyday life and in the classroom grows, most pupils are now born into a digital world.

One of the chief alarms for educational institutes is digital transformation as it is an important step for gaining a comparative edge in the industry, just as it is for corporate institutions (Alenezi, 2021). According to (Yanli & Danni, 2021) digital education should enable more personalized, flexible, and student-centered instruction. Meanwhile, the COVID-19 pandemic has put higher educational institutions' faculty on a steep technological learning curve. Educational Institutions are under reeling burden to provide an innovative learning experience due to increased competition in the digital realm (Rof, & Bikfalvi, 2022). University professors were compelled to modify their lectures to a digital, online format to suit the demands of the more than 150 million pupils affected by COVID-19 regulations around the world (Bozkurt & Jung *et al.*, 2020).

The technical advancement that the Industrial Revolution 4.0 delivers has pervaded higher education platforms, forcing them to contend with transformation, majorly digitalized on all fronts. The application of digital transformation in Higher Educational Institutions is a new subject with sparkling interest among stakeholders. (Benavides & L. M. C.*et al.*, 2020).

CHAPTER 12**A Sneak Peek into the Future of Artificial Intelligence in Education: Opportunities and Challenges****Sheikh Sajid Mohammad¹ and Huzina Saheal^{1*}**¹ *Department of Commerce, School of Business Studies, University of Kashmir, Srinagar, Jammu and Kashmir, India*

Abstract: Artificial intelligence (AI) is undoubtedly the driving technological force of the 21st century and is expected to virtually transform every sector, if not human endeavours at large. It would be premature to assume that AI will have no impact on education, as it can pave the way for new methods of learning and teaching by reorganising classrooms or making them obsolete. The application of AI in education may bring about insights into how learning happens and can alter the way learning is assessed. AI has begun to exhibit its effect, acting as an assisting tool for both students and teachers. Studies demonstrate a positive impact of AI on education in the near future. It is currently changing the education sector, but it has yet to demonstrate its true potential. AI will affect education in three major ways. On the learning front, the strength of AI is its personalization, universal access, and generation of smart content, which will aid students in understanding concepts efficiently. Secondly, AI can assist tutors in reducing their workload by automating activities such as grading and assessment. In this way, teachers will be able to shift their entire focus to student learning. Moreover, with the AI system, administrative activities such as registration, course allocation, and staff recruitment are expected to decline. By virtue of this, AI can reduce the educators' burden of performing manual operations. To reap the benefits of AI transformations in education, teachers and students should be prepared to utilize AI programmes effectively through training. Against this backdrop, the chapter will discuss AI in education, its history, opportunities, and challenges.

Keywords: Artificial intelligence, Administrative management, AI-powered education, Collaborative learning, Computer-aided instruction, Coursera, Cyberattack, Digital lesson, Inclusive data system, Information visualization, Intelligent tutoring system, Intelligent tutoring tools, Machine learning, Microsoft translator, Personalized learning, Programmed logic for automated teaching operations, Self-adaptive keyboard instructor, Smart content, Time-shared interactive computer-controlled information television, Virtual tutoring.

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INTRODUCTION

Artificial intelligence (AI) is one of those modern-day phenomena of which most people are aware, yet acknowledge they know very little (West, 2022). Many people link AI with humanoid robots (Fadel *et al.*, 2019) because news regarding AI is usually portrayed by a picture of a digital brain or robot. While robotics is a key topic of AI study, AI is utilized in a wide range of contexts, including entertainment, transportation, health care, education, home and service robots, the workplace, public safety and security, and so on. AI is a controversial subject that is typically depicted negatively; some view it as a blessing in disguise, while others regard it as a threat to the survival of humankind due to its ability to take over and dominate humans. However, AI has directly and indirectly affected our way of life and is expected to shape our future as well. The ability of a digital computer or a computer-controlled system to execute tasks ordinarily performed by intelligent beings is referred to as AI (Kurzweil, 1990). AI is defined as the use of computers and robots to simulate perception, decision-making, and other processes to complete a task (Bellman, 1978). To put it another way, AI is when robots learn while performing high-level pattern matching. AI is the science of building intelligent computers, notably in the areas of vision, decision-making, speech recognition, and language translation. It is a simulation of human intelligence processes, which encompass all aspects of problem-solving, learning, planning, reasoning, self-correction, perception, motion, knowledge representation, manipulation, and creativity. Artificial intelligence is now widely recognized as a scientific field concerned with the creation of machines that can perform suitably and predictably in their environment.

Artificial intelligence has already begun its integration with the education sector, with a market value of 3.68 billion USD predicted by 2023 (Market, 2022). Between 2018 and 2022, experts predict a 43% growth in the use of AI in education (Zawacki-Richter *et al.*, 2022). AI can change present management systems by automating administrative tasks at the institutional level, as well as by technologically modifying traditional teaching and learning methods. Students, teachers, parents, and educational institutions have all attained a new outlook on education due to the implementation of AI. There is also a lot of hope that as artificial intelligence becomes increasingly integrated into the classroom, teachers will be able to provide a better individualized learning experience for students. All in all, it is believed that AI will eventually assist teachers in making continuous improvements in addressing the wide range of cognitive, physical, academic, social, and emotional factors that can have an impact on student learning, ensuring that students regardless of social class, sexuality, race, ethnic background, gender, or mental or physical disability have equal access to education.

HISTORY OF AI IN EDUCATION

The work of psychologists, Sidney Pressey and B. F. Skinner might be seen as forerunners of AI's application in education. Based on Edward Thorndike's rule of effect (Thorndike, 1927), Pressey claimed that immediate feedback was essential for tests to improve learning, which was impossible to provide when exams were marked by hand. A mechanical approach, on the other hand, would ensure that no opportunities for learning were missed. The most sophisticated version of Pressey's machine, which was built in 1924 and was based on a mechanical typewriter, was set up such that students could rapidly discern if they had picked the correct answer and could not move on to the next question unless they corrected it. As a result, the computer would simultaneously test and educate the student (Pressey, 1950).

In 1958, Skinner improved Pressey's technique by developing a teaching machine that automatically covered the student's response such that it could not be altered while exposing the right answer. This approach allowed students to compare their responses to the offered model solutions, which, if designed properly by the tutor and diligently executed by the student, would assist in learning and quick reinforcement (Skinner, 2013). Students were taught to design their solutions rather than picking from a restricted set of possibilities (as in Pressey's multiple-choice questions) as Skinner discovered that memorizing a correct response is more effective than simply recognizing it.

Norman Crowder in the 1950s invented an intrinsic or branching programmed instruction which was a paper-based substitute to prior teaching machines. Here the user was provided brief information on a page which was followed by a multiple-choice question, with each potential response leading to a fresh page. If the right option was selected, the next page would provide new information built on what had previously been understood correctly; if the wrong option was selected, the new page would provide feedback intended to assist students to comprehend the reason for their mistake based on the options students had selected. However, in the early 1950s, Gordon Pask, a British polymath, built the first entirely adaptable teaching machine SAKI, abbreviated as a self-adaptive keyboard instructor. The task given to a student was tailored to the student's performance, reflected in a constantly changing probabilistic student model, which distinguished SAKI from other early teaching computers (Pask, 1982). SAKI, which was one of the first adaptive systems, underwent multiple changes, making use of computer developments and new microprocessors to enter the market. Apart from the multiple variations of SAKI, adaptive learning made little progress in the years that followed, and the focus shifted to computer-aided instruction (CAI) systems.

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Gurinder Singh

Gurinder Singh is the Group Vice Chancellor at Amity Education Group, India. He has an extensive experience of more than 28 years in institutional building, teaching, consultancy, research, and industry. He is the youngest Founder Group Vice-Chancellor of Amity University for two terms, the Founder Director General of the International Business School, and the Founder CEO of the Association of International Business School, London, UK. He has conducted many international conferences, including the International Business Horizons Conference, a landmark conference, for the last 22 years. He has also conducted IEEE conferences in India and London. He has established international campuses in many countries and has contributed to the academic field, including writing Scopus-indexed books and research papers. A renowned scholar & academician in the area of International Business, he holds a prestigious Doctorate in the area along with a Postgraduate degree from the Indian Institute of Foreign Trade where he illustriously topped with 7 merits. He holds the distinction of being the youngest Founder Pro Vice Chancellor of Amity University for two terms, the Founder Director General of Amity International Business School, and the Founder CEO of the Association of International Business School, London. He has been instrumental in establishing various Amity campuses abroad including London, the USA, Singapore, Mauritius, Tashkent & other parts of the world.