Education 4.0 and Future Education

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Abstract: In today's world, education has long-term value. Its key goals are to foster values and shape attitudes and behaviours that are consistent with societal norms. The secondary goal of education is to educate students with the information and skills they need to succeed in life; but, as society and technology progress, the dynamic nature of what is "required" in life changes. Thus, Education 4.0 is the product of education's growth and evolution. Technology began to permeate the educational process in the twenty-first century, and both students and teachers began to use technology in the classroom in fundamental ways that became known as Education 2.0. Education 3.0 is the result of technical advancements, most notably the broad adoption of a more user-generated internet. The fourth industrial revolution's Education 4.0 learning plan aims to modernise education through automation and cutting-edge technology. The technological revolution includes artificial intelligence, robotics, and smart technology. Education 4.0 aims to address the limitations of traditional teaching and learning approaches. Under Education 4.0, students will take primary responsibility for their own learning. Over the next few years, lessons will become more adaptable to various learning styles. The technological revolution includes artificial intelligence, robotics, and smart technology. Education 4.0 aims to address the limitations of traditional teaching and learning approaches. Under Education 4.0, students will take primary responsibility for their own learning. Over the next few years, lessons will become more adaptable to various learning styles. In this study, the researcher gathered secondary data from a variety of sources to better comprehend the future role of industry 4.0 in the educational system.

Keywords: Education 4.0, Technology, Industry

INTRODUCTION

Simply said, Education 4.0 refers to the convergence of education and technology. Teachers shifting from blackboards to smart boards embody the concept in educational institutions. Education 4.0 is characterised as teaching students about technology as part of the curriculum, fundamentally altering the approach to learning, and leveraging this technology to enhance the educational experience. This teaching style enables students to become more independent and to learn at their own pace. The primary reason why Education 4.0 is useful to students is because it prepares them for a world in which cyber-systems are deeply intertwined in almost every professional path. It creates more employable individuals who possess the essential knowledge to thrive in the real world. This educational system has completely transformed the outmoded and obsolete learning methods of the past. Instead, it focuses on instilling creativity and a sense of accomplishment in students through a more personalised teaching method that enhances their "21st-century skills." Education 4.0 transforms learning and teaching mind-sets and approaches. Because digitalisation enables learning to occur anywhere, students become active participants in their own learning. Teachers become facilitators of learning. Instead than promoting degrees, learning focuses on applicable competencies. Education 4.0 also refers to ecosystems of educational institutions and workplaces that develop innovations and adapt to changing conditions. It implies that, via education, we actively shape our own meaningful future rather than merely responding to change. Traditional methods of delivering education are no longer adequate in Education 4.0, and we must redefine learning and education to suit the needs of a changing society. The threat is global, but it might be far worse in rapidly developing countries like Vietnam. In this piece, we will discuss our initial thoughts on establishing Education 4.0 through an Asian-European alliance.

OBJECTIVES OF THE STUDY

1. To understand the fourth industrial revolution technologies in the education 4.0.
2. To know the major trends of Education 4.0.
3. To understand the recent technological advances in education 4.0.

LITERATURE REVIEW

1. Nurken Akimova & Nurlan Kurmanovb: In this study article, the researcher investigates the elements, major components, and characteristics of Education 4.0, as well as the adaptation of teaching and learning practices to Industry 4.0's changed criteria for the successful implementation of the Open Innovation model. This study provides a comprehensive examination of 48 WoS and Scopus papers, allowing us to identify Education 4.0 components used in the framework of the OI model in recent years. Data analysis has been applied to four research questions. The results of this study revealed that (a) there is limited literature research on topics connected to crucial features in the dynamics of open innovation (partnerships, critical thinking, self-assessment, leadership, friendships, and risk-taking); (b) the main literature focuses on a comprehensive analysis of knowledge and skill parameters, the use of appropriate techniques for their growth, and there are gaps in character development and meta-learning; (c) there are gaps in character development and meta-learning. (c) There is a significant absence of research on the competency framework of OI directed at schoolchildren and the use of learning and teaching strategies to promote open educational innovations in schools; and d) There is insufficient study on the development of OI competencies using cloud resources. This study is aimed at researchers, educators, and open innovation professionals interested in the potential of educational technology for the dynamic evolution of the OI paradigm.

2. Muhammed Yusuf & Mohammed Y.M. Mai: The primary purpose of this study was to perform a literature review in order to identify and categorise the most effective pedagogical practices used in education 4.0 to improve graduates' acquisition of 21st-century skills. A systematic review technique was largely used to evaluate prior studies on Pedagogical Practices in Education 4.0 between 2018 and 2022, using the PRISMA method used in the review process. The study identified student stimulation - instructors' preparation and involvement - as essential components in solving the challenges of education 4.0. It is an important factor in acquiring education 4.0 resolution skills and improving character education in soft skills development, curriculum design, learning modules, assessment technique, and classroom experience. Finally, effective integration of education 4.0 into learning institutions is evident through a paradigm shift in infusing education 4.0 features into the curriculum, pedagogical practices, and instilling excitement in students and teachers. The PRISMA technique is used to help graduates acquire Education 4.0 technical skills.

4. Dr. PRAKASH HEMRAJ KARMADKAR: The purpose of this article is to provide practical suggestions for anyone who want to develop digital courses and make informed judgements during the implementation phase. According to the authors, effective digital instruction requires 1) well-designed course content, motivated interaction between the teacher and learners, and 2) well-prepared and fully-supported teachers. 3) The growth of a digital learning culture among students; and 3) the rapid advancement of technology. It is hoped that by doing so, an ongoing discourse of successful practices that can increase university and faculty efficacy in transitioning to digital education can be initiated. In light of current debates regarding the cost and quality of higher education, this study could help progress higher education as well as student enrollment and retention.

5. Katyeudo K. de S. OLIVEIRA, Ricardo A. C. de SOUZA: This paper describes the creation and testing of a method known as TADEO - an acronym in Portuguese for Transformaço Digital na Educaço (digital transformation in education) - to guide the design and implementation of teaching and learning experiences from groups of digital transformation in education drivers, with the goal of meeting Education 4.0 objectives. The TADEO method was used in elementary and higher education classes to increase students' understanding of climate change by developing projects to mitigate environmental problems caused by human activity while also exercising students' soft and hard skills needed for 21st century learning and work. The evaluations of students and educators who participated in the TADEO-guided teaching and learning experiences show that the anticipated outcomes were achieved.

6. Laura Icela González-Pérez and María Soledad Ramírez-Montoya : This article investigates which Education 4.0 components have been incorporated into 21st century skill frameworks, as well as the teaching and learning approaches used and the major stakeholders affected. The researcher conducted a systematic literature review (SLR) with research questions to uncover studies that address 21st century frameworks globally, determining which teaching-earning strategies contain

4.0 components, their learning characteristics, and the intended stakeholders. The findings allowed us to identify opportunities to build or improve 21st century skills frameworks that include Education 4.0 components for future skill development. Our research revealed that such frameworks for teachers and schools do not exist. The majority are student-centered, developing capacities through character dimensions, meta-learning, and integrating active learning teaching approaches. This work involves research on innovative teaching practices as well as key Education 4.0 components. It concludes with a discussion of designing educational models that promote problem solving and meet societal requirements by developing complex reasoning skills and auto-systemic thinking.

7. María Soledad Ramírez-Montoya , Isolda Margarita Castillo-Martínez , Jorge Sanabria-Z : In this work, the researcher investigates complex thinking in educational contexts as a macro-competency with sub-competencies including critical, systemic, scientific, and innovative thinking. The researcher conducted a comprehensive literature analysis, selecting 35 papers from the Scopus and Web of Science databases based on keyword and exclusion criteria. The data analysis was guided by seven research questions. The findings revealed that: (a) there are common characteristics of studies linking complex thinking, critical thinking, and creative thinking; (b) the qualitative method dominates in the studies; (c) critical thinking competency has been the most addressed in the research; (d) the predominant components of Education 4.0 are teaching methods and techniques; and (e) the three challenges that stand out for educational research are project feasibility The article is intended for academic and social communities, as well as decision-makers, who want to improve reasoning for complexity in the context of Education 4.0.

8. Rivika Alda, Helen Boholano, Filomena Dayagbil: This study evaluates the readiness of Philippine teacher education institutions for Education 4.0 in the areas of faculty, teaching and learning, infrastructure, and research, as perceived by administrators and faculty members. This study used a survey questionnaire to collect data on the four parameters mentioned, and the data was analysed quantitatively. According to the study's findings, administrators and faculty members believe they are well-prepared in terms of selecting and integrating digital resources for teaching and learning because they are also provided with capacity building opportunities through technological literacy seminars and conferences. They are, however, inexperienced with the learning management system and other online class modes, as well as augmented reality, robotics, and digital enablers like 3D printing. This finding can be attributed to the lack of digital infrastructure and virtual laboratories in most teacher education institutions. Respondents also disagreed about teacher education institutes' readiness for Education 4.0 in terms of research programmes and projects. As a result, to prepare for Education 4.0, teacher education institutions must revaluate infrastructure planning, redesign research programmes, and improve teacher-training capacities.

9. Simin Ghavifekr, Seng Yue Wong: The goal of this research is to investigate the effects and roles of principals' technological leadership on teachers' ICT use and students' academic progress in secondary schools in Selangor, Malaysia. This empirical study uses a series of questions to elicit information from teachers. A total of 310 surveys were conducted and evaluated. The findings demonstrated a significant positive impact of principals' technology leadership responsibilities on teachers' effective ICT use and students' academic performance. The integration of ICT and technology instruments in schools is a big problem as we enter the new era of the Education 4.0 system. This suggests that principals who embrace technology will effectively guide their schools' acquisition of instructional tools to promote student engagement and learning.

FOURTH INDUSTRIAL REVOLUTION TECHNOLOGIES AND EDUCATION 4.0

The fourth industrial revolution in human history is referred to as the Industrial Revolution 4.0. Educators are excited about Education 4.0 as the fourth industrial revolution sweeps through all sectors, including education. In May 2020, over 40 government, academic, and start-up partners formed Education 4.0 India. As a result, Education 4.0, a new era in education, is set to begin. IoT, sensors, and automation are just a few of the technology advancements that have already influenced India's existing education system. Furthermore, virtual communication technologies and digital platforms are widely used in education nowadays. However, issues with internet protocol and communication technologies continue to plague the Indian educational sector. Some areas of the country continue to practice traditional rote learning methods, which are inefficient for students. This existing educational model will not serve children in the future. Education 4.0 aims to solve the shortcomings of traditional methods of teaching and learning. Under Education 4.0, students will take primary responsibility for their own learning. Classes will become more adaptable in the next years, allowing for a greater variety of learning modalities.

- **Emerging Transformations**

As a result of the Fourth Industrial Revolution, new and advanced educational institutions are emerging, including massive open online courses (MOOC), virtual classrooms, virtual libraries, virtual labs, and virtual educators. Education 4.0 is also pushing schools, colleges, and universities to modernise. Smart technology, artificial intelligence, and robots are just a few of the ways the industrial revolution impacted our lives. As a result, in order to stay competitive, educational institutions are preparing students for a world in which cyber-physical systems saturate practically every industry.

- **Promotes a student-centric model**

Students will also be able to select what they wish to learn under Education 4.0. Furthermore, each student will have a personalised learning experience. Furthermore, they must demonstrate a certain level of expertise before moving on to the next level. Students will be able to select their preferred learning tools. Furthermore, the learning method will be more project-based, allowing students to develop time-management and interpersonal skills that will prepare them for work.

- **Promotes inclusiveness**

In addition to making digital learning a crucial component of education around the world, the epidemic has expanded the digital divide, pushing those without internet access and devices further behind. Some Indian schools have restricted computer access, while others lack internet connectivity.

- **Transforming teaching methods**

Training 4.0 will enhance instructors' ability to deliver training in creative ways. The report suggests that improving teacher training can help instructors perform better. Teachers are also helping to establish a comprehensive teacher capacity-building programme that combines training and career development.

The Fourth Industrial Revolution, thanks to enhanced technology, will have a significant impact on the Indian educational system. The Fourth Industrial Revolution, powered by artificial intelligence, will improve the learning experience and give exciting opportunities for higher education, with the potential to benefit Indian society. As higher education enters the Fourth Industrial Revolution, it will provide great instruction, educate students through exploratory research, and promote social progress, all while playing an increasingly important role in the global education sector.

MAJOR TRENDS OF EDUCATION 4.0

Education 4.0 is an intentional approach to learning that is aligned with the fourth industrial revolution and seeks to revolutionise the future of education via the use of modern technology and automation. Creativity is key to Education 4.0. It highlights the need of educating students to confront difficulties head on. To keep up with the times, previous educational paradigms must be examined from a forward-thinking standpoint. Students should be adept in the skills required by quickly changing technology; they should be led rather than instructed; and information should be made available to them rather than forced onto them. The major trends in Education 4.0 are as follows:

- **More remote learning opportunities:**

The foundation of Education 4.0 is to make learning available anywhere, at any time, thanks to a collection of e-learning tools that facilitate remote and self-paced learning.   The concept of Active Blended Learning (ABL), in which students actively participate in learning outside of class, is gaining acceptance. As a result, they understand both practical and experiential learning.

- **Project-based learning:**

Students learn in a fun and interesting way thanks to Education 4.0's project-based approach! It avoids theoretical knowledge and encourages students to develop time management, organisational, cooperation, and time management skills, all of which are necessary for their future careers.

- **Easy and accurate assessment:**

With Education 4.0, a more realistic approach to assessment is implemented. Evaluations are conducted both online and offline, and students are graded on projects, assignments, and fieldwork.

- **Data at the fingertips:**

Data analytics and reporting in Education 4.0 offer better insights into students' learning

journeys. The statistical analysis allows teachers to determine where students stand and advise them accordingly.

- **A more personalized learning:**
  Education 4.0 recognises each student's uniqueness and the pace at which they study. A customised approach to teaching will have a greater impact on students' capacity to attain their objectives. There are various solutions available that use Artificial Intelligence and Cloud Computing to modify the entire teaching process based on the individual learner's needs and learning pace. Faculty, on the other hand, will be able to rapidly assess students' strengths and weaknesses and provide timely comments.

- **The plethora of education tools:**
  Education 4.0 provides students with a clear route by integrating resources and tactics into their learning environment. This means that students will be able to choose which tools and tactics they want to utilise to learn. Examples include collaborative and engagement tools, flipped learning, and blended learning.

THE MOST RECENT TECHNOLOGICAL ADVANCES IN EDUCATION 4.0

The utilisation of technological advancements in teaching and learning can enhance the learning process and stimulate learners' interest in the learning materials. In some respects, Education 4.0 culminates the phenomenon of digital infiltration in our daily lives. To embrace the fourth industrial revolution, Malaysia's higher education system is being restructured, with an emphasis on education 4.0. The most recent technology advancements in Education 4.0 include the following:

- Cloud Computing: E-learning architecture based on cloud computing is a method of implementing an e-learning system that takes advantage of cloud computing's features. Furthermore, the advent of the Education 4.0 age, which is an adaptation of the development of Industry 4.0, will cause a shift in the E-learning system. Cloud computing in education means transferring school data to an offsite cloud server managed by a third party. This method allows administrators to save money and resources on data storage while still providing virtual materials and learning environments to teachers and students.
- Biometrics: Biometric technology is widely used in schools for identity management, class attendance, e-evaluations, security, and learning analytics. Given its vast range of applications, using biometric identification in educational institutions is bound to have multiple advantages.
- 3D Printing: 3D printing and scanning technology has grown so quickly that it is now being explored across industries. Its applications have become so versatile and popular that there is a growing demand for people who can comprehend, manage, and deliver innovation using 3D printers and 3D modelling principles. This is why educational technologists and academics are working together to develop innovative approaches to engage and attract students.
- Multi-touch LCD screen: Interactive touch screen displays in education are set to significantly change how teachers teach and students learn. There are various benefits to using interactive whiteboards in the classroom, ranging from student engagement and performance to teacher and administrative efficiency. They also provide a few unexpected benefits.
- Internet of Things: Students, particularly those in college, are increasingly abandoning paper textbooks in lieu of tablet and laptop computers. Students can now learn at their own pace and have practically identical educational experiences at home and in the classroom since they have access to all of the necessary materials. With the advancement of mobile technology and the Internet of Things, schools can improve campus safety, track important resources, and improve access to information in the classroom. Teachers can also use this technology to create "smart lesson plans," rather than the traditional boring plans of the past.
- Augmented Reality: Students, especially in college, are rapidly ditching paper. Augmented reality is a cutting-edge technology that integrates digital content including 3D objects, music, and text elements into a physical environment. Augmented reality in education benefits students by creating an immersive learning environment that allows them to study more effectively. Augmented reality in education can serve a number of purposes. It makes it easier for youngsters to learn, process, and remember information. Furthermore, augmented reality makes studying more engaging and pleasant. It is also not limited to a single age group or level of education, but may be used effectively at all levels of education, including pre-school, college, and even the workplace.
- Artificial Intelligence: The Fourth Industrial Revolution resulted in tremendous technological improvements that impacted many aspects of society, including education. The rise of artificial

intelligence (AI) has brought about a new era of education that is more customised, flexible, and accessible. AI has the potential to alter education in a number of ways, including higher student engagement and learning outcomes, as well as enhanced teacher training and professional development. In this essay, we'll look at the function of artificial intelligence in education 4.0. Personalisation is one of the most major advantages of AI in education.

- QR-code: QR codes can help with a range of teaching and learning purposes in education. Faculty and students can instantly generate QR codes that link to a variety of online resources, including maps, charts, graphs, audio or video clips, photos, quizzes, surveys, PDF documents, websites, and collaborative papers. The opportunities for introducing QR codes into courses in any area are endless.
- Hologram: Holograms can enhance communication between students and teachers by simulating face-to-face interactions. Holograms can be used to project live or recorded lectures, presentations, or demonstrations delivered by specialists or lecturers in another location. Students can also use holograms to collaborate with peers from diverse geographical or cultural backgrounds.

FUTURE SCOPE FOR THE RESEARCH

Education 4.0 essentially is a paradigm shift in pedagogy and teacher-learner mind-set in the backdrop of the on-going and futuristic trends in the field of elementary, middle level as well as higher education on account of emerging technology such as Artificial Intelligence and Machine Learning. The present research paper succinctly provides a bird's eye view of the same. However, most of the emerging futuristic technology, that would imminently influence education in the coming decades, is in a conceptual stage. Therefore, there is enormous scope to conduct domain specific exploratory research as much as descriptive and causal research on contemporary issues in different spheres of education.

CONCLUSTION

Education 4.0 is a cyber-physical, smart digital transformation that will benefit a wide range of stakeholders, including instructors and educators. Education 4.0 benefits instructors and educators by enabling them to better fulfil the needs of individual students. The evolution of the educational system has changed the old educational model's approach to knowledge transfer. The emergence of Education 4.0 was influenced by Industry 4.0, which saw a significant increase in the usage of internet-based technologies and communication tools across industries. Today's educational trends are affecting tomorrow's workforce by embracing learner-centric, decentralised, and personalised learning techniques, as well as appropriate pedagogies and teaching tactics. Educational institutions are implementing an experience-based, hands-on approach to learning in order to educate future skills and prepare students for the workforce, which will shape learning models. Education 4.0 is an effective method for building desirable skills in students, resulting in innovative and creative entrepreneurs/employees who can adapt to the use of new technology.

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