Fourth Industrial Revolution and Education – A Study.

[1.] Dr.Geetanjali Joshi
[2.]Prof.Dr.Pratibha Patankar

Abstract
The current study helps to know about the effect of the Fourth Industrial Revolution on Education and to create societal awareness about the 4th Industrial Revolution IR 4.0. The internet, cloud computing, big data, cyber security, artificial intelligence, block chain, and robots are the products of the Fourth Industrial Revolution. The Education system is getting affected due to these digital tools when used in the various teaching and learning processes such as learning, understanding concepts, learning opportunities, teaching methods, classroom activities, and knowledge acquisition. To achieve the aim, a review of related literature is taken and the findings revealed a real and serious picture of the implications of 4.0 IR on education. It was noticed that block chain, Cloud Computing, and cyber security will be a part of the education field to improve teaching-learning processes. But there is a threat of a low level of student-teacher interactions and education will be of reduce moral values. In the future, humans will be replaced by robots and machines that will affect work culture and opportunities for educational jobs According to the findings, the study suggested implementing significant transformations in teachers' student roles along with teaching methods and learning styles of students to deal with IR 4.0 technologies.
Keywords
4th industrial revolution, Products of IR 4.0, learning opportunities

I.   Introduction

The COVID-19 pandemic is a huge challenge to education systems around the world. With the emergence of the Fourth Industrial Revolution (4IR), rapid developments in science and technology have greatly affected everyday life. COVID-19 has posed great challenges for education. All stakeholders including educators and parents were not prepared and have had to quickly adapt to the "new normal" of online education. During the pandemic, about 1.5 billion students around the globe have utilized remote learning. The new teaching and learning requirements of Education 4.0, which refers to technology-based, digitized teaching and learning were the cause of the leapfrog taken by the current educational practices.

This is a need of time, to develop every aspect of our environment /surroundings. The development in science and technology is a result of the Industrial Revolutions The aim is to improve everyone's standard of living life. Arnold Toynbee, a British economic historian, of the late nineteenth century introduced the term Industrial Revolution. The Fourth Industrial Revolution (4IR) at the World economic forum (WEF) 2016, as defined by the founder and executive chairman of WEF, as "A range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.".

In the 19th century, the first industrial revolution IR 1.0 started which was associated with the introduction of mechanical production facilities powered by water and steam. At the start of the 20th century, the second IR 2.0 started which handled the mass production of electrical current.

Automated production using electronics and data technology was the theme of the third age revolution IR 3.0 which appeared at the tip of the 20th century. Now the fourth industrial revolution IR 4.0 which is defined briefly as the vital interaction between humans and machines. Internet of Things IT and Cloud Computing which refers to the use of a network for massive data collection are examples of it. Artificial Intelligence AI is an example of an IR 4.0 product that is formed by machines like robots to perform complex tasks like perception, speech recognition, and decision making (Liaoa, Louresa, Deschampsa, Brezinskia & Venancioa, 2018; Mezied, 2016). According to Min, Kim, Lee, Jang, Kim & Song, 2019, IR 4.0 technologies are predicted to have an impact on the 2030 Sustainable Development Goals such as good health, clean water and sanitation, clean energy, sustainable cities, and climate action and affecting the most active sectors such as industry, agriculture, medicine, and economics. New machines, new power sources, and new ways of organizing work made existing industries more productive and efficient.

IR 4.0 technologies also have a great impact on the educational system such as the effect on learning opportunities, and policies of Education. The Education Boards/Universities design suitable curricula and programs as per the requirement of jobs and employment which is the first step toward change. There is a need to research more and more to suggest methods and strategies that ensure quantitative and qualitative learning which in turn helps the students to face the new challenges. To overcome the problem of unemployment it is necessary to empower individuals with proper education and career strategies.While Sharma (2019) emphasized that when we teach our students, we must preserve our ethical standards to maintain our way of life. The transformation of higher education is a key factor in the digital industrial revolution.

The Problem Statement

It is needed to vary the structure of the education system in India to arrange the subsequent generation of students capable of latest technologies to scale back the effect of 4IR. The current study throws light on the teaching and learning processes using products and technologies of 4IR. Specifically, this study tries to identify the current scenario of the Indian Education system with the impact of the Fourth Industrial Revolution.

II. Methodology

The current study is theoretical research supported reviews of related literature. The number of reviews taken is 11.
This helped the researcher to conclude the effect of IR 4.0 ideas and products within the context of the Indian Education system.

Fourth Industrial Revolution

The fourth industrial revolution is about areas ranging from gene sequencing to nanotechnology, from renewable to quantum computing. It is useful in interaction across the physical, digital and biological domains.

Education changed during the Industrial revolution.It changed society because more people can be educated better and the entire country can be more advanced and develop more because the more the people are educated the cleverer the country.

For the primary time, education was provided by the state and learning was regimented. Dozens of scholars at a time were placed in grades in keeping with according to their age and moved through successive grades as they mastered the curriculum. They took an industrialized approach to education: impersonal, efficient, and standardized.
Before discussing Fourth Technological Revolution, let's have a look at previous industrial revolutions:

Sr.No	Industrial Revolution	. Basis
1	Industry 1.0:(1784)	Production is Enabled by the division of labor
2	Industry 2.0:(1870)	Mechanical production equipment is driven by water and steam power and also the use of current
3	Industry 3.0(1969)	The utilization of electronics and IT
4	Industry 4.0(today	The utilization of cyber-physical systems

It is clear that 4IR has significant effects on educational processes. Since education under 4IR is filled with innovation, there is a desire to arrange students to be creative and innovative in their thinking. It's suggested that Education 4.0 will affect the cognitive, affective, and psychomotor domains of learning . Students will need appropriate training to handle the digital applications .4IR may bridge the disciplinary divides between social sciences, humanities, science, and technology; this may include the perticular convergence of disciplines like business administration, and engineering.

Universities must collaborate with industry to make new disciplinary programs. The new generation of teaching tools and techniques like Big data, mobile computing, social networks, and clouds, allow for self-learning environments and are independent of your time and place. Students should bear in mind of their own education pathways to attain their personal goals. These new learning approaches require developing skills in areas like mobile/virtual learning, MOOCs, remote/virtual labs, and gamification. The rising level of complexity in Education 4.0 creates a desire for the increased use of blended learning, problem-based learning, and open-source innovations.

Industrial Revolution had an effect on Education. Over the last hundred years, there have been a plenty of changes within the way of learning. Everything has changed, from the way we design classes to whom we share our classrooms with. Thanks to the changed Education, as a result, changed society because of availability of being educated is increased and also the graph of development shown a substantial hike. The conclusion is that thanks to increased educated people the country and its economy get increased.

Education should be moldable as per the individual's styles and techniques. To extend student interest in learning, teachers need to apply innovative ideas in teaching. Within the industrial age Education became more important because there was a requirement for more people with technical and manageable skills. Due to the Commercial Revolution, the distribution of wealth in large proportion and increase in international trade was observed. There was an infinite increase within the output of products and services because of an unprecedented jump within the capacities of human societies to produce wealth; unprecedented technological innovation; new sources of power; and new employment opportunities for participants.

Students get a chance to actively involve in constructing content and new ideas in modern classrooms. The teaching - learning methods like project-based learning and design-based learning, use of Case Studies, problem solving methods where students can connect to the in real world is required to succeed up to the world standards of Education.

What exactly are going to be within the core of the subsequent industrial revolution?

The flexibility to get rid of linguistic boundaries and to create information as a unified international resource, the subsequent revolution are going to be supported on computational linguistics engines supporting multiple languages. In the least levels of education, the usage of such information technologies could make a major contribution to the individual learning. Also it is required to coach teachers to enhance their skills; developing vocational training programs about the way to gather information, process and protect data, and build information resources. To safeguard education environment against a rapid technological change is that the priority of educationists. The essential role in adapting the education system to the technologies of the 4IR and evolving market needs is undoubtedly played by close collaboration of education- al organizations with new modern enterprises. Innovative technologies are used as training tools within the learning process and internship.

The higher education in the 4IR being a complex and exciting activity promises to transform for the betterment of society. A technological revolution in the world is going to alter the lifestyle and way of thinking of humans. The Fourth Industrial Revolution (4IR) forces humans to encourage creative thinking about every aspect of life. Everything including Education is required to redesign strategically prepare the coming generations for the challenges ahead. The use of knowledge and skills of the employees of the future has to be done in new ways and upgrading and improving their knowledge is required to become successful due to Industrial Revolution 4.0. To meet these requirements it is compulsory to adjust the curricula accordingly the educational institutions.

III. Literature Review

With the information of technological revolutions, it has become easier today to describe technological progress of any organization. The 1st Industrial Revolution carried out the expansion of mechanical production, and enables massive increases of manufacturing. The 2nd Industrial Revolution is generally associated with technologies based on electricity. The 3rd Industrial Revolution is attributed to computerization and web-based resources. The concept of the 4IR is widely discussed in, the most highly cited research paper by Klaus Schwab. The increase in research on the 4IR shows that a whole new field of study has emerged and blossomed over the past 10 years. However, there is no common definition of the 4IR. For instance, it could be defined as, 'A technology fusion that involves physical, digital and biological spheres.'

Akash (2018),discussed about fourth Industrial Revolution in the article "Is Indian Education Sector Ready for Industrial Revolution 4.0"According to author ,"Hybrid education" allows teachers' to use digital skills and implement through experimental collaborations during teaching. Professional teachers can help transform school environments to become hybrid learning communities, where teachers can, become digitally literate and assume their role as facilitators by adopting innovative pedagogies.

Asmaa Abu Mezied (22 Jan 2016) explains about the role of education in the article ," What role will education play in the Fourth Industrial Revolution? According to her, combining the traditional higher education with the increasing trend of MOOCs is a necessary step to provide quality education.

Bernard Marr explains in the article " 8 Things Every School Must Do To Prepare For The 4th Industrial Revolution", how the 4th Industrial Revolution will dramatically change the way we live, work, and educate our children. To live in a world with smart machines, we should prepare our children with proper education.

Bryan Edward Penprase (2018),Soka University of America, Aliso Viejo, CA, USA, explains in the article 'The Fourth Industrial Revolution and Higher Education ',about future of the students.
These are as follows:
*After the first industrial revolution there was found a big change in the curriculums due to the totally new vision of educationists as per the situation.

 *According to plan of 4IR of higher education will ensure that our students will graduate into a world that they can help shape their future with wisdom and skill.
In the era of the 4IR we can state that there is a high demand in: developing critical thinking skills, skill to search, collect and analyze information ─ Teaching at all levels of education and in all disciplines,─ Creating comprehensive educational programs based on library literature of foreign language resources that have a great impact on openness and personalized learning .
EDr. V. Sasi Kumar explains the Education System in India., India had the Gurukula system of education in ancient times . The guru used to teach everything the child wanted to learn, from Sanskrit to the Holy Scriptures and from Mathematics to Metaphysics.
 James D. Basham et al sets out to analyze the impact of the 4IR on the preparation of learners with disabilities.
Hussien Mohamad Alakrash and Norizan Abdul Razak*," Education and the Fourth Industrial Revolution: Lessons from COVID-19"
This study is about the use of technology in teaching during the COVID-19 lockdown in Malaysia, focusing on technology-based teaching methods, modifications that occurred with this new teaching style, and challenges teachers faced when using technology. The challenges teachers faced included managing online classes, unavailability of Internet connections, overcoming a lack of preparedness, and dealing with students' mental health. Such changes in teaching methods have created new roles for teachers while also increasing their acceptance of e-learning and remote learning.
Lee R.M et al study how the design thinking method prepares China's students for the 4IR and whether China can innovate in a way that promotes future economic growth and employment.
Shri. M.Venkaiah Naidu said, "Equip Students with 21st Century Skills, 4th Industrial Revolution Knocking at Our Door",in an article," Education in India and fourth Industrial Revolution". During 4IR, to boost advanced learning in new-age technologies the government prefers an education ecosystem.
The Third Industrial Revolution was of personal computers and the internet, and the Fourth Industrial Revolution is a next wave of global progress and growth, where a bouquet of emerging technologies such as artificial intelligence, machine learning, the internet of things, 3D printing, biotechnology, and 5G merge together to change the dynamics of how industries operate.
It is the requirement of the fourth industrial revolution to transform skill-based sectors, and also increase investments in R&D measures. In such a scenario, India needs to accept changes in its own labor market. In any case, India needs more jobs that will be in the labor market by 2030 for its 50-crore youth.
Nancy W. Gleason reviews the multi-faceted strategy of Singapore's higher education in preparation for the 4IR.
Penprase asserts that the 4IR is a compounding effect of multiple "exponential technologies," such as AI, biotechnologies, and nonmaterial. In the paper, the researcher examines the impact of the 4IR on the American education system and how liberal arts should respond to this new human condition.
Shahroom & Hussein, 2018; Ceylan, (2020) stated that , World Economic Forum reports that reshaping the future of education and diversifying talents is required .It is essential for organizations to have a successful strategy and adopt new products of IR 4.0 such as big data, block chain technology and artificial intelligence in education instead of traditional procedures .
Sivasankaran P1 and Mr. R. Karthikeyan wrote in an article entitled, "Industry 4.0 CHALLENGES AND IMPLEMENTATION IN EDUCATION SECTOR IN INDIA", to reach the students learning and understanding in the pandemic situation, it is unavoidable to switch over to digital mode of operation that is remote learning approach. A lot of pressures students have faced in listening to the normal mode of classroom teaching in the conventional system of education, but in online or remote-based education learning has given some pace and flexibility to the teaching-learning process.
The Indian education system will have a big impact on Industry Revolution 4.0 and will transform the future of advanced technology through various methods. Conventional education patterns will not be going to help students in the future due to advancements of technology.
Vadim Grinshkun and Elizaveta Osipovskaya explained about advantages of 4IR in an article entitled, "Teaching in the Fourth Industrial Revolution: Transition to Education 4.0"
Advantages of 4IR such as World technological development and digitalization which will have a positive impact on Education 4.0 were discussed by the author in this study. This article is regarding the key challenges and features of the 4IR for the Russian educational system. Researchers also consider how Big Data,

the Internet of Things (IoT), Artificial Intelligence (AI), automation, robotics, and Virtual and Augmented Reality (VR/AR) are shaping the future of high-quality education. According to the author, teacher training programs and Pedagogical systems should be improved in order to prevent negative social consequences of the new technological revolution.

Prof. Yang P. et al deals with the complex relationships between the 4IR and HE through two phenomena: international student mobility and the emergence of the transnational HE industry in the context of Asia.India Today Web Desk New Delhi, December 19, published the article "Education in 2022: 4 things to look forward to and how it is going to be different from previous year" .According to the **NEP**, additional impetus should be given to vocational education by introducing vocational subjects and training at school levels.

Challenges

The Education System in India is going through a phase of transformation from traditional methods to digital mode. The population of young people in India is the world's largest population, hence to bring a change in the Education system is a difficult task. With the demands of the new age, India has to rearrange the higher education sector in order to face the effect of the Fourth Industrial Revolution. Since the technology itself is evolving rapidly the trained faculty and the inadequacy of curriculum are the biggest obstacles to the advancement of Education. The proper way for students to gain knowledge in emerging technologies is to learn directly from practical experiences instead of theoretical knowledge. To take the youth into the mainstream of employment through various carrier options is also a big task. The government of India is taking initiatives to support and build a new advanced Education System. Autonomy, Ranking, and Technical education are the three pillars that have been created for the needed structural change.

IV.   Conclusion:

From the reviews of related literature, it is clearly seen that the education industry is changing day by day and accepting new ways to cope up with the change occurring in all aspects of life due to the fourth Industrial Revolution. Professional teachers can help transform school environments to become hybrid learning communities. It is essential for organizations to have a successful strategy and adopt new products of IR 4.0 such as big data, blockchain technology, and artificial intelligence in education instead of traditional procedures.

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