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Role of Fourth Industrial Revolution and Education 4.0 on Sustainable Development in Education

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Abstract

Sustainable Development Goal 4 deals with Quality Education- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. The Fourth Educational Revolution together in par with Fourth Industrial Revolution offers numerous opportunities to enable and accelerate the progress towards this sustainable development goal with the integration of digital technologies, artificial intelligence, automation and data driven process. A well-developed plan for Education 4.0 form of higher education will ensure that our students will graduate into a world that they can help shape with wisdom and skill, while building a future society we would want ourselves and our grandchildren to live in. Graduates of any Education 4.0 higher education should be capable of advancing the material culture of our future world, while creating a culture which advances technologies sustainably and ethically. Educational Revolution 4.0 has impacted Indian Education system in a significant way through advanced technology. The present study is a conceptual discussion about Education 4.0 and Fourth Industrial Revolution (Industrial Revolution 4.0) and how it brings sustainability in Education

Keywords: sustainable development goal, fourth industrial revolution, education 4.0, sustainable development in education

Introduction

The United Nations defines sustainability as “a movement for ensuring a better and more sustainable well- being for all, including future generations, which aims to address the everlasting global issues of injustice, inequality, peace, climate change and environmental degradation” (Ghobakhloo, 2020). “Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Cook, 2019). Sustainable Development in the Fourth Industrial Revolution is “the use of technologies to combine the physical, digital and biological worlds to improve the lives of citizens while existing in harmony with the environment (Allyn & Wark, 2020).

The word Fourth Industrial Revolution (4IR) was coined by prof. Klaus Schwab (2016). According to him, our world has already entered into the Fourth Industrial revolution with the growth of Artificial Intelligence (AI), Robotics, Internet of Things (IoT), Information and Communication technology (ICT), nano technology, 3D printing, genome editing storage and Quantum Computing. 4IR is an innovation based on the combination of varied technologies (Allyn & Wark, 2020). Under his chairmanship in the World Economic Forum meeting held in January 2016, Davos- Klosters, Switzerland highlighted the importance of Fourth industrial Revolution for the future world.

Educators are abuzz with Education 4.0 due to the fourth industrial revolution sweeping all sectors, including the education sector. Education 4.0 India was launched in May 2020, bringing together over 40 partners from ed tech, government, academics, and start-ups. We are, therefore, on the verge of a new era in education; Education 4.0. (Gupta, Abhishek, 2022)

Education 4.0 for Sustainable Development

17 comprehensive Sustainable Development Goals are set by United nations General Assembly in 2015. (United nations, 2018). Among these Sustainable Development Goal 4 deals with Quality Education- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. The fourth industrial revolution offers numerous opportunities to enable and accelerate the progress towards this sustainable development goal with the integration of digital technologies, artificial intelligence, automation and data driven process. As societies have moved from First industrial Revolution to the present Fourth Industrial Revolution, a drastic change have happened in the field of education also.

1 st Industrial Revolution (1750-1900)	1 st Education Revolution
Steam Engine	Small classrooms (20-30 students)
Mechanical Systems	Use of black Board
2 nd Industrial Revolution	2 nd Education Revolution
Combustine engine	Larger classroom (30-40 students)
Mass production	Use of Black board & White board
3 rd Industrial Revolution	3 rd Education Revolution

Large Computer	Larger classroom (30-800 students)
Micro Computer	Use of Black board, White board, Overhead transparencies & Internet
4 th Industrial Revolution	4 th Education revolution
Artificial intelligence	Online Teaching -Learning
Robotics	MOOC
Internet of Things	Artificial Intelligence
	Extended Reality
	Virtual Labs
	Big Data
	Biotechnology
	Cloud Computing/technology
	Holograms
	Mobile technology etc

Emerging Transformations in Education in Education 4.0 Era

In Education 4.0, there is a concerted effort to address the limitations of conventional teaching and learning methods. Under this paradigm, the primary responsibility for learning shifts from teachers to students, marking a significant departure from traditional approaches (Gupta, 2022). Classes are expected to become more flexible, accommodating diverse learning methods as the educational landscape evolves (Block et al., 2081; Grodotzki et al., 2018; Mavrikios et al., 2019; Mourtzis et al., 2018).

Mavrikios et al. (2019) illustrated how learners in holistic, immersive environments utilized holograms, mobile technologies, and finger-tracking to interact with educational

resources and peers. Similarly, Grodotzi et al. (2018) observed students exploring and testing complex engineering procedures through the integrated use of a MOOC, augmented reality (AR), remote and virtual labs, and additive manufacturing technologies. The transition from traditional classroom-based learning to online and Mixed Reality (MR) environments is underway, providing timely and relevant apprenticeship and on-the-job training opportunities (Allyn & Wark, 2019).

The proliferation of online and mobile learning platforms, along with recent initiatives to develop AI-enabled open-source online learning platforms, suggests a future where online and MR learning supersedes traditional face-to-face learning (Aziz Hussain, 2018; Bhattacharjee et al., 2018; Block et al., 2018; J. Chen et al., 2018; Jia et al., 2019; Lou, 2018; Strock et al., 2018; Duraiappah, 2018). The advent of the Fourth Industrial Revolution (4IR) technologies such as AI, Learning Analytics, and the Internet of Things (IoT) is expected to industrialize and shift learning towards a more learner-centric model (Aker, 2020; Chai & Kong, 2017).

As a result of these technological advancements, the role of teachers is evolving, with many becoming "4IR" or "digital" teachers, utilizing deep learning technologies such as AI, Robotics, Big Data, and IoT (Ally, 2019). Education 4.0 promotes a student-centric model where learners have autonomy over their learning paths, receiving customized learning experiences tailored to their needs. Additionally, the learning process becomes more project-based, fostering the development of time-management and interpersonal skills to enhance students' job readiness.

Changing Role of Teacher: From Teachers to Facilitators

The teacher now needs to prepare themselves to be facilitator rather than teacher. The present-day students have multiple sources to gain knowledge. They have lots of exposure so teacher should now swiftly shift from being teacher to being facilitator. They should use the technology to support the students. Teachers can now use technology to make the teaching learning process interesting and supportive. The teachers can opt for flipped classrooms, active learning, hybrid mode of teaching, Collaborative classrooms. Teacher can use video lectures, virtual labs in the classroom. The students can collaborate on various projects across nation regardless of their physical location. Self-learning environments needs to be created.

Shift in Pedagogy

New teaching strategies needs to be evolved which will cater to the needs of fourth revolution. The pedagogy needs to be shifted from rote memorisation to higher orders learning of Bloom's taxonomy. We need to prepare students to apply their learning in new situations. They should be trained to analyse and in new knowledge. The aim of teacher should be to develop the 21st century skills. There is a need to evolve the teaching strategies in such a way that it helps in building the problem-solving skills among the future generation. They need to be trained to resolve their issues on their own. Empower the students to think independently and design their own future. With so much changes taking place in our society how can the teaching be done in the same way. The schools, classroom also needs to change. We need to understand that students

no more are interested in listening to lectures. They don't get inspired by the traditional ways of teaching.

Conclusion

Integrating the core 4.0 educational components with Industry 4.0 is the beginning of a model that involves the different stakeholders in the education system in flexible, pedagogical practices. This integration considers the technology that supports learning, connectivity, storage infrastructure, institutional guidelines, organizational processes, practices to promote innovation, digital skills training for teachers (doing and being), and coexistence with digital native students. (Gonzalez & Ramirez, 2022). A well-developed plan for Education 4.0 form of higher education will ensure that our students will graduate into a world that they can help shape with wisdom and skill, while building a future society we would want ourselves and our grandchildren to live in. As education moves into the 4th Industrial Revolution and 4th Educational Revolution, it will provide quality teaching, enlighten learners through exploratory research, and sustain societal development while taking on an increasingly important role in the global education sector.

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