Opportunities And Challenges of Learning During the Fourth Industrial Revolution

Irshad Hussain
Department of Education, The Islamia University of Bahawalpur, Pakistan
irshad.hussain@iub.edu.pk

Afshan Rahat
Assistant Professor, Department of Special Education, University of Karachi
afshan_rahat@yahoo.com

Rifat Tahira
Department of Education, The Islamia University of Bahawalpur, Pakistan
riffat.tahira@iub.edu.pk

Shahida Sajjad
Vice Chancellor, Metropolitan University, Main University Road, Malir Cantt Karachi
shahida_sajjad75270@yahoo.com

Abstract

The present time is regarded as the Fourth Industrial Revolution (4IR) which has created opportunities as well as challenges for individuals as well as the nations and countries. Opportunities are for those who have prepared themselves or are preparing themselves to assume their roles during the 4IR. Generally, those who do not develop themselves; they lag behind and face the challenges of 4IR. The 4IR has promoted opportunities of learning by empowering the learners in their academic life. They can use different Information and Communication Technologies (ICTs) which have revolutionized the entire landscape of education including teaching and learning. The leaners, now can access the learning materials according to their own need at anytime from anywhere. A large number of opportunities have been created by the 4IR besides its challenges. These opportunities opened up new horizons of learning and jobs; whereas the challenges can be overcome by understanding their nature and intensity.

Keywords: *Opportunities, Challenges, Industrial Revolution, Higher Education, Learning Materials*

Introduction

The human life is seen to be associated with transformation and revolutions which opened up new horizons of thinking, actions and activities. It created an urge to invent and to innovate – the development. That's why the world has witnessed the tremendous developments and innovations throughout the history of mankind. Innovations and invention have/ had been taking place over the time. Observingly, the [diversities in] innovations and developments are interlinked to facilitate the human life in different fields. In their combination, different innovations like Artificial Intelligence (AI), Quantum Computing, Gene Therapy, Three Dimensional (3D) Printing Technology, Nano-materials and Robotics significantly play a transformative role in the human life (Schwab, 2016) by bringing about a revaluation throughout the world.

We are living in a world which is linked with the innovations and inventions and these have affected the human life in its all spheres. Keeping in view their effects on human life one can say that, *"Technology has re-shaped the human life"* and brought about a revolution in the world society. Along with other technologies, the emerging *"Information and Communication Technologies (ICTs)"* seem to have brought about an information revolution (Hussain, & Sajjad, 2020). However, the history of mankind witnesses to see the revolutions and revolutionary innovations. Presently, we are living in the Fourth Industrial Revolution (4IR) which is regarded as the result of such innovations and developments in computer technology aligned with "information and Information & Communication Technologies (ICTs) –Artificial Intelligence, Robotics, Internet of Things (IOT), Biotechnology, Nano-materials". On account of it, a faster change is taking place in the world which in 1992 was estimated by the Daggett (1992) to be four times faster than ever before that time. It accounted for some modern phenomena like *"globalization, competition, collaboration & cooperation, creativity & innovations, multiculturalism, conflicts [and conflicts' resolution] and [accepting] diversity, information explosion, media, & technology, and commercialization of education. This situation puts an immense pressure on educational institutions to promote the skills among graduates to live and work productively"* (Sajjad, 2020): the 21st century skills. The humans now seem to be aligned with and dependent on emerging technologies for their interaction(s) and communication thus these becoming part of their *"physical lives"*. These and alike capabilities and features of the technologies seem to have revolutionized education and training as well and the situation is termed as the result of the *"Fourth Industrial Revolution (4IR)"*.

The Fourth Industrial Revolution -4IR

The advent of the technology brought about the First Industrial Revolution (1IR) which consisted upon steam engine, iron and textile factories; similarly, the invention of steel, electricity, cars and planes brought about the Second Industrial Revolution (2IR); whereas, the Third Industrial Revolution (3IR) emerged from the invention of electronics, digital, computers; and the Fourth Industrial Revolution (4IR) is regarded as an extension of the 3IR which particularly embraced ICTs. According to Schwab (2019) *"The fourth industrial revolution is not merely a series of incremental technological advancements, it is an upheaval — a dramatic and wide-ranging shift in the way that value is created, exchanged, and distributed across individuals, organizations, and entire economies"* (p. 13). It enhances the access of all [individuals] to the all resources of knowledge and information by using the tools of artificial intelligence –robotics, internet of things etc. In this perspective, Azoulay (2018) asserted that "*Promoting open-access AI tools that will encourage local innovation will be one of our priorities. To prepare future generations for the new [roles and] landscape of work that AI is creating, it will also be necessary to rethink educational programmes [for skill development], with an emphasis on science, technology, engineering and mathematics — but also giving a prominent place to the humanities and to competencies in philosophy and ethics"* (p. 38) to impart values' education.

The 4IR as a combination of digital, biological and physical world has steered up the socio-economic conditions of developing countries like Africa. Ndung'u and Signé (2020) rightly said in African perspective that it is *"characterized by the fusion of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies, among others — has ushered in a new era of economic disruption with uncertain socio-economic consequences for Africa"* (p. 61). The 4IR has a greater potential of integrating cyber-physical with digi-biological sphere in human life. It was affirmed by the Pollitzer (2019) by saying, *"the big transformational promise of [the] 4IR is in cyber-physical systems that will merge different digital technologies and integrate them within the physical, digital, and biological spheres"* (p. 76) of human life. This situation witnesses that an accelerated, larger scale, deeper and lasting social change is anticipated. It is also acknowledged by Schwab (2019) and the World Economic Forum (2017) that emerging technologies are combining the digital, physical and biological worlds to impact on industries, economies and all societal aspects during the 4IR to flourish accordingly.

Learning during 4IR

Our time –the 21st century is regarded as the century to be full of challenges and opportunities, information & knowledge explosion, collaboration & cooperation and competition. The 4IR opens up new horizon to live and work effectively during this time of diversity. It leaves a responsibility on professionals, the nations and the countries to coach the young generation in right direction; and to equip them with 21st century skills. Observingly, the 4IR is transforming and/ or has transformed the entire process of education –the teaching and learning (Low, 2020). It has reshaped the instructional process and brought a systematic revolution in education at its all levels. It required learners to be team builders, creative, innovators and logical thinkers. It would happen through teaching and learning which affects cognitive faculties, affective capabilities and psychomotor skills during the 4IR (Razak, Saeed & Ahmad, 2013) for sustainability. The learners are needed to learn the application of knowledge rather than the rote memorization of information. They need to learn 'how derive the right information' as it exists in abundance now in the age of information and ICTs; 'how to process and convert information into knowledge'; and 'how to use certain type of knowledge and information' to solve the certain real life problems; and 'how to use ICTs' practically –the skills of using the technology in different situations. It requires training and retraining instead of mere memorization and retention of information (Alakrash & Razak, 2020). This situation calls the attention of the educational stakeholders particularly, that of higher education to design the curricula in accordance with the needs of the learners during the 4IR. To achieve this, the interdisciplinary approach would be useful strategy to teach the skills of applying knowledge in real life situation(s). For the purpose, university-industry collaboration can play an important role in this regard (Hamat, Hassan & Embi, 2029). The new ICTs-led environments need new ways of learning through human-machine interactions which lead towards independent and self-determined learning environments which are free of place and space restrictions. Such learning environments allow the learners to design, develop and/ or create their own ways of learning by developing distributed learning environments. Here new approaches and new tools of learning like Open Educational Resources (OERs), Massive Open Online Courses (MOOCs), and Modular Object-Oriented Dynamic Learning Environments (MOODLEs) emerge to facilitate the remote learners (Alakrash, Razak & Krish, 2021) in their learning. This situation has given rise to the transnational education, virtual education, online and blended learning, mobile learning thus innovating and modernizing the teaching learning process (Hamat & Hassan, 2019).

The learning during 4IR requires innovation in traditional curricula at all levels of education to make it student centred i.e. creating skills among the students. These skills include critical thinking and problem solving skills, ICTs skills, working in teams or team building, understanding and accepting diversity, rationality in decision making and so on. It focuses more on critical thinking, problem solving, communication, collaboration & cooperation and innovation (Klarner, Sarstedt, Hoeck & Ringle, 2018; Drath & Horch, 2014).

Threats and Challenges of Learning Revolution and 4IR

The 4IR has brought about a great change in the entire process of education. Technology-led educational endeavours are becoming common. Artificial intelligence and robotics are taking over the human activities and making the human dependent. Therefore, there is a fear of joblessness or less jobs for the humans. It calls to think the other-way round that the nature of the jobs is being changed –becoming more ICTs skill oriented. Hence, those who will learn the skills of Information Technology (IT) would become more capable of living and working productively than those who will do otherwise. Even so, it is feared that the working with independence would be snatched by the technology; and the humans would become handicapped or slaves of the technology. It would be ironical to work without technology. The performance effectiveness and efficiency would be measured in terms of the use of technology –IT Skills. Formal degrees for the jobs would be replaced by the skills and digital literacy. However, some problems and issues related to the sociability, and morality can be anticipated like misuse of data, disseminating unauthentic information, hacking and immoral practices (Hussain, & Sajjad, 2020).

Opportunities

The optimists view magnificent opportunities associated with 4IR. These are new learning approaches in new learning environments for the learners. Besides, the openness of educational opportunities with freely available learning resources is one of the greatest opportunities for those who otherwise would not be able to continue their studies. Also the ever updating *"educational Software including Multimedia Educational Resources for Learning, Open and Online Learning Initiative, Open Educational Resources, and OpenCourseWare"* (Casserly & Smith 2008) is the common prospects of the 4IR. It has made learners more important than ever before as they have become focus of all of the academic activities inside or outside of the institution (Hussain, & Sajjad, 2020). It makes learners more independent and self-determined in their learning whereby allowing them learn from the real life situation(s) and interacting and communicating with others (Archambault, 1974) in such situation(s).

Besides, the employment in IT sector has increased on a noticeable pace in the Organization for Economic Cooperation and Development (OECD) countries. Analysing the situation and anticipating the future of education and job market, different researchers (Acemoglu & Restrepo, 2018; Autor & Salomons, 2018; Acemoglu & Restrepo, 2017; Bessen, 2017) have asserted that the 4IR has promoted opportunities of learning in innovative ways and styles by developing offshore educational enterprises, boosting up the educational process in newest forms, innovating the business models and entrepreneurial activities, transforming industries, and entrepreneurial skills. It has transformed the job market in new environment(s) by extending the opportunities and modern ways of service delivery with enhanced employment opportunities. Therefore, it seems necessary for the graduates to learn such skills and attitudes for living and working in the 4IR.

The 4IR makes educational institutions and teachers *"to say Good bye"* to the traditional pedagogies and embrace the innovative ones like virtual and online pedagogies, and mobile and blended learning besides extending opportunities of transnational education. It has changed the entire landscape of the process of education by realizing the learners' needs and focusing on to meet these.

Challenges

The 4IR has brought some challenges along with opportunities. The main challenges and concerns are the jobs and job-oriented skills of the graduates. It is a main challenge for the all stakeholders of education to think and re-thing how to develop job oriented skills among the graduates. Inculcating soft skills and socially accepted behaviours among the graduates is another challenge. Meeting global standards and imparting quality education, institutional management, dealing with traditional mind-set, meeting financial constraint of the institutions, provision of infrastructure, planning and offering career training, revisiting curricula, and imparting value-based education are some of the key challenges which need to be addressed by the stakeholders.

Conclusion

The present time is regarded as the Fourth Industrial Revolution which has created opportunities as well as challenges. Opportunities are for those who have prepared them or are preparing them to assume their roles during the 4IR. Generally, those who lag behind face challenges. These opportunities and challenges can be met by visionary leadership.

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