Preparing Workforce for Industry 4.0 through Education 4.0

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*[**Abstract**: As machine intelligence capacities develop, there will be disruptions in the labour markets. New job descriptions and new job roles will emerge and many of the existing ones will disappear. Current workers would need to be re-skilled to reduce their skill mismatch and today's young generation would have to be educated in line with the requirements of future jobs. Many companies conduct retraining programmes to re-qualify their employees to reduce their skill mismatch. In order to respond to the requirements of Industry 4.0, companies would have to induct new recruits appropriate to the emerging job descriptions and new job roles which will be high-skill and analytical in nature. Schools of the future will be required to prepare students in the required traits. In response to the needs of Industry 4.0, some initiatives have been taken in developed countries, departing from the current curriculum to give way to individual-based flexible systems with focus on skill learning. Such systems have come to be called Education 4.0. An initiative on these lines is also being conceptualised in India as well with the vision of keeping human values and beliefs intact.]*

As Industry 4.0 takes root, developments in computing, robotics, and artificial intelligence enable automation and digital systems to penetrate the group of tasks that used to be done solely by humans by means of cognitive abilities such as sensing, reasoning, and decision-making. As machine intelligence capacities develops further, applications of artificial intelligence like 3D printers and driverless cars are likely to abolish jobs currently done by humans, not just in manufacturing, but also in service industries. While some researchers and experts claim that automation will eventually replace human workforce to a large extent, some others claim that it is not possible to massively substitute human workforce with automation. The digital systems will only be used for assisting human workforce in more sophisticated digital platforms. New jobs and occupations would emerge as well as hybrid configurations would be formed through human-machine integration. Nevertheless, there would be disruption in the labour markets. New job descriptions and new job roles will be created. Some new job descriptions in future will be robot-coordination, digital product manager, digital business developer, data protection officer, web manager, and web integrator.

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Although advancements in digital technologies may bring about job displacement and job losses mostly in industries where automation can displace tasks and actions traditionally performed by humans, the rise of digitalisation would also have considerable positive impact on employment by creating new jobs and roles in various industries.[1]

Fulfilling the need of creating the future workforce brings some responsibilities for companies, business leaders, and governments. The current employees need to be reskilled to reduce their skill mismatch. Prospective employees, i.e. today's youngest generation, need to be educated in line with the requirements of future jobs and skills.

Many companies conduct retraining programmes to re-qualify their employees, and with the onset of Industry 4.0, these efforts will need to be expanded and redefined. Effective training programmes for specific job-related skills should include both on-the-job instruction and classroom instruction. It will be essential to offer online competency based learning programmes. Training in a broader set of skills will often be required because many employees would be working on a variety of tasks. Fostering a positive perspective on change among employees will be essential for enabling them to adapt to new processes and challenges. Besides, companies must ensure that humans remain responsible for innovation, and also co-ordinate the overall processes rather than trying to automate these critical capabilities.

While considering fresh recruitment in the environment of Industry 4.0, companies would have new approaches that focus on capabilities, rather than on qualifications determined by degrees and roles. Further, in the future, employees would be working on a great variety of tasks unrelated to their core education; recruiters will have to look beyond formal degrees to identify workers with relevant skills for specific roles. Rather than insisting on formal degrees and training requirements, job specifications would be laid down innovatively. Employees in the

[1] Ustundag, A. and E. Cevikcan (2018), *Industry 4.0: Managing the Digital Transformation*, Springer.

recruitment department will need to update their skills to work effectively in the Industry 4.0 environment.[2]

Future educational systems will prepare students in line with the demand of the future industry. This means that there would be innovation in the pedagogical system of today, leading to experimental or disruptive education endeavours. Education 4.0 systems will be positioned to respond to the requirements of Industry 4.0. Within the Industry 4.0 set-up when automation and artificial intelligence will be setting in, jobs available to humans will mostly be high-skilled and analytical in nature and will require the recruits to be creative and innovative with high levels of cognitive and emotional intelligence. Also, the recruits will be expected to perform their tasks in line with the machines with AI capabilities so that the work environment is cohesive and efficient. With all this in mind, schools of the future will have to prepare students in these traits in line with the job requirements. There will be emphasis on creativity and innovation in order to train them to be better at problem solving.[3]

In advanced countries, initiatives have been taken to reorient the education system to better suit the industry and modern society and traditional subjects are being replaced with topics or phenomenon that prepare the students better for work life. The topics will be a combination of many subjects, giving students the ability to groom themselves in all aspects of a skill or job. Students are encouraged to approach a problem from different angles to make them better at problem solving tasks. In contrast, the traditional methods of teaching make students well versed in subjects, giving shallow understanding of the variation of their application. In such institutions, there are multipurpose classrooms, and evolving software and hardware infrastructure to impart "personalised education" to the students. The students are tested in problem-solving approaches in topics and subjects they are most passionate about, which gives them an in-depth understanding. The achievements of students are mentioned on apps in real time. Each student has a personalised plan based on

[2] Lorenz, M. *et al*. (2015), *Man and Machine in Industry 4.0: How Will Technology Transform the Industrial Workforce through 2025?* The Boston Consulting Group. Available at: https://image-src.bcg.com/Images/BCG_Man_and_Machine_in_Industry_4_0_Sep_2015_tcm9-61676.pdf

[3] Focusing Future (Undated), "New Philosophy of Education." Available at: http://www.focusingfuture.com/me-consumer/new-philosophy-of-education/

what they are passionate about and instructors enhance their understanding on these topics. Hence, students graduating from such institutions are more skilled & tech-savvy, and better prepared for professional careers.[4]

Some universities in advanced countries plan to overhaul their university education system by introducing new ways to impart skill-learning and education. Departing from the current curriculum of four-year format, it is proposed to engage students in a loose teaching schedule lasting from six years to their whole lifetime. Student will be allowed to switch from education to work and vice-versa ensuring flexibility and a more focused approach towards skill learning. Students would be expected to come back any time to learn more and polish their skills. In yet another model, students will be grouped and taught strictly in line with their capabilities and skills. This way, a more individualised pedagogical system will focus on the potential of students. In other words, studies will be reoriented to suit individual skills, harnessing the job and market dynamics to their maximum. Students will not seek degrees but will target missions which they would seek to complete during the course of their studies. This way, individuals sharing missions will join forces and can contribute fully to reach their targets. Universities that are planning to do overhaul the education system will bring these changes gradually with the objective of preparing the students in line with the demands of the future job market.[5] Thus, the future workforce will comprise a group of intellectuals who would be honed to make use of the advanced technologies of the future.

Humans have the ability to learn constantly. Due to medical advancements, not only are humans able to live longer, but also remain productive most of their lives. Hence, there will be more opportunities to learn and work. Peter Fisk postulates that most people will have at least six different careers, requiring re-educating, while the relentless speed of innovation will constantly demand new skills and knowledge to keep pace.[6] In that sense, the future student will neither be limited to academic

[4] *Ibid*.

[5] *Ibid*.

[6] Fisk, P. (2017), "Education 4.0….The Future of Learning Will Be Dramatically Different, In School and Throughout Life," Genius Works, January 24. Available at: https://www.thegeniusworks.com/2017/01/future-education-young-everyone-taught-together/

institutions nor restricted by age. Everyone will have chances to learn new skills based on demands of that specific time. The workforce will be more flexible and open towards learning new skills to meet the demands of the fast-paced economy of the future. Those who understand this are already working on a schooling system that can do justice to these demands. It is important to keep an eye on these endeavours and to adopt them elsewhere before the technological advancements make today's labour obsolete.

An initiative is also being taken in India with the proposed launch of Auronya College in 2018, the first educational institution that seeks to answer questions about the little-explored world of Education 4.0. The proposed college in India will consider similar reorientation as discussed in the preceding paragraph. The proposed institution shall focus not only on "what is taught," but also on "the way it is taught" with a view to align with future trends to develop and enhance individualised education that will eventually define the manner in which youngsters of the future will work and live. The promoters of the Auronya College have a vision that as the barriers between man, machine and technology dissolve, Education 4.0 for the next generation must be conceptualised keeping intact elements, values, beliefs and insights that make us human. Whether it is geosciences, quantum computing, robotics, or artificial intelligence, education here will focus on future trends while keeping intact today's values and beliefs. With this vision, the promoters propose to prepare their students to build on indelible capacity to operate at strategic/senior levels in both the globalised and the technologically-advanced environments and gain hands-on experience to solve real-world problems nationally and globally.[7]

[7] Krishnan, M. (2017), "Education 4.0 is Here," *The Hindu*, June 13. Available at: https://www.thehindu.com/education/education-40-is-here/article19093549.ece