STUDY ON THE IMPACT OF INDUSTRY 4.0 IN EDUCATION SYSTEM OF INDIA

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ABSTRACT

In today's modern age each and every person is fascinated about the 'Industry 4.0'. The industry 4.0 is so powerful that changes in the present times are unavoidable and these include changes in the education sector also. We believe that the Industry 4.0 can become highly useful in the education sector. Use of the Industry 4.0 technological advancements in today's education system for teaching and learning methods can create the interest in the students to engage in the new age learning of different subjects and their study materials. Application of the Industry 4.0 in education sector has given rise to the 'Education 4.0'. Education 4.0 is a complete process that can help the students to understand the digital use of Industry 4.0 and there we can align human and technology to work on different opportunities available. This explains the various roles, changes, benefits of Industry 4.0 in education and also finds various potential opportunities that can of use in the future.

Keywords: Industry 4.0, Education 4.0, Digital age, Digital learning, Web based learning, Technology enabled tools, Education sector.

INTRODUCTION

Industry 4.0 refers to the fourth industrial revolution and it calls for a complete and dynamic transformation of how all aspects of business and production are done? A new wave of global technology is expected to change the global production systems. Internationalization, in all aspects of business and industry, will be the norm in the future. Countries can no longer remain confined within their borders. They need to become citizens of the world. Leaders in this new era will need to be critical thinkers, problem solvers, and be able to interact across the globe regularly. All need to be properly educated.

We need to ask this: How should its impact be on education? Future workers will need to be highly trained in the emerging technologies. Also, as importantly as in other parameters, in the values associated with using these new age communication and technology based technologies. In the future, we shall not only possess the ability to develop the technology but also to know whether, when, and where to use that technology, efficiently and economically. This thinking is both reflective and interdisciplinary. Schools and colleges need to reinvent themselves quickly. They need to adapt to the demands of the Industry 4.0 and have the obligation to come out of their somberness. These need to try to give as many opportunities as possible by an appropriate context for the students to be prepared for the future jobs. Pro**blem in the future may not be related to the lack of employment but to the** shortage of desired skills **that these new jobs will invariably demand.**

During the last few decades, we had experienced four different industrial revolutions and these have changed our understanding of humanity. With the onset of Industry 4.0 education revolution, we are entering a new era (Education 4.0), where learning is also expected to change entirely. This is an era characterized by automation of all kinds of tasks, artificial intelligence in all spheres of life. There exist endless possibilities that technology can open up for us. How these are related to the education sector? Is there a phenomenon that can be called education 4.0? So, to begin, we can ask: What does Education 4.0 mean?

Education 4.0 is a new experience-based education system that uses digital technologies instead of the rote-based learning system and responds to the needs of the new world through personalized and targeted education. This system that envisions the training of new generations to meet the needs of the Industry 4.0, brings together

technology, individuality and discovery-based learning. The educational industry is already being influenced by cognitive and cloud computing, 'Internet of Things (IoT)', and other trends imposed by the Industry 4.0.

EXPECTED CHANGES OF INDUSTRY 4.0 ON EDUCATION SECTOR OF INDIA

We can note the following changes of Industry 4.0 on education sector in India:

- *(A) Students have technology driven expectations:* Do we know what influences the expectations of students? Answer seems to be the expectations of future job markets. Clearly, future workers will be expected to be not only knowledgeable in their domain of expertise but also trained in emerging technologies as well. This might be the right time for professors to stop assigning textual projects and focus on practical assignments instead. When it comes to textual assignments, students don't benefit from them too much. Most of them can easily buy essays. Essays and research papers remain an important aspect of education. Still, the educational system must be reinvented in another direction. Students need to develop practical skills in terms of using the technology and these will be encountered by them in their future jobs.

Let's take doctors as an example. Medical robots are not just a sci-fi dream and they are becoming reality in that industry. They will collect and classify patient data, and they will present it to the doctor in a format that's ready to use. A student in any medical school has to keep pace with all the new inventions. The school should equip them with knowledge about big data and its impact on their profession.

- *(B) Education is getting personal*: It's time for the universities to embrace big data. It's their opportunity to understand strengths and weaknesses of an individual's performance. We have been talking about personalized education for the ages. That's why online courses gained so much traction as anyone can study what they want, at their own pace. We need to go even further. When the professor measures the student's performance and behavior, they can finally offer a personalized learning experience for them. If an individual student is facing learning disabilities, they can find a different approach in their teaching methods. If they realize that this student is intimidated by testing, they can offer them to write blog posts at home instead of essays at school. It takes a lot of training for teachers to be able to understand and use big data, but we are making small but steady steps towards such a future.

- (C) IoT is taking over: The 'Internet of Things (IoT)' is all about our convenience. It's about keeping our homes safe and more effective while we're away. What does this mean for the classroom? The applications of IoT technology are not extreme at the current scene. Many modern schools are equipped with wireless door locks, attendance tracking systems, room temperature sensors, security cameras, 3D printers, and other smart devices. This technology is on a rapid track of development. We expect to see more innovative applications in close future. Of course; students go to school to learn. But convenience is an important part of the process. If smart devices can keep the classroom environment more comfortable, it will be easier for the students to stay focused.

NOVELTIES OF INDUSTRY 4.0 FOR EDUCATION 4.0 FOR INDUSTRY 4.0

With Education 4.0, the concept of education changes completely and some new trends appear that we are not familiar with. New education system, built on success in life and not on exams, draws attention to the necessity of personalized education. Some novelties of the Industry 4.0 for Education 4.0 are:

- *(I) Time and space-independent education:* Students have the opportunity to learn wherever and whenever they want. Because of new interactive learning tools, education is now space and time-independent. While the theoretical dimension is learned outside the classroom, face-to-face practical learning is carried out in the

classroom. Students' need and dependence on buildings surrounded by stone walls, which we used to call a "class" or "school", are diminishing. Likewise, with the advantage of time independence, a child can undertake their education through e-learning tools from their room. Individuals who learn the theoretical part of their education on their own and in a digital environment can transform their knowledge into real-life experiences through practical project-based activities in the classroom.

- *(II) Personalized learning:* Students will receive personalized learning through special tools adjusted to their capabilities. In this way, a student who has difficulty in understanding what many children can easily absorb will be able to improve at their own pace.

- *(III) Learning flexibility:* Traditional education systems apply the same model for each student. Education 4.0 believes that there is no drawback in trying different paths as long as it reaches the same goal. From Education 1.0 to Education 3.0, the same curriculum was offered to all students with the same teaching styles. Although, some more efficient methods were used in Education 3.0, the necessary flexibility could not be provided. In Education 4.0, a flexible global education model is recommended for every student. Teachers can use online data to track and measure the results of their students and then provide personalized guidance based on their specific strengths and weaknesses. With successful orientation, each child will become more successful in the areas they are predisposed towards and will develop their weaknesses through their own flexible education plan.

- *(IV) Project-based learning:* In order to prepare children for the future freelance work model, students need to become familiar with project-based learning and study models. In other words, students have the chance to apply what they have learned on a real project, instead of writing answers on paper. In the field of learning called it is called 'Maker' and in this an individuals are transformed into self-sufficient persons by using their talents effectively and in a fun way in many areas, especially technology. Maker culture aims to prepare children for the future via fun. Through project-based learning, children can improve different abilities: Problem-solving, Being solution-oriented, Collaboration and teamwork, and Time management. Furthermore, they can develop themselves in areas of great importance throughout their academic career.

- *(V) Data interpretation:* Mathematics and logic will keep its place in our lives in the future. However, this time robots will do these operations instead of humans. The task for people will be to draw insights based on the released data. The world is developing technologically every day. Information technologies are the biggest opportunity of our future. When future graduates leave university, they may not know their professions but they will know technology very well and be able to respond to the global needs of Industry 4.0. It is necessary for people to learn competencies such as setting up, managing, developing, collecting, processing, and interpreting data. As one of the important requirements of Education 4.0, students should be able to recognize trends in data and develop recommendations based on the data. As a result, students should learn to approach standard data from an unusual perspective.

- *(VI) Not a single exam, continuous improvement:* In the current system, students are subjected to a question-and-answer based exam. According to many educators, this system is only successful in the short-term. After the exam, students forget the memorized information very quickly. In Education 4.0, the focus is on evaluation instead of exams. Students should use their acquired knowledge as soon as possible when they begin their professional life. The evaluation results will be based on the entire education period instead of one exam. Likewise, students are expected to produce continuous Maker activities and put what they have learned into practice? Children learning to code can develop a calculator or a game that they can use in their daily lives,

instead of just mastering theoretical knowledge. These projects will contribute to transforming theoretical knowledge into practical experience and storing it in the long-term memory.

- *(VII) Curriculum with student participation:* In Education 4.0, students will be involved in the creation of curricula. This is because maintaining a contemporary, up-to-date and useful curriculum will be important to professionals, as well as students.

BENEFITS OF INDUSTRY 4.0 IN THE EDUCATION SECTOR

We note the following benefits of Industry 4.0 in the education sector:

- *(1) Benefits of Education 4.0 for Teachers:* Education 4.0 is a smart, virtual and digital revolution for the benefit of many stakeholders, including teachers and educators. Teachers may think that the Education 4.0's personalized learning philosophy will give more work, but it is not. In contrast, Education 4.0 is beneficial for the school teachers and educators in educational institutions for the reason that they can better meet the specific needs of students. Through Education 4.0, teachers can ultimately teach students, not classes. Use tools and techniques that promote this personalized learning goal. This leads to better learning outcomes for students and better educational outcomes depending on what results educators and teachers bring. Education 4.0 permits teachers and educators by providing best methods & techniques to facilitate work. School management systems like the 'Fedena (https://fedena.com/)' allows teachers to communicate better with students. However, we need to do it more effectively and quickly. Also, we need to reduce the administrative burden by automating many processes while modernizing specific processes and teaching methods. Education 4.0 aims to improve performance by enhancing teacher skills and improving student learning outcomes.

- *(2) Benefits of Education 4.0 for students:* This is the most important goal of Education 4.0 for all educational institutions: to encourage students and improve students' learning outcomes. Students are the main stakeholders of the educational ecosystem and are the main beneficiaries of the educational ecosystem. Education 4.0 treats students as beneficiaries as before. Using technology, students can connect in a better way with many other stakeholders in the system, better communication with teachers, parents and management. Student learning outcomes are directly proportional to the level of implementation of Education 4.0. Education 4.0 also helps improve learning as most of the tools and methods that support Education 4.0 will help to learn more effectively and effectively than traditional teaching methods. In many cases, learning is personalized, so students are interested in Education 4.0. In other words, there is a natural interest in the curriculum, [3]. Education 4.0 makes dynamic exercises more accessible such as photos and videos that make students more interested and learn through tools and platforms, even when students can connect and learn at any time Easy access to teaching materials is truly revolutionary and greatly improves student learning outcomes.

INDUSTRY 4.0 AND INDIAN EDUCATION SYSTEM

The Indian Education System today is at a pivotal stage, where all stakeholders across socio-economic demographics have started questioning the **purpose of learning and the approach to education in the 21st century?**

While on one hand, practices such as rote learning and 'teaching to the test' are being universally denounced, on the other hand, the age-old challenges of syllabus completion, nurturing student engagement and catering to differentiated learning levels and abilities in a classroom remain relevant even now. There are multi-level discussions happening that involve policy makers, school leaders and education consultants, who agree on the

need to address the learning styles of the 21st century learner, but also struggle to find practical ways to do it. With technology entering the learning space within classrooms in the last decade, there have been mixed thoughts about the efficacy of the medium in raising the learning profile of the students.

Technology, like any other medium, has its strengths and weaknesses. The biggest strength of technology as a medium is its ability to meet each child at his/her level of understanding and to cater to each individual's learning needs. The biggest weakness, in our opinion, is that technology is devoid of emotion and lacks the ability to form lasting emotional connections with the learner, as a human being can. This is where the content and its delivery play a huge role in impacting the learner. From the innovator's end, the platform needs to be designed in a way that recognizes every student as a unique learner and personalizes his or her learning path. At the teacher's end, the platform must offer a way to use that data for recognizing individuality so that teachers may perform their tasks better. This is the only way the impact of a technology-driven solution can be noticeable and effective on a cognitive and emotional level.

However, this feat is only possible with the zealous drive of educators who are ready to create their own micro-innovations to leverage the powers of technology. Once the teacher is convinced and aligned to the solution, half the battle is won. There are some very dynamic teachers across the country that have shown tremendous support and understanding of the purpose of technology implementation in the classrooms and have used it to benefit learning for all. Not just for students, but personalized portals are being used in government and affordable private schools of Karnataka for ongoing teacher training, lesson plan ideas, and mentorship. In a government school in Bihar, a teacher has been using a pen-camera to record his lesson to review and improve his own language skills as well as providing a platform for students to review their classroom behavior, thus making everyone aware of their areas of improvement on a personal level. With the use of virtual reality, some government school teachers are bringing current, political scenarios to their classrooms, such as the Syrian refugee crisis and then invoking deliberation and discussion among the students, leading to higher participation and empathy with global issues. These examples are significant because the world and jobs of tomorrow will require an ability to self-learn, an ability to work on critical feedback and to engage with people from diverse backgrounds and with problems of a global nature.

The contribution that conscious use of technology can make in raising the level of understanding and opening up horizons for stakeholders on a large scale is tremendous. A proper approach to blend traditional teaching practices and technology-led enhancement programs is the way forward to serve the learning needs of 21st century learners as well as teachers and thus, the sector is ready to absorb the principles of Industry 4.0.

OPPORTUNITIES FOR INSTITUTES AND UNIVERSITIES

Industry 4.0 in education cannot exist without University 4.0. The present enterprise revolution is bringing unprecedented changes. If we do not upgrade our education system our graduates will lose shine in the job market of the future. Industry 4.0 also has a lot of opportunities for academic institutions to upgrade themselves to the next level. Institutions can develop an advance plan to bridge the demand-supply gap of skilled labor in the digital economy. At the same time, revamp their own functioning to achieve operational efficiency using technology. Educating emerging workforces with modern tools and techniques is the only solution to Industry 4.0. Colleges and universities need to think about how we can establish an ecosystem of continuous and futuristic learning that paves the path towards the big Indian dream.

In the digital age where qualifications need to be quickly upgraded, it is no longer a one-time course/degree that can ensure life-long employment, but a continuous endeavor towards up skilling that can achieve it. The responsibility of educational institutes today is to ensure that their students should possess hard and soft-skills to be future-ready for jobs. Most importantly they must also ensure that the students inculcate the necessary attitude to become a lifelong learner. In the present job market driven by the fourth industrial revolution, companies only want candidates who have the right attitude to perform. This means that the education system should not only focus on developing the right skills but also the right attitude in their students.

In the age of disruptive technologies, there is a greater need for universities and schools to evolve their course curriculum and upgrade faculty skills. This can be achieved by developing a comprehensive framework for continuous up-gradation in academic administration. Existing courses should be continuously upgraded to meet industry demands. In addition, new courses or modules should also be added to fill the required skill gap. Course content should be user-friendly and can be accessed across multiple delivery modes. Such content will enable switching between online, blended, or on-campus modes of learning thereby giving greater flexibility to the learner. There is also scope for academic institutes to launch shorter certifications for professionals looking to enhance employability. In curriculum 4.0, modern techniques such as Machine Learning (ML) can be used for assessment of student progress. Such tools would also provide valuable insights into a student's strengths and weaknesses. Such modules can also foster a viable ground for academia-industry partnerships and provide space for education based technological companies to think of developing innovative solutions in similar areas. Preparing learners for jobs of the future cannot happen if the faculty is not ready to co-invest in the up-gradation process. Hence the need for Faculty 4.0 is critical than ever before.

India's re-skilling challenge can only be met if our education system is constantly aligned and receptive to the changes around it. The entire value chain comprising of the three important links – industry, students/jobseekers, and the schools/universities have to work in tandem.

ISSUES AND CHALLENGES AFFECTING UTILIZATION OF INDUSTRY 4.0 IN EDUCATION

Following [1] amd [3], we can note that the education readiness in responding to industry 4.0, need to be questioned. We need to know if universities are capable of managing the convergence, fluidity, and power shifts, contingency and ethical issues that came along with the 4^{th} industrial revolution? It was emphasized that investment in emerging technologies and human connectivity, building digital resilience, as well as institutional capabilities in digital governance and accountability, are key strategies for survival; however, it is unclear whether the higher education community are doing enough to adapt and create an enabling environment for learners, academics and practitioners to break barriers, imagine, innovate, create, and collaborate.

We need to focus on the following: Developing a 4.0-ready ecosystem fitting to institutional contexts, Stimulating greater human connectivity through the exchange of students and staff which is enabled through global and regional networks, To create consortium of higher education institutions, To incorporate spiritual values, ethics and morality, national identity and a sense of connection to the community, through curriculum delivery and technology transfer; and To be mindful of the benefits and risks brought about by the 4th Industrial Revolution.

We believe that the Education 4.0 will require gradual paradigm shifts and these are: Demand led instead of supply-led education; Competency-based instead of knowledge-based; Incorporate disruptive technologies

&skill-sets; Lifelong learning instead of front-loaded learning; Modular Degree instead of one-shot going; Emphasis on EQ than IQ alone; and Focus on purposefulness, mindfulness leading to overall happiness and wellbeing.

As per [1], since Industry 4.0 in education denotes changes, relevant to Industry 4.0 and it is in response to the global call for action by World Economic Forum; the education industry can expect better-prepared workforce, and students will have better employability and better preparation for future with a better return expectation on educational investment. Industry 4.0 in education or Education 4.0 is aimed at improving the productivity of an employee, improving the competitiveness of the industry. Furthermore, it aims to improve the productive and competitive capacity of the country as a whole. Such a system where creativity and innovativeness of the human brain are improved will make educated students more prepared for an uncertain and volatile future. Thus, with Education 4.0 the students, the industry and the nation, all will be able to reap the dividends better in the time of 'Fourth Industrial Revolution'.

CONCLUSIONS

Education 4.0 system needs to change to match the needs and requirements of the younger generation as per industry 4.0. Educational institutions need to be dynamic and ready to for see the future for Education 4.0 as many jobs are not served in the past/traditional education. By the year 2050, all the present education and learning will only correspond to one per cent of what students will have in front of them when they are made known to the Education 4.0 based teaching and learning methods. Big issue would be how to ensure that students of the future and those of today have the competency not only to recall but to process and discriminate information and be critical thinkers. Educationists have advised and suggested that Industry 4.0 in education needs to begin from elementary school to have a higher rate and chance of success. Nevertheless, there is a need to have a new road map and new direction in the education from elementary school all the way to the university. Universities need to join with well suited/intended parties to achieve insights in order to transform the education revolution 4.0 into a grand success. Current education system in India needs to be adapted in line with technology and scholar generation to provide the right schools with the right skills for the near and far future. Education Industry 4.0 is a revolution in education and also it's a challenge faced by all countries around the world, including India.

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