

# Implementation of Education 4.0 as Sustainable Decisions for a Sustainable Development

Yulia Tri Samiha  
Faculty of Education  
Universitas Islam Negeri Raden Fatah  
Palembang, Indonesia  
yuliatri samiha\_uin@radenfatah.ac.id

Tutut Handayani  
Faculty of Education  
Universitas Islam Negeri Raden Fatah  
Palembang, Indonesia  
tututhandayani\_uin@radenfatah.ac.id

Abdur Razaq  
Faculty of Dakwah & Communication  
Universitas Islam Negeri Raden Fatah  
Palembang, Indonesia  
abdurrazaq\_uin@radenfatah.ac.id

Mia Fithriyah  
Indonesia Open University  
Jakarta, Indonesia  
mia.fithriyah@alumni.ui.ac.id

Annisa Fitri  
Department of Business  
An Nashr Institute  
Malang, Indonesia

Muhammad Anshari  
School of Business & Economic  
Universiti Brunei Darussalam  
Brunei Darussalam  
anshari.ali@ubd.edu.bn

**Abstract**— excellent concept of sustainable development is an essential factor in addressing the world's rising unemployment rate. Many researchers believe that Industry 4.0 will increase unemployment besides replacing old jobs with automated machines such as robots, while others believe it will decrease underemployment by creating new employment opportunities. To prepare the millennial generation for the possible ramifications of Industry 4.0, Education 4.0 should be introduced. The purpose of this report is to examine the potential causes of youth unemployment in the age of Industry 4.0, to determine preventive measures or steps that can be taken, particularly by the educational system, to reduce the unemployment rate. According to root cause analysis (RCA), the problem might be caused by the lack of understanding of the critical elements of Education 4.0.

**Keywords**—Education, Education 4.0, Industry 4.0, Industrial Revolution 4.0

## I. INTRODUCTION

The concept of work, employment structure, and market areas of competence have all changed throughout the industrial revolution 4.0, and technology has transformed the job structure, affecting many workers and jobless individuals positively and negatively. Industry 4.0, the Fourth Industrial Revolution [1], is the most recent technological advancement. It focuses on how physical technology is being combined with concepts like the internet of things (IoT), big data, artificial intelligence (AI), robotics, and cyber-physical systems (CPS) to minimize job-related issues and costs, particularly in the manufacturing sector [2, 3, 4]. It is worth mentioning that Industry 4.0 would apply to manufacture and other industries like healthcare and agriculture. By establishing hundreds, if not millions, of new employment or equipping new occupations with intelligent machines or robots, the rising tendency may relieve or worsen labour shortages [5, 6, 7].

Unemployment rates are rising globally, particularly among the younger population, which is cause for concern [8]. IT skills, creativity skills, thinking skills, sophisticated problem-solving skills, decision-making skills, communication skills, and human skills may be necessary to survive with the invention of Industry 4.0, according to numerous research [9]. Because new technologies can create new jobs while displacing existing ones, millennials must

prepare for Industry 4.0's potential effect by honing these skills through Education 4.0. This article aims to look into the causes of youth unemployment concerning Industry 4.0 and come up with some prevention strategies to help reduce unemployment. These findings could aid millennials in preparing for the challenging new Industry 4.0 era of employment.

The Fourth Industrial Revolution has divinely inspired Education 4.0, adequately described as the increased use of digital technology (electronic systems) in the learning process. With this technology, the learning process can be sustained in a time and place-constrained manner. Classrooms and learning time obtain not only places where people can learn. One of the educational problems students confront in the age of Industry Revolution 4.0 is promptly changing the way they study, think, act, and develop new ideas in various domains.

## II. LITERATURE REVIEW

The purpose of this research study is to look into the concept of education 4.0 and the role of educational technology in the education 4.0 eras. Aside from competent teachers' abilities and competencies, learning media that facilitate the learning procedure, curriculum connected with employment demands, and technological aid that supports the teaching and learning process are all critical considerations.

### A. Industry 4.0

Industry 1.0 saw the introduction of water and steam as a mechanical power source, followed by industry 2.0, which saw the beginnings of mass production using electricity, and finally, industry 3.0, which spot automation and computerization [1, 10, 11]. Industry 4.0 was initially formed in Germany in 2011 at the Hanover Fair [12]. It sufficiently emphasizes recent growths in mixing visible technology with concepts like the internet of things (IoT), big data, artificial intelligence (AI), robotics, and cyber-physical systems (CPS) to reduce job-related challenges and costs, notably in the industrial sector [2, 4, 13, 14].

Industry 4.0 comprises the manufacturing industry and healthcare and agriculture, referred to as Health 4.0 and Agriculture 4.0, respectively. (11) And (15) The purpose of both Health 4.0 and Agriculture 4.0 was to track things in real-time over the internet. One of the key goals of Health 4.0 is to establish a platform that allows doctors and nurses to monitor

their patients in real-time online no matter where they are, whereas Farmers 4.0 use a platform to monitor and track the state of farming activities in the online period [11, 15, 16]. Agriculture 4.0 encircles several elements, including the employment of robots to milk dairy cows and autonomous vehicles to detect weeds [17, 18]. The development of high-quality agricultural goods, as well as a reduction in production inputs, are two of Agriculture 4.0's bits of help [11, 18]. Efficiency and more customized treatment attend amid the Health 4.0 benefits, while the creation of high-quality farm products and a reduction in production inputs are among the Health 4.0 benefits.

Several scholars believe that Industry 4.0 will increase unemployment rates by replacing present jobs with automated technologies like robots [12, 19]. Routine staff, such as production workers, bookkeepers, and product testers, are more likely to lose employment [5]. Traditional financial sector jobs such as banking and accountancy, according to the authors [5,] could be replaced by contemporary practical applications like Blockchain technology. Rendering to Görmüş (2019), qualified workers with elementary education or, to a smaller extent, are also liable to be succeeded by armed robots, and those with a Ph.D. or more are less likely to be promptly replaced [12]. Besides, automated machines are on the verge of displacing 47 percent of continuous occupations in the United States [20].

On the plus side, Industry 4.0 is eagerly expected to reduce unemployment by efficiently producing millions of new jobs, according to various experts [6, 12, 21]. Even if technological advances cause countless millions of jobs to be tragically lost, occupations will be created as a result of innovation and economic growth [21]. The Income Effect occurs when a corporation gets more funds, and customers save spare money due to the enforcement of robots or AI, issuing in increased purchasing power [22, 23].

As a consequence of their increased purchasing power, people were willing to spend their money on various additional goods and services, resulting in the indirect creation of recent jobs. Individuals working in new Industry 4.0 vocations will need IT, creativity, thinking, advanced problem solving, decision-making, communication, and, most importantly, human skills, mainly if the positions include human relations or customer service [24]. As a result, educational systems must focus on sharpening the skills necessary to prepare better students, particularly millennials, for Industry 4.0 through access to education 4.0.

### B. Education 4.0

Education 4.0 refers to the combination of new technologies with traditional training in the classroom in order to improve critical thinking [25, 26]. It allows them to interact with Industry 4.0 through this medium. Nine education 4.0 trends [27] include more personalized learning, modification of knowing processes that learners choose freely, project-based learning, increased field experience within courses, increased exposure to data interpretation, shifts in scholar assessment, consideration of students' opinions in curriculum creation, and more independent learning with teachers acting as facilitators.

Several kinds of research have identified a variety of advantages and disadvantages related to Education 4.0. 28 and 29. Education 4.0 implementation is strongly related to student learning outcomes because it enhances contact

between teachers, delivers more effective learning than traditional learning, and enhances students' interest in education [25, 26]. On the other hand, Education 4.0 has many drawbacks, including a high implementation cost and difficulty enticing skilled workers. A lack of excitement and aversion to change, particularly among senior professors, is another tribulation with Education 4.0 [29].

### III. METHODOLOGY

Exploratory research is commonly used to learn more about a particular topic. The study's primary goal is to determine how prepared tertiary educational institutions are for Education 4.0. This study followed suit, taking the same (exploratory) strategy and employing a qualitative research method. The Root Cause Analysis (RCA) was then used to look into the causes of unfavourable events to come up with preventative measures [30, 31]. Sakichi Toyoda invented it in 1958 as part of Toyota's production process development [32]. This process starts with defining the problem, then collecting data such as the trouble's impact, identifying possible causal aspects using methodologies such as the five whys, which leads to root cause identification, and finally recommending and enforcing a solution to the problem [33]. The economic consequences of this procedure and the fact that it pinpoints the root of the problem rather than the symptoms enable future precluding of the potential crisis [34].

### IV. ANALYSIS

According to the root cause analysis, one of the worries or challenges of Industry 4.0 is the continuous growth in unemployment rates, particularly among millennials. This issue has a negative impact on unemployed people, society, and the economy, according to various experts [35, 36]. Unemployment has a negative impact on the health of jobless people due to psychological disorders such as depression, according to a study involving 300 unemployed men [36]. Suicide is well-known to be linked to depression [37]. Unemployed people are also more likely to put off medical treatment since they don't have a source of money, which might lead to further deterioration of their health [38, 39]. Unemployment-related household problems, like domestic violence and divorce, can lead to psychiatric disorders in unemployed people and their family partners [40]. One societal consequence of unemployment is rising crime, like burglary and robbery. He discovered that unemployment and economic growth are adversely associated in Western Balkan countries in his study of the relationship between GDP expansion and unemployment [35].

In the Industry 4.0 eras, the five whys techniques were employed to control the likely root cause of a high young unemployment rate. The problem raises two questions: "Why is the unemployment rate high in the era of Industry 4.0?" and "Why are youth not hired?" "What was the reason for the adolescence's lack of necessary skills and qualifications?" "How come the youth education system failed to educate them with the necessary skills?" Finally, "why hasn't Education 4.0 been implemented in the educational system?" "These five reasons point to an underlying problem: a lack of understanding of the value of Education 4.0 and Industry 4.0. Figure 3 describes the five aspects that donate to the elevated unemployment rate in the context of Industry 4.0.

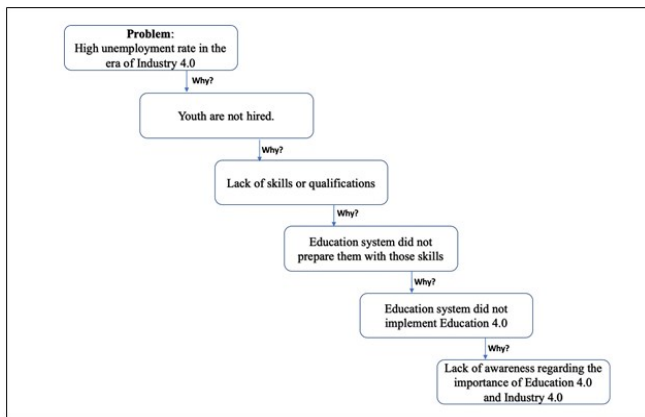


Fig. 1. 5 whys analysis of high youth unemployment in Industry 4.0

The income effect could arise from the displacement of manual labour, which leads to hiring more workers to create higher outputs [22]. However, individuals in the new professions created by Industry 4.0 will almost certainly need to be skilled in IT, creativity, thinking, complex problem solving, decision-making, communication, and, most importantly, human traits [10, 24, 41]. They are in extraordinary demand in Industry 4.0 since they endure abilities that cannot be encoded into robots. As a result, kids who possess these essential characteristics are more likely to benefit from the Income Effect..

By incorporating Education 4.0 into their academic system, new generation students should be prepared for Industry 4.0. Following Fisk's (2017) nine education 4.0 trends (Fig. 2), include using eLearning tools to facilitate traditional learning. It is more personalized learning, modification of studying processes that they choose willingly, more project-based learning, increased exposure to field experience within courses, increased exposure to data interpretation, alteration of students' assessments, and consideration of students' viewpoints in curricula design. Some other countries have begun implementing Education 4.0 to educate their pupils for a better future. The University of Northampton has adopted Active Blended Learning (ABL) in its specific classes [42, 43]. Becky, a chatbot created by Leeds Beckett University, was able to convey reliable information to potential students going through clearance [44]. At last, at Bolton College, a chatbot named Ada was created to help students answer inquiries about the university.

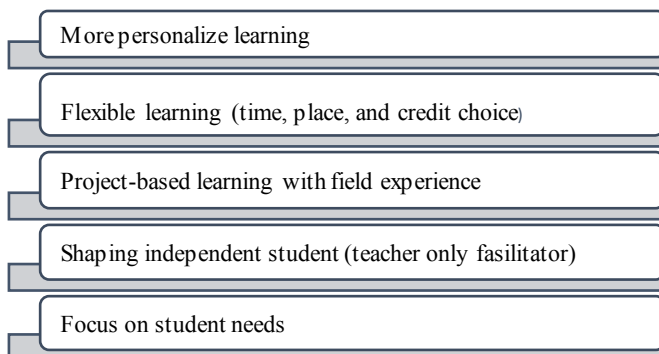


Fig. 2. Excellent in Education 4.0 (Fisk, 2017)

## V. DISCUSSION

Presenting the link between Education 4.0 and Industry 4.0, Industry 4.0 will change the roles in which all students in

this generation will be improved for their future employment. The Industrial Revolution 4.0 is altering the world. As a result, Industry 4.0 will impact industries and how people see work and education. Under Education 4.0, academic institutions must produce a workforce capable of working in this digitally transformed world. As a result, current employees will be needed to upgrade their skills and knowledge to meet the increased job obligations. To enable individuals worldwide to take advantage of the prospects afforded by new technologies, a revolution in education is needed. The education business will become more peer-to-peer, individualized, and more continuous due to this evolution. There are connections between Industry 4.0 and Education 4.0, assigned to the literature review. Industry 4.0 supports Education 4.0, and both must be enforced simultaneously. Industry 4.0 will fail unless the academic segment is well-equipped.

Industry 4.0, to put it another way, is carefully constructed on the exposed top of Education 4.0. As a result, if a country decides to seize Industry 4.0, it must first ensure that all higher education systems can adjust to the changes brought about by Industry 4.0. Adapting to Industry 4.0 will be challenging if their educational system is unprepared for the changes. Fortunately, they can still adopt Industry 4.0, but with a lower accuracy rate than countries that have already completed Education 4.0 as part of their Industry 4.0 preparations. To compete in this new Industry 4.0, students and teachers must equip themselves with knowledge and skills. Industry 4.0 directs people to apply theoretical knowledge in the real world; controlling machines and other practical applications cannot be made by people who lack the necessary qualifications and capabilities. Education 4.0 is a form of advanced teaching [45] that is viewed as a modification of traditional university teaching in which students should be educated both about technology and how to use it. Conferring on to Fisk (2017) [27], Education 4.0 focuses on the possibilities of digital technology, individualized data, open-source material, and humanity's current level of technological connectivity.

Education 4.0, based on the following structure, is a new way of teaching pupils that uses technology to make traditional methods of instruction. Aside from that, via their education, Education 4.0 discloses pupils to technology-related challenges such as cyber-physical systems. Education 4.0 is vital in today's environment since it equips children for a future based on technological growth.

The excessive use of technology is emphasized heavily in Education 4.0 and 4IR. 4IR has given birth to Education 4.0 due to the specification for technical and kindly alignment to offer recent opportunities. As a result, the growth of 4IR has brought in disruptive innovation across a comprehensive range of industries, including education, where a contemporary curriculum is critical for keeping up with 4IR. It is critical for the long-term success of the next generation.

The educational learning structure is then built to track students' attendance and academic victory and allow students enrolled in the system to properly utilize the internet for educational causes with a more limited data allocation. Students must also register with the academic learning system recognized by each of their particular internet providers to gain admission to a Student Edition of the internet. Students will be given a more lenient data quota when they connect to their accounts, restricting all of the material they can see to be instructional. Teachers and parents can exploit the academic

learning system to examine their accounts and record their pupil's progress and online attendance.

Imparting to the link between Education 4.0 and Industry 4.0, Industry 4.0 will change the roles in which all students in this generation will be educated for their future employment. With signs of progress affecting significant industries and occupations, the Industrial Revolution 4.0 is altering the world. As a result, Industry 4.0 will have an impact on industries and how people see work and compulsory education. Under Education 4.0, educational institutions must produce a workforce capable of working in this digitally transformed world. As a result, current employees will be needed to upgrade their skills and knowledge to meet the increased job obligations.

Improving human resources, particularly instructors, remain a vital factor in this era of education. 4.0. The fundamental causes of educational delinquency have been recognized as generational injustices between coaches and pupils. What is the motivation for this? Students who utilize digital tools that do not be consistent with the learning methods provided by educators are taught by educators from different generations than students who use digital tools that do not correspond to the learning approaches provided by educators. Traditional education methods are undesirable to the millennial generation.

Because today's students are increasingly comfortable with technology, instructors must improve their aptitudes to prepare for the era of Education 4.0. Familiarity with industrial technologies and information flow 4.0 shows that graduates must be capable of completing the demands of industry 4.0 and developing exceptional generations to fill the industrial revolution 4.0.

Education 4.0 is essential to qualify students with the capabilities needed to satisfy industry 4.0's demands. Critical thinking and problem-solving ability were demanded this competency. In 21st-century learning, this is an essential ability for students. For youths to explore this capacity, 4.0 educators must be qualified to combine content.

Second, qualities in communication and teamwork. As a capability essential in the twenty-first century, this talent must be developed through learning. The instructor must employ a learning model based on information and conversation technology to develop communication and collaboration abilities.

Third, The ability to conceive strategically and invent remains the third requirement. Students must inevitably think and act creatively and innovatively in the fourth industrial revolution. Students must put up this effort to compete and create industry-based employment 4.0. This criterion is necessary for light of the fact that the fourth industrial revolution has at present accompanied numerous lives. Automated robotic robots, for example, have supplanted many occupations. E-tolls, for example, can be used to pay for toll roads.

Finally, some appropriate seminars and workshops will be held to familiarize all stakeholders with Education 4.0, in which teaching staff, guardians, and students will be informed about Education 4.0, the benefits of incorporating Education 4.0 into the current academic process, and what each neutral must do to ensure students fully utilize Education 4.0. All stakeholders will receive practical training on the many stages

required to achieve Education 4.0 to familiarize themselves with handling each platform.

## VI. CONCLUSION

According to the root cause analysis, a lack of understanding of the significance of Education 4.0 and Industry 4.0 could be a worry in the era of Industry 4.0, leading to a high unemployment rate. It is suggested that adolescents incorporate Education 4.0 into their academic system to prepare for Industry 4.0 by following the nine education 4.0 trends. It is advised that adolescents incorporate Education 4.0 into their educational system to train for Industry 4.0.

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