The Challenge Of Elementary School Teachers To Encounter Superior Generation In The 4.0 Industrial Revolution: Study Literature

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Abstract – The challenges of the elementary school education world in the 4.0 industrial revolution era require the elementary school to keep abreast of the rapid technology development and utilize information and communication technology as advanced technology to facilitate the learning process. In addition, the use of technology in the 4.0 industrial revolution era is expected to prepare a superior generation that can be competing in the world, mastering in technology and having good literacy. Furthermore, the role of elementary schools in preparing superior generations in the 4.0 industrial revolution era using the information and communication technology learning mindsets can shift from teacher-centered to student-centered. In this paper will discuss the Development of Indonesian Education in the Revolutionary Era Industry 4.0, how to Answer the Challenges of Elementary School Teachers in Preparing a Superior Generation in the Era of the 4.0 Industrial Revolution era, Concepts of Learning in Elementary Schools to Preparing a Superior Generation in the Era of the Industrial Revolution 4.0.

Index terms – Elementary School, Superior Generation, 4.0 Industrial Revolution Era.

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1. Introduction

The Education 4.0 era is a very difficult challenge for teachers. Jack Ma (CEO of Alibaba Group) at the 2018 World Economic Forum annual meeting, stated that education is a big challenge this century. If we don't change how to educate and teach the students, we will get great difficulties in 30 years later. Education and learning related to knowledge teach less content of attitudes and skills that are currently applied today, so it will produce the students who are unable to compete with machines.Therefore, teachers must reduce the dominance of knowledge in education within the hope that students will be able to surpass machine intelligence. Education that is balanced with character and literacy will make students very wise in using machines for the benefit of society. Education 4.0 era is the answer to the 4.0 industrial revolution. Teacher 4.0 is needed in facing the education 4.0 era. How to become a 4.0 teacher? This question is very important to be answered to make the teacher that can improve the competency towards teacher 4.0. Teacher 4.0 has a greater responsibility in educating students to face the Industrial Revolution 4.0. Teacher 4.0 is a teacher who is able to master and utilize digital technology in the learning process.

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2. Development of Indonesian Education in 4.0 Revolution Industry Era

The development of education in the world can't be separated from the development of the industrial revolution that occurred in the world, because indirectly it not only changes the economic order but also changes the educational order in a country. The industrial revolution began from 1) the Industrial Revolution 1.0 occurred in the 18th century through the invention of a steam engine, thus enabling the goods to be mass-produced, 2) the Industrial Revolution 2.0 occurred in the 19-20th century through the use of electricity which made production costs more cheaper than before, 3) The 3.0 Industrial Revolution occurred around the 1970s through the use of computerization, and 4) The Industrial Revolution 4.0 occurred around the 2010s through intelligence engineering and the internet of things as the core of the humans and machines to movement and connectivity [1]. The emergence of steam engines in the 18th century has succeeded in accelerating the economy drastically which in the period of two centuries has been able to increase the income per capita of countries in the world.
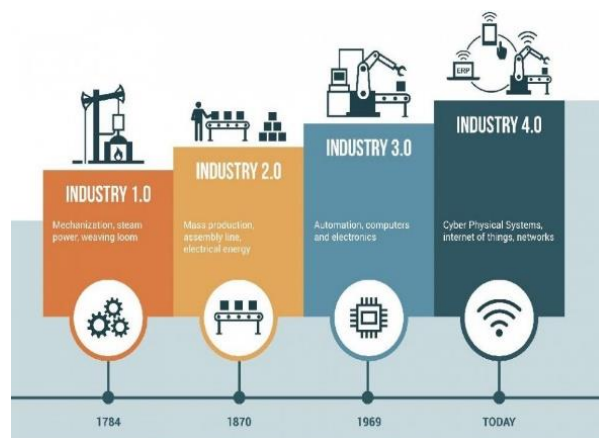

Figure 1. The development of the 4.0 industrial revolution. (*Source: Ristekdikti presentation 2018*)

The name of industry 4.0 is started from a project that was initiated by the German government to promote computerized manufacturing [2]. Germany is the first country to make a roadmap (grand design) about the implementation of the digital economy. The industrial revolution era is also known as the digital revolution and the disruption era. The term disruption in the Indonesian language is uprooted from its roots. Disruption is also interpreted as innovation [3]. From its terms, disruption can be interpreted as a fundamental change in innovation. In this disruption era, fundamental changes occur because of society massive changes in the field of technology in every aspect of community life. As explained in RISTEKDIKTI presentation 2018, The characteristics of disruptive era can be explained through (VUCA), the rapidly massive changes with unpredictable patterns (Volatility), the rapid changes causing uncertainty, occurrence of complex relationships between factors the cause of change (Complexity), the lack of clarity in the direction of change that causes ambiguity (Ambiguity). In this era, information technology has become the fundamental of human life, including in the education field in Indonesia, even in the world currently entering the era of the industrial social revolution 5.0. In the 4.0 industrial revolution era, several things happened without limit through the unlimited of the computing and data technology, it influenced the influenced by the massive development of the internet and digital technology as a backbone of the movement and humans and machines connectivity. This era will also disrupt various human activities, including the fields of science and technology (science and technology) and higher education.

What is the policy of the Government in organizing Education in the Industrial Revolution Era 4.0? The Government of Indonesia is currently implementing strategic steps determined based on the Making Indonesia 4.0 road map. This solution was made to accelerate the realization of the national vision that has been set to take advantage of opportunities in the 4.0 industrial revolution era. One of the vision is "Making Indonesia 4.0" where its vision makes Indonesia among the top 10 countries that have the strongest economy in the world by 2030 [4]. Improving the quality of human resources is one of the 10 priorities to implement the "Making Indonesia 4.0" program. Human resource is an important thing to achieve the successful implementation of Making Indonesia 4.0. To increase human resources, Indonesia has a plan to change the education curriculum with more focus to the STEAM (Science, Technology, Engineering, the Arts, and Mathematics), corresponding to the national education curriculum and future industrial needs. Indonesia will collaborate with industry players and foreign governments to improve the quality of vocational schools; at the time it also improves the global labor mobility program to utilize the availability of human resources to accelerate the transfer of capabilities.

3. Answering the Challenges of Elementary School Teachers to Prepare a Superior Generation in the Era of the Industrial Revolution 4.0

The solution that answering the challenges of elementary school teachers to prepare a superior generation in the era of the industrial revolution 4.0 is from the abilities and character formation aspect of students. This solution certainly can't be separated from the purpose of education in the industrial era 4.0 to obtain competent education graduates in the current era. The children are not only able to take advantage of ICT but also be able to be competent in literacy, critical thinking, problem-solving, communication, collaboration, and having good quality characters. Optimizing all the student abilities can be done using a variety of learning methods that are fun and in accordance with the stages of child development. In the industrial era 4.0, the learning process is expected to provide more opportunities for students to be creative, solving the problems, optimizing the literacy and numeracy skills, collaboration, and critical thinking [5, 6]. Based on the explanation, various approaches, strategies, and methods were used by educators that provide the opportunities of the students to develop their industrial era 4.0 abilities. Every educator has own choices that are adjusted to the characteristics of their students [7].The efforts have been done by elementary school teachers to answer the challenges in preparing a superior generation of the industrial revolution 4.0 beside of the cognitive abilities of students. Teachers must have the competences in the learning process that are oriented to information and communication technology by strengthening literacy. The Ministry of Education and Culture has developed the school literacy movement (GLS). GLS is an effort carried out jointly involving various parties such as teachers, students, parents or guardians of students and the community. This new literacy movement emphasizes that the teachers must have three aspects, namely data literacy, technology literacy and literacy of humanism or human resources. The Practices of teacher learning must present learning as follows:

1. Data literacy in students' learning practices must be taught to understand the data both qualitative and quantitative and present the management of information to be consumed.
2. Technological literacy, namely improving students' ability to use internet information optimally and expanding access using cyber-security protection by increasing learning breakthroughs by utilizing technology.
3. Human resources or humanism literacy is also known as human literacy. The government emphasizes the learning process on the communication and design ability to form the strengthening of human resources so the students have good communication. Moreover, they must also be able to use foreign languages without leaving their Nationalism language. It means that the teacher should understand foreign language communication than the students.

This literacy movement will make education in Indonesia, especially at the elementary school level more advance to answer the challenges of the industrial revolution 4.0 era. To achieve all the challenge depends on the teacher as the captain in the classroom to create human resources who are ready to face a challenge in the industrial revolution 4.0, because the job market requires multi-skills today.

4. The Learning Concept in Elementary Schools to Preparing the Next Generation in the Industrial Revolution Era 4.0

The learning concepts in the elementary school that can prepare the superior generation in revolution industry 4.0 era are the concept which applies the principle of 21st-century learning activities. The learning activities should follow the rapidly of the technology development where it has an influence on various life aspects including the teaching and learning process in elementary school. One example of the Information and Communication Technology progress which has influence in learning process is the opportunity that given to the students to develop their skills in mastering information and communication technology - especially computers, so the students have the skill to use the technology in the learning process that has aimed to achieve thinking and learning students skills [8].In addition, the learning concept is a transition of the learning process where the developed curriculum today requires the schools to change teaching-centered learning approaches to the student-centered learning approaches [9]. This approach is corresponding to the demands of the future world where students should have the thinking and learning skills [10]. Those skills are problem-solving skills, critical thinking, collaboration, and communication skills. All of these skills can be possessed by students if the educator could develop a learning plan that contains the activities that challenge students to think critically in solving problems. The activities that encourage students to work together and communicate should be applied in every lesson plan [9].The learning activity concepts in elementary schools that prepare a superior generation in the era of the industrial revolution 4.0 are based on the "21st Century Partnership Learning Framework". There are several competencies that should be had by students to face up of the 21st Century competency. These competencies should be mastered and owned by each student who is capable to become part of life in the industrial revolution 4.0 era. Therefore, the current learning concept should have the skills or abilities:

1. Critical Thinking and Problem-Solving skills - the students are able to think critically, laterally, and systemically, especially in problem-solving.
2. Communication and Collaboration Skills - the students are able to communicate and collaborate effectively with the various participant.
3. Creativity and Innovation Skills - the students are able to develop their creativity to produce innovative breakthroughs.
4. Information and communication technology literacy - the students are able to utilize information and communication technology to improve their performance and daily activities.
5. Contextual Learning Skills - The ability to undergo independent contextual learning activities as part of personal development.
6. Information and Media Literacy Skills - the ability to understand and use various communication media to present various ideas and carry out collaborative activities and interactions with various participants.

In the Learning Context of Elementary Schools, 21st-century skills are also needed namely 4C (Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation) and this skill are the real abilities that want to be achieved in 2013 curriculum.

1. Communication
Communication is an activity to transfer information both orally and in writing. However, not everyone has good communication. Sometimes, they convey all the information verbally but don't in writing. They require the right communication techniques to get well communication between humans both orally and writing. Communication technique is a method that is used to convey the information from communicator to communicant with certain media. This technique is expected that everyone can effectively communicate with each other and appropriately use it.

2. Collaborative
Collaborative is the ability to work together with others, adapt to various roles and responsibilities, work productively with others; put empathy in the right place, and respect for different perspectives. Collaboration also means being able to carry out the responsibility and flexibility personally both at work and in community relations; setting and achieving high standards and making the goals for yourself and others; understanding the confusion.

3. Critical thinking and Problem Solving
Critical thinking and Problem Solving is the ability to understand a complex problem and connect the information with others, so several perspectives appear and find solutions for the problem. Critical thinking also means the ability to reason, understand and make complex choices; understanding the interconnection between systems, compiling, revealing, analyzing, and solving problems.

4. Creativity and Innovation
Creativity and Innovation is the ability to develop, implement, and convey new ideas to others, being open and responsive to new and different perspectives. Creativity is also defined as a person's ability to create a new merge. Creativity will very dependent on one's creative thinking, the process to create new ideas. The creativity that can produce new discoveries (and are usually economically valuable) is often referred to as innovation [9].

5. Conclusion
The Elementary Schools' role in preparing the superior generations in the industrial revolution 4.0 era provides the teachers who have the ability to adapt to the industrial revolution 4.0. The industrial revolution 4.0 appears by the presence of four characteristics, namely supercomputers, artificial intelligence, cyber systems, and manufacturing collaboration. Therefore, the competencies that able to offset the presence of the four things in the era of Education 4.0 are needed. This competency is one of the important competencies in the 21st-century.

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