The Use of Visual Basis Learning Strategy in Social Science: Facing the Industrial Revolution 4.0 Era

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Abstract: - **Industrial revolution 4.0 brings challenges and problems to the education system and social skills. The education system should be able to prepare the students to face the challenges of industrial revolution 4.0, while social science lesson should be able to improve students' social skills that may be declined by the emergence of industrial revolution 4.0. This study is a review study that aims at exploring visual basis learning strategy with the integration of ICT to teach social science. It tried to find out whether or not visual basis learning strategy and ICT suits industrial revolution 4.0 challenges and can solve the problems in social skills that is caused by it. The data of the study were collected from books and journals that discuss about industrial 4.0, social science lesson, and visual basis learning. The collected data were analyzed using content analysis technique. The result of the analysis shows that the use of visual basis and the integration of ICT in teaching social science is promising since it suits the characteristics of the z generation and the education 4.0. Therefore, it is recommended that visual basis learning with the integration of ICT is used by the social science teachers in teaching their students in facing industrial 4.0 era.**

Keywords: **social skills, visual basis, industrial revolution 4.0, education 4.0**

I. INTRODUCTION

Industrial Revolution Era 4.0 was marked by rapid technological development. Its development affects almost all sectors of human life. It is also age of advanced technology based on information and communication. It has a more powerful impact on the economy than in the past(Min, et al., 2019). This triggers changes, one of which is a variety of physical/ tangible activities that can now be done with the help of applications or other equipment through the internet network. Maria, Shahbodin, & Pee(2016) also explained in her research mentioning all equipment, machinery, sensors, and people in the industrial revolution era 4.0 were designed to be able to communicate with each other using internet technology known as the "Internet of Things" (IoT).Even more, the Cyber Physical System (CPS) may change the human communication in which bring about radical changes and revolution in the interaction between the physical and virtual worlds(Kim & Park, 2017).

Industrial revolution 4.0 also brings challenges to the education system. In order to face the challenges of industrial revolution 4.0 education system is also transformed to education 4.0. Integrating current technology is the main characteristics of the education 4.0(Hussin, 2018). While the students of this era are the millennials or the z generation, who cannot live without their smart gadget and internet (Cotet, Carutasu, & Chiscop, 2020). In addition, the other characteristics of millennials are they are not patient, that do not want something to be instant and can be done anytime and anywhere (Rue, 2018). Therefore, in education 4.0 computerized teaching methods and smart classroom should be implemented, because they will help the teacher to conduct teaching and learning process anytime and anywhere (Shahroom & Hussin, 2018).

Besides challenges, industrial revolution also brings problems on the social aspect. The problem in social communication, for example, now people prefer to communicate via social media compared to direct social communication. That way humans will be more individualistic and ignore social skills in society. It also creates a new network social system of which has already changed the way people communicate. In the future, operational technology or cyber-physical system devices will monitor, coordinate, and integrate information in real time(Bloem, et al., 2014). Operational technology will lead to a hyper-connectivity society, with human-machine, machine-machine, and human-human connections However, the threat of cyber security increases as the increased connectivity and use of standard communications protocols that come with Industry 4.0(Vaidya, Ambad, & Bhosle, 2018).

This phenomenon found in many communities, especially among young or educated people. An association of youth who are busy with their respective gadget, a family consisting of fathers, mothers, and children are also busy with their respective worlds, and friendship and games on social media/cyberspace are more interesting than the real world has become a common thing. Apathy like this that we should be able to avoid and put aside in the industrial revolution era 4.0. It is intended to create a balance between the times and the development of the quality of human resources so that the level of welfare can be enjoyed by all people not only benefit a particular party.

The main current problem is the lack of human recognition (HR). This is proved by the rise of technological developments that actually raises many new problems, such as addiction to gadget, online games, online shop, and so forth. Some of the effects/impacts are very contrary to the goal of technological development, which should improve human

welfare and overall income rather than causing a hedonist attitude that is increasingly pressing the middle and lower class. This phenomenon shows that in this case the need to prepare quality human resources so that they are able to compete with the global community in the era of the industrial revolution 4.0.

Education is one of the solutions to improve the quality of human resources in the industrial revolution era 4.0. The rapid development of technology in the era of industrial re-revolution 4.0, demands innovation and rapid renewal in the world of education so as not to lag behind the times. The existence of innovation and renewal in the learning process must also always be updated on its development. In addition, the selection of appropriate learning strategies and methods also influences the level of success of a learning process. However, every development in industrial revolution era 4.0 can be carried out consciously and systematically, it will certainly have a positive impact on the achievement of our national education goals in the future(Afrianto, 2018).

Considering the challenges of industrial revolution 4.0, the social problems that follow, and the education role in preparing the students to face the industrial revolution 4.0, this study aims at proposing a new way of teaching social science in order to cope with industrial revolution 4.0, minimize social problems, and prepare the students to face industrial 4.0. This study propose and explore visual based learning strategies with the integration of the current technology to teach social science. Visual learning strategies is chosen in this study because it has been proven to be able to improve social skills (Sriyanto, Yudha, & Praktik, 2019). In addition, this strategy is easy to be integrated with the current technology that is the internet and smart gadget. In which the use of current technology will help the students learn better (Baharuddin & Dalle, 2017). It is expected that this article can give sufficient information for the social science teachers who want to implement alternative teaching strategy that suit industrial revolution 4.0 and the concept of education 4.0.

II. METHOD

This study is a review study or a library research that aims at exploring visual basis learning strategy for teaching social science to cope with industrial revolution 4.0 and education 4.0. The data of the study were collected from the latest books and journals that explain about industrial revolution 4.0, social science, and visual basis learning. The collected data were analyzed using content analysis technique.

III. DISCUSSION

1. Industrial Revolution 4.0 Challenges

The term industry 4.0 comes from a project initiated by the German government to promote computerized manufacturing. Industry 4.0 comes to replace industry 3.0 which is characterized by physical cyber and manufacturing collaboration (Hermann et al, 2016; Irianto(2017)). The German economist who first introduced the concept of the Industrial Revolution explained that the industrial revolution 4.0 could fundamentally change the way we live, work and relate to one another (Schwab, 2016).Previously, Dutton (2014)called industry 4.0 as "smart factory". It is possible for physical systems can cooperate and communicate with each other and with humans in real time, all enabled by the Internet of Things and related services (Morrar & Arman, 2017).

The industrial revolution 4.0 stimulates the advances of science and technology, in which the Internet of Things (IoT) and its supporting technologies serve as backbones for Cyber-Physical Systems (CPS) and smart machines are used as the promoters to optimize production chains(Liao, Loures, Deschamps, Brezinski, & Venancio, 2018). It is characterized by an increase in digitalization of manufacturing which driven by four factors: 1) Increased data volume, computing power, and connectivity; 2) difficulty of analysis, ability, and business intelligence; 3) New forms of interaction between humans and machines; and 4) improvements in teaching digital transfers to the physical world, such as robotics and 3D printing (Lee, Lapira, Bagheri, & Kao, 2013). While the principles of the industrial revolution 4.0 include interconnections, information decisions, technical assistance and transcendental decisions(Hermann, Pentek, & Otto, 2016).
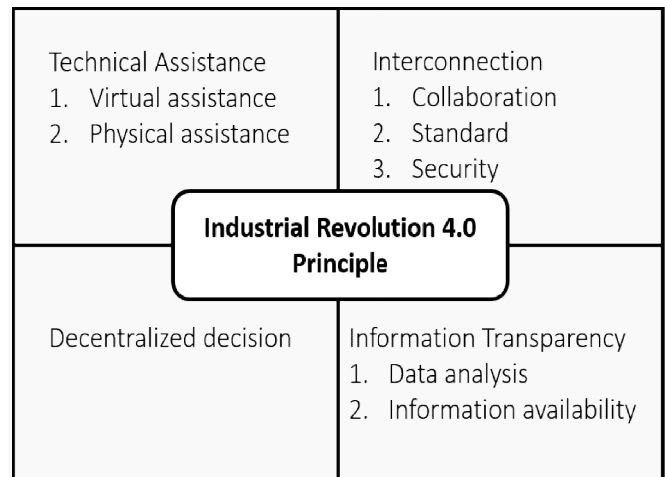

Figure 1.Industry Principle 4.0 (Source:Hermann, Pentek, & Otto(2016))

Four industrial design principles 4.0 according to Hermann, Pentek, & Otto(2016)above can be explained as follows:

1) Interconnection, which the ability of machines, devices, sensors, and people to connect and communicate with each other through the Internet of Things (IoT) or the Internet of People (IoP). This principle requires collaboration, security and standards.
2) Information transparency is the ability of information systems to create virtual copies of the physical world by enriching digital models with sensor data including data analysis and information provision.

3) Technical assistance which includes; (a) the ability of an aid system to support people by consciously combining and evaluating information to make the right decisions and solve urgent problems in a short time; (b) the ability of the system to support humans by performing tasks which are considered unpleasant, too tiring, or unsafe; (c) includes visual and physical assistance.

4) Decentralized decisions which are the ability of virtual physical systems to make their own decisions and carry out tasks as effectively as possible.

Industrial Revolution 4.0 also has other terms, which are digital revolution and the era of technological disruption. It was called the digital revolution because of the proliferation of computers and the automation of record keeping in all fields. Industry 4.0 is said to be the era of technological disruption because automation and connectivity in a field will make the movement of the industrial world and job competition become non-linear. One of the unique characteristics of Industry 4.0 is the application of artificial intelligence or artificial intelligence (Tjandrawina, 2016).

One form of application is the use of robots to replace human labor so that they are cheaper, more effective and efficient and it happened since 19th Century. The robots work more precisely than humans and cost less. Creative solutions like 3D printers and the selflearning ability of these production robots will replace human workers(IBA Global Employment Institute, 2017).Moreover, the fear is not only about job replacement but also on the possibility of super-intelligent robots outsmarting or even controlling humans(IFR International Federation of Robotics, 2018).

The phenomenon now shows that the industrial era 4.0 has not been able to improve people's welfare in all factors of human life. The impact of the digital era is actually causing dependence that result humans too lazy to have direct creativity in the real world. This shows the decline in social skills that will be owned by the community in the industrial era 4.0 thus the efforts needed to be made to get a balance in various sectors of human life. It is in line with the review of Morrar & Arman (2017) who said that the success of industry 4.0 which is especially concerning the business will be those that offer both social progress and economic benefits.The technological revolution that accompanies the Industry 4.0 will achieveits true potential in combination with social innovation.

The existence of the industrial revolution is even feared could threaten the unity of the community. That is because the digital era has many opportunities to absorb human labor, causing unemployment. Besides, it is triggering social conflict due to rapid technological advances that are less controlled and several other factors caused by reduced interaction and social skills of the community making it easy

for social inequalities to emerge in the community. Some of these things can eventually lead to division that threatens the society.
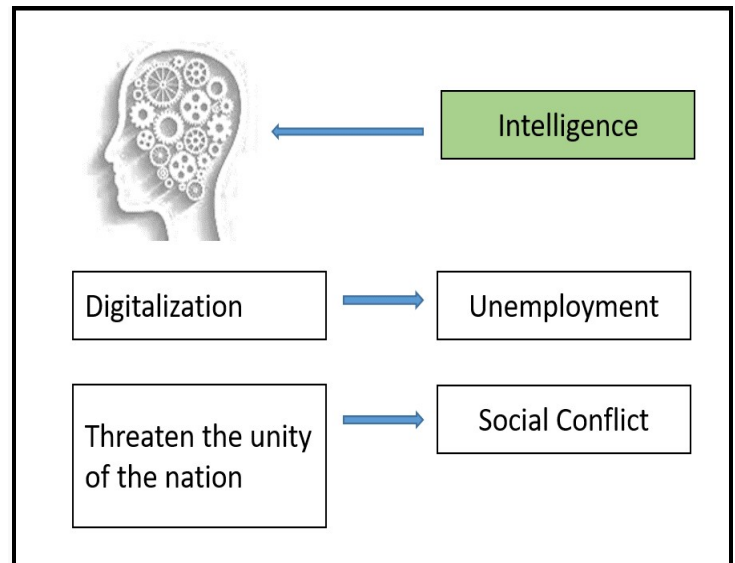

Figure 2.Development of the Industrial Revolution(Warsono, 2018)

2. *Social Skills Importance in Industrial Revolution 4.0*

Advances in technology enabled automation to occur in almost all fields. Current technologies and approaches that combine the physical, digital and biological world will fundamentally change the pattern of life and human interaction (Tjandrawina, 2016). Industry 4.0 as a phase of technological revolution changes the way in which human activities take place in the scale, scope, complexity, and transformation of previous life experiences. Humans will even live in global uncertainty; therefore, humans must have the ability to predict the fast-changing future.

In other field, Industrial Revolution 4.0 has changed the landscape of educational innovation. The Industrial Revolution 4.0 is controlled by artificial intelligence and digital physical frameworks that make human machines more universal interfaces. The rapid revolution in innovation has produced another educational model for the future, which is Education 4.0. It aims to prepare graduates for future life and work in the industrial revolution era 4.0, where more smart robots will replace people in certain activity divisions, education must utilize information and related abilities that cannot be replaced by robots. The disruption of innovation results in Education 4.0 which focuses on the development of education and skills to make future learning more customizable, hyper, intelligent, portable, global and virtual (Shahroom & Hussin, 2018). Therefore, in order to prepare the students in the future working place to be successful, they should have appropriate digital and virtual education. At school, university, or at work - the ever-changing digital landscape is making IT skills increasingly important and effective(Sharma, 2019).
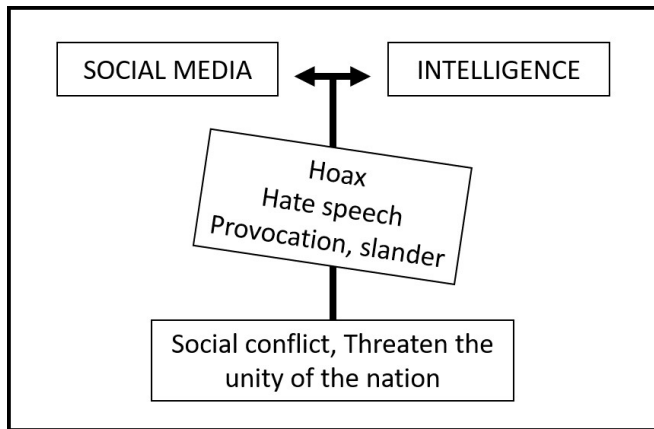
Figure 3.Social Challenges Heckeu et.al (2016)

Based on this figure, it can be concluded that the existence of the Indonesian Revolution enabled the emergence of various divisions arising from the presence of social media as a result of the industrial revolution. Some of these social challenges include:

1. Changes in demographics and social values, in the form of the ability to transfer knowledge, acceptance of work task rotation and related work changes (tolerance for ambiguity), flexibility of time and place, and leadership skills.
2. Enhancing virtual work, including flexibility in time and place, technology skills, media skills and understanding of Information & Security technology
3. Growth in process complexity, in the form of technical skills, understanding of processes, learning motivation, tolerance for ambiguity, decision making, problem solving, and analytical skills.

Some of these skills can be drawn outlines that the skills needed in the industrial revolution era 4.0 are social skills. The Economists Magazine January 14, 2017 edition also features a special report that illustrates the importance of social skills in work. The pattern of labor recruitment in the United States shows that since 1980 what are needed are those with high social skills, even though their academic skills are low. "Those with high mathematical skills, but low social skills are not needed in the era of the industrial revolution 4.0," said the Dean Faculty of Business Widya Mandala Surabaya University (UKWMS). Thus, the existence of social skills is indeed important to be developed in the Industrial Revolution Era 4.0.

Azmi, Kamin, & Noordin(2018) also found that non-technical skills are important to be mastered by someone to be accepted as the employee in Industrial Revolution 4.0. Communication skills especially in English, teamwork skills, critical thinking and problem-solving skills, entrepreneur skills and computer skills are the skills that should mastered by someone to be competitive in this era. Social Sciences or Social Sciences Learning as one of the fields of study that has the aim of equipping students to develop their reasoning, besides aspects of moral values that contain a lot of social material as well as social material that is memorized. The nature of the social studies learning material has consequences for the teaching and learning process that is dominated by expository approaches, especially teachers using the lecture method while students tend to be passive in the learning process. Though the learning process invites student involvement to be in totality, it means that it involves the mind, vision, hearing, and psychomotor.

Modern learning is one of the products of the rapid development of technology and information that changes the conception and way of thinking of human learning. The increasing development of technology and information has resulted in behavioristic learning theories deemed less suitable to be developed for students in schools. Difference between traditional and modern social studies learning in the current industrial revolution era 4.0. Traditional social studies learning explains that in traditional social studies learning is done through traditional learning approaches. The traditional approach is a learning approach where the teacher in the classroom uses a relatively fixed (monotonous) teaching method each time teaching social studies. The teacher seems more active than the students. The teacher plays an important role in learning. This approach does not use adequate tools or media so that student learning outcomes are less extensive and deep, instead it tends to be verbal.

Social studies in industrial revolution 4.0 is not merely about concept and theory but the implementation of social science for the students to solve social problem. It should transform to be more interesting and exciting, creative, triggering high curiosity, critical thinking, team collaboration, social sensitiveness, and problem-solving skill. Therefore, in the end social science does not only make the students smart but also making them to be good citizen with high social sensitiveness, good behavior and good character (Nursyifa, 2019).

According to Afriani(2018), social studies learning in the Industrial Revolution 4.0 era can be done by focusing the study as follows: First how the social construction of teachers towards social studies learning and second how the latest alternative solutions that we need to develop in anticipating the era of disruption others as a form of the development of contemporary literacy. In conclusion, that social studies education has not been felt to have a major contribution in meeting the needs of life for most people, due to internal factors (learning efforts) and external factors (consumerist, hedonic and pragmatic paradigms).

3. *New Literacy in the Industrial Revolution 4.0*

The strengthening ofthe four elements that exist in the education system requires a novelty movement to respond to the industrial era 4.0. One of the movements launched by the government is the new literacy movement as an amplifier even shifting the old literacy movement. The new literacy movement is intended to focus on three main literacies which

are, 1) digital literacy, 2) technological literacy, and 3) human literacy (Aoun, 2017).Three skills are predicted to be skills which are needed in the future or in the industrial era 4.0. Digital literacy is directed at the goal of increasing the ability to read, analyze, and use information in the digital world, technology literacy aims to provide an understanding of the workings of machines and technology applications, and human literacy is directed at improving communication skills and mastery of design science (Aoun, 2017).

In addition, Rahman, Sakti, Widya, & Yugafiati (2018) also proposed data literacy as the other literacy that should be taught in elementary education. Data literacy, technology literacy, and human literacyare also considerably important to be taught for the students as proposed by Angelianawati (2018). Meanwhile, Trilling and Fadel as cited in Lase (2019) proposed that skills digital literacy which includes informationliteracy, media literacy, and information and communicationtechnology (ICT) literacy becomes one of the three 21ˢᵗ century skills that should be considered as the learning content.

The new literacy provided is expected to create competitive graduates by perfecting the old literacy movement which only focuses on improving reading, writing and mathematics skills. Adaptation of the new literacy movement can be integrated by making adjustments to the curriculum and learning system in response to the industrial era 4.0.
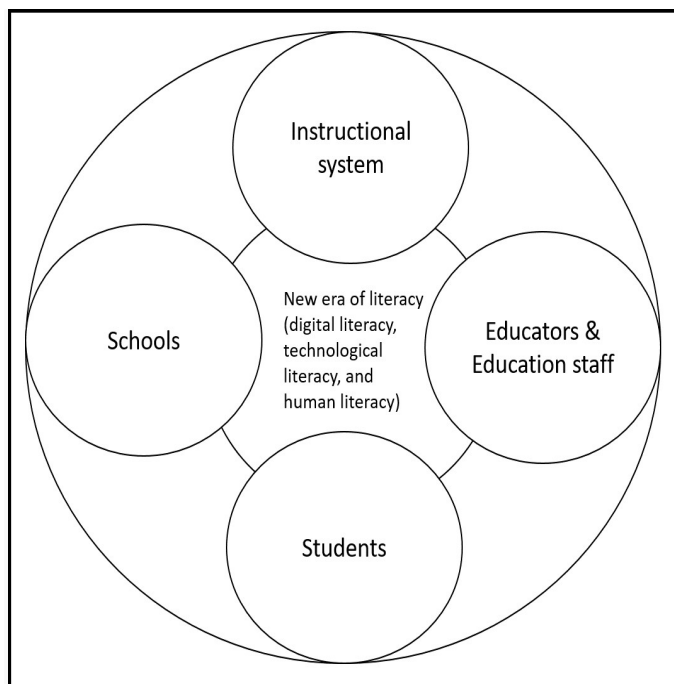

Figure 4.Industrial Revolution Literacy 4.0 (Yahya, 2018)

The Minister of Research and Technology, Mohamad Nasir stressed that improving the quality of education requires equitable distribution of education through the use of information technology such as learning through digital learning which is currently developing. This was said by Minister Nasir when opening the 2018 Learning Innovation Summit at Kasablanka Hall, Jakarta (14/3). In addition, "Libraries must transform to follow technological developments in order to continue to answer the needs of the community. Not only a gathering place to read books or look for information, but the library must be able to become a working space for the emergence of new innovations, "Ainun said (22/3). Based on this it can be seen that the form of literacy in the Industrial Revolution 4.0 era in addition to physical literacy (using books) can also use digital literacy to match the times.

4. Visual Based Learning

Visual basis learning is a learning strategy that involves image and techniques (Philominraj, Jeyabalan, & Vidal-Silva, 2017). This learning strategy refers to the process of gaining knowledge explicitly through visual tools that include printed words, paintings, drawings, sculpture, photography, cartography, diagrams, video, television, graphs, charts, images, films, newspapers, signs, and slides. Therefore, this learning strategy is very easy to be integrated with current technology, the smartphone and internet. The study of Raiyn(2016) proved that visual learning offers better results than traditional learning systems. It could increase students' higher order thinking skills. Visual learning is an essential part of the overall experience that the learners gain towards their process of language learning. Also, it constitutes a vital process of 'Input and Interaction' for the learner ensuring that his needs, necessities and aspirations are taken into account and by making him involved, produce genuine learning(Philominraj, Jeyabalan, & Vidal-Silva, 2017). In adopting a visual learning and teaching approach, the educators can better meet the needs of the students, especially those who have visual-spatial strengths, though students with auditory-sequential strengths can be assisted as well (Daniels, 2018).

In the structure of visual thinking, there are structured steps that are very helpful for students in learning and make it easier for teachers to achieve learning objectives based on 3 components, which are knowledge, attitudes, and skills optimally. As well as the use of this visual strategy effectively used in the teaching and learning process. In addition, Brumberger(2007) explains that visual communication can go beyond print and digital liters so that it is faster to provide understanding to students regarding subject matter.

5. Effectiveness of Learning Social Sciences in the Era of the Industrial Revolution withVisual Basis

Bestari(2018) delivered 4 social science learning strategies in the Industrial Revolution4.0Era:

1) Students are not only prepared in the mastery of ICT. But the main thing is to equip students with critical thinking skills and can solve problems, communicate, becreative and be able to collaborate.

2) Teachers need to change their mindset to adapt to ICT in their learning.
3) Schools must also use ICT.
4) Curriculum adjustments that equip students with understanding of big data, artificial intelligence, and digital society.

The use of ICT will help the implementation of visual basis learning. This integration will bring benefits to the teaching and learning process of social science, because the use of ICT has been proven to be effective in education setting. The use of ICT makes the teaching and learning process more dynamic and improves the teacher and students interaction (Almara'beh, Amer, & Sulieman, 2015). Interaction increases means the students social skills also increase at the same time. The active interaction between students and teacher will create a students centered learning (Sakat, Zin, Muhamad, & Ahmad, 2012). Therefore, the students will be an active learning automatically. The use of technology may improve students' motivation, because it will make the teaching and learning process more interesting (Kadaruddin, 2017). Since ICT makes the learning process more interesting, it will make the students stay focus and concentrate to the teaching material (Liu, 2009). Moreover, the use of ICT make the teaching and learning process more efficient and effective since it will decrease the cost of buying books and other materials and the teaching and learning process can be done anytime and anywhere (Turan & Goktas, 2016). In other words, the use of ICT will make the instruction can be studied by the students autonomously without the presence of the teachers (Dalle & Ariffin, 2018).

Nursyifa(2019) also proposed some points of teaching social science transformation in industry revolution 4.0, as follows:

1) The change of conventional teaching into technology-based teaching, implementation of any kinds of media and teaching method which are relevant to the era. However, the role of teacher could not be replaced, especially in teaching character.
2) Developing students' skills in industry revolution 4.0, such as creativity, innovation, critical thinking, social problem solving, communication skill, and mutual collaboration.
3) Strengthening value education which can be implemented in daily life such as being good citizen, having social sensitiveness, good behavior and good character.
4) Improving teachers' professionalism.
5) Development of social science curriculum based on the era development which balance the hard skill and soft skill in the learning as well as implementing scientific-based social science teaching.

Based on the explanation, it can be concluded that learning social science can be done by utilizing ICT as part of the learning strategy. In addition, by conducting social science instruction using ICT, it will help the students learn better, because it will suit their characteristics. The students who are at school right now are dominated by the z generation, who expect that they can study through their smartphones and internet because they were born with it (Kim & Park, 2017). Thus, the use of technology in the classroom will motivate them to study (El-Seoud, Taj-Eddin, & Seddiek, 2014). The use of ICT also may increase the interaction among students and it is very important to build their social skills (Sakat, Zin, Muhamad, & Ahmad, 2012). Interactive teaching media using ICT is also reported to be effective in replacing the teachers when the teachers cannot present in person (Taiwo, 2009).
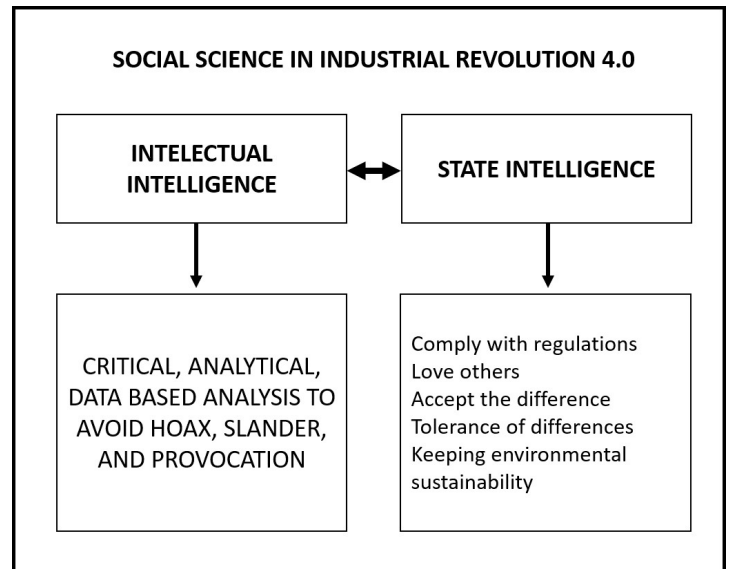

Figure 5.Learning Social Science In The Industrial Revolution 4.0Era

(Warsono, 2018)

Based on the picture above, learning social science according to Warsono (2018)can be done by developing critical thinking skills and developing national character. It is expected that the awareness of having harmony in life in the Industrial Revolution era 4.0.

IV. CONCLUSION

From the discussion that has been explain previously some important points can be concluded. First, social science as a part of education should take a part in facing the challenges and problems of industrial 4.0. Second, the use of visual basis and the integration of ICT in teaching social science is promising since it suits the characteristics of the z generation and the education 4.0. Third, it is recommended that social science teachers implement visual basis learning with the integration of ICT in their teaching and learning process and try to explore other strategies in order to help the students in facing the industrial revolution 4.0 and to make the teaching and learning process more dynamic and interesting.

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