The Preparation of the Social Science Teacher in Jakarta Senior High School in Facing the Industrial Revolution 4.0

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ABSTRACT

This study aims to determine the readiness of teachers in the fields of Social Sciences (Geography, Economics, History and Sociology) in DKI Jakarta High Schools in facing the industrial revolution in education. Specifically the research aims to find out; (1) the level of readiness of teachers in the field of Social Sciences studies facing the industrial revolution 4.0 (2) the understanding of social science teachers on learning in the industrial revolution 4.0 (3) the use of information technology teachers in the field of Social Sciences in making learning media. The method used in this research is a mix method between quantitative and qualitative. With a survey approach, because this research is intended to tell and interpret existing data obtained through the primary data collection tool, the questionnaire. The survey method is used to obtain facts from the symptoms that exist, looking for factual information from ongoing practices. The results showed that teacher competencies in Jakarta were in accordance with the competency standards applied. As well as aspects of understanding of the industrial revolution 4.0, teachers of the Social Sciences group in DKI Jakarta have understood the changes and their impact on learning technology. But in the aspect of readiness to make technology-based learning media is still not fully used due to limited information and skills in making technology-based learning media.

Keywords: Readiness, Social Sciences Teacher, Learning, Industrial Revolution 4.0

INTRODUCTION

The Preamble of the 1945 Constitution of the Republic of Indonesia, mandates that the independence of the Republic of Indonesia aims to "protect the entire nation and all of Indonesia's blood, develop the intellectual life of the nation, advance public welfare and participate in carrying out world order based on independence, lasting peace and social justice" (Wahyuddin, 2016). Article 28 paragraph (1) of the 1945 Constitution "Everyone has the right to develop themselves through the fulfilment of his basic needs, the right to receive

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education and benefit from science and technology, arts and culture in order to improve his quality of life for the welfare of mankind” (Sumadi & Casmana, 2020; Wahyuddin, 2017).

Education is not only the most important pillar in the effort to educate the nation, but also an absolute requirement for improving the welfare of a just society (Sarkadi, Casmana, & Rahmawati, 2020; Yang, Kaiser, König, & Blömeke, 2018). To be able to carry out quality education, teachers are needed. Professional teachers are the key to implementing quality education in schools. Professional teachers have at least three characteristics (Komarudin, Alkhudri, Ubedilah, Syaifudin, & Casmana, 2019). First, have core competencies and expertise as educators. This is because the changing times encourage teachers to be able to present learning in the XXI century, which is preparing students to have critical thinking skills, creative, innovative, communicative and able to collaborate. Second, the teacher must establish peer service (Ukpokodu, 2020; Van Canh, 2020). Studying with other fellow teachers to improve their abilities is a must so that teachers do not go out of style. Third, teachers must continue to care for the social soul as an educational fighter whose job is to prepare the nation's future generations of higher quality (Sarkadi & Casmana, 2020; Sibona, 2017; Thayer-Bacon, 2019).

This research refers to an article written by Abdelrazeq (2016) which provides three scenarios in the learning process in the classroom during the industrial revolution 4.0 era, such as the use of technology in learning in the classroom by using tools that can see the behavior of students, besides the teacher also get feedback from students by using tools such as earphones that are used in seeing the differences in sound produced in the classroom (Schleicher et al., 2019; Schonert-Reichl, 2017; Suhadi, Syafrudin, & Casmana, 2020). So the teacher can go to students who are lacking the source of sound from the teacher. Unlike the case with Abdelrazeq (2016) article written by Shahroom (2018) with the title Industrial Revolution 4.0 and Education aims to see the challenges of the education system in the industrial revolution era 4.0 (Santagata & Yeh, 2016; Zid, Alkhudri, Casmana, Marini, & Wahyudi, 2020).

World civilization was marked by technological change with the invention of the steam engine by James Watt which marked the industrial revolution in the mid-18th Century (Aesaert, Siddiq, & Tondeur, 2018). This era was marked by the shift of human power to machinery, which produced industrial-scale manufacturing in agriculture, manufacturing, mining and transportation. The next revolution, when the industry is growing, the problem of electricity, gas, water, telegraph as a telecommunications tool was discovered and developed rapidly. Experts agree that 1850-1940 was the era of the second industrial revolution (Ahmetoglu & Acar, 2016; Salomon-Fernandez, 2019). The third stage of the industrial revolution was marked by the invention of mobile phones, control machines and computers. Different types of jobs switch more electrification, to faster jobs with more accurate results (Rahmatullah, 2016; Zid, Casmana, & Hijrawadi, 2020). The last stage is the revolution, better known as the industrial 4.0 revolution, beginning with the progress of the internet that connects the world as if without limits. Revolution 4.0 marked the development of technology and information that is extraordinary, marked by the emergence of the term artificial intelligent, robotics, internet of thinking, to 3D printing machines (Coberly-Holt &
Various types of work experience disruptive or disrupt the establishment of the economic and technological fields. Technological progress does not necessarily shift the role of teachers in educating. Although there are machines and robots that can replace human labor, in the world of education the teacher is still the main holder in the learning process in the classroom (Ra, Shrestha, Khatiwada, Yoon, & Kwon, 2019).

Afrianto (2018) revealed that to become a professional teacher in the era of the industrial revolution 4.0 teachers must be able to adapt to developments in this era with several existing characteristics such as digitalization, internet utilization, big data, artificial intelligence (Perzigian, 2018; Zhibin & Weiping, 2017; Zorza, Marino, & Acosta Mesas, 2019). Many benefits can be obtained in research and learning in class. Teachers must adapt learning concepts, digital literacy processes, and teachers must also be able to take advantage of the benefits of the development of the industrial revolution 4.0 so that they can become good teachers. Collaborative activity in the classroom by utilizing network technology or commonly known as blended learning is one of the recommendations in learning strategies that are exposed by the teacher (Legkauskas, Magelinskaite-Legkauskiene, & Kepalaite, 2019).

Ally (2019) as in Figure 1 explains that there are at least nine aspects that must be possessed by teachers in the era of the industrial revolution 4.0 (Lam & Emmy, 2018; Mohamadi Zenouzagh, 2019). First of the general aspects, the teacher should be comfortable working in a virtual environment, always updating the right method of learning, and understanding (state of the art) of the field of science being taught. Second, in the use of technology, teachers must have good digital eruption and be able to integrate curriculum with technology. Third, able to develop digital-based learning resources. The fourth is able to integrate various sources of digital teaching materials. Fifth, being able to communicate according to patterns of communication in the present and future. Sixth, positioning themselves as facilitators in seeking knowledge, not merely being a source of knowledge. Seventh, has a pedagogical strategy in utilizing technology (Hunter, Bierman, & Hall, 2018; Hussin, 2018; Mohamadi & Malekshahi, 2018). Seventh are able to do an assessment by utilizing digital technology. Ninth has a personal character who is open-minded, digital, always wants to learn new things, and be a good role model for students.
Figure 1 Nine basic aspects for teachers in the industrial revolution era 4.0

Other research related to professional teachers in the era of the industrial revolution 4.0 was written by Afrianto (2018) who revealed that to be a professional teacher in the era of the industrial revolution 4.0 needed abilities that were in accordance with the characteristics of the industrial revolution 4.0 such as digitization, internet utilization, big data, and artificial intelligence (Fiorilli, Albanese, Gabola, & Pepe, 2017; Gadusova & Predanoczyova, 2018). Teachers are also expected to keep learning new things and have integrated learning strategies with networks such as hybrid learning models. Based on the findings from the results of this research, this study will look at the readiness of teachers, especially teachers in the social sciences cluster in the face of the industrial revolution 4.0 in the DKI Jakarta province (Collie & Perry, 2018; DeLuca, Schneider, Coombs, Pozas, & Rasooli, 2020).

METHODS

Research Design
This study aims to determine the readiness of teachers in the fields of Social Sciences (Geography, Economics, History and Sociology) in DKI Jakarta High Schools in facing the industrial revolution in education. Specifically the research aims to determine the level of readiness of teachers in the field of Social Sciences studies to face the industrial revolution 4.0. Teacher readiness includes the understanding of social science teachers towards learning in the industrial revolution 4.0 and the use of information technology in the field of social studies teachers in making learning media.
The method used in this research is a mix method between quantitative and qualitative. With a survey approach, because this research is intended to tell and interpret existing data obtained through the primary data collection tool, the questionnaire. The survey method is used to obtain facts from the symptoms that exist, looking for factual information from ongoing practices. The instruments used were in the form of questionnaires, each given to teachers who had been teaching for 5 years in the High Schools of DKI Jakarta Province which were spread in five municipalities.

### Data Collection

The population of this study was high school teachers in the DKI Jakarta Province, which amounted to 464 teachers spread across 5 municipalities in DKI Jakarta province and 1 Thousand Islands Administrative District. The sampling technique uses area (cluster) sampling (sample by region). Because schools in the DKI Jakarta municipality are not the same, the sample collection needs to use stratified random sampling. The following is a sample of teachers in schools in 5 municipalities in DKI Jakarta. Data is collected through questionnaires given to social science teachers who have taught for more than 5 years through Google Forms. The number of teachers who teach Social Sciences (Geography, Economics, History, Sociology) in High Schools in the Province of DKI Jakarta is around 464 teachers from 5 municipal areas namely; Central Jakarta, North Jakarta, East Jakarta, West Jakarta, and South Jakarta, and 1 Thousand Islands Administrative District. Sampling uses a 5% error rate so that the distribution of respondents sampled totaled 100 teachers of Social Sciences subjects.

### FINDINGS

Teachers are the main and foremost actors in the teaching and learning process, they play a strategic role in building the nation through developing the desired personality and values. This strategic position requires special competence, so that it can show its optimal professionalism. Professional teachers must have a set of competencies, as in the data description section of research results that teachers must have pedagogical competencies, personal competencies, social competencies and professional competencies. In accordance with Permendiknas No. 16 of 2007 that pedagogical competencies include: (a) understanding insight or educational foundation; understanding of students; (c) curriculum / syllabus development; (d) learning design; (e) the implementation of educative and dialogical learning; (f) evaluation of learning outcomes; and (g) the development of students to actualize the various potentials they have(McKim, Sorensen, Velez, & Henderson, 2017; Melchor-Couto & Jauregi, 2016).

### Teacher competence

The academic qualifications and teacher competency standards have been regulated in the Republic of Indonesia's Minister of National Education Regulation No. 16 of 2007. The regulation explains that the Teacher Competency standards are fully developed from four main competencies, namely Pedagogic, Personality, Social and Professional Competencies. All four competencies are integrated in teacher performance. The existence of these
regulations proves that teachers must have qualification and competency standards, so that teachers become a profession that is considered by the government. According to Glasser (1998) in Rusman (2010) there are four things that must be mastered by the teacher including the teacher must master the subject matter, the teacher is able to diagnose student behavior, able to carry out the learning process and be able to evaluate the results of student learning (Legkauskas & Magelinskaite-Legkauskiene, 2019; Ludwikowska, 2019). Following are the data obtained based on the results of filling out the questionnaire filled out by respondents.

a. Pedagogical Competence
A teacher must have pedagogical competencies, these competencies include understanding students, planning and implementing learning activities, evaluating learning outcomes and developing students to actualize the various potentials that students have. Based on the results of the study obtained pedagogical competency data from respondents.

![Pedagogical Competence](image)

The results of the data show that as much as 64 percent of respondents answered very well, 32 percent answered well and 2 percent of respondents answered less well. The statements submitted in the questionnaire were 28 statements that were adjusted to the Minister of Education Regulation Number 16 of 2007 concerning Competency Standards that teachers must have.

The development of technology and theories of learning continue to experience adjustments, for that teachers are required to renew teaching methods and the use of technology (Lee, 2017). Teachers must be able to apply Information and Communication Technology (ICT) in their learning, use a variety of media and learning resources that are relevant and attract the attention of students so that learning objectives are reached optimally. In addition, the teacher must also be able to optimize the potential of students to actualize their abilities in the classroom, and the teacher must also be able to carry out an assessment of the learning activities that have been carried out.

b. Personality Competence
Teachers as educators should be able to influence the process in accordance with good values. Because education is a planned process so that all develop through the learning
process (King & La Paro, 2018). Values including norms, morals, aesthetics and science, influence the ethical behavior of students as individuals and as members of society. The role of the teacher is needed in the formation of character, although this responsibility is not only done by the teacher but together with parents (Jennings et al., 2017; Kasekende, Munene, Otengei, & Ntayi, 2016).

The current era of globalization is very heavy challenges for educators, teachers are not only dealing with students. However, they also have to keep abreast of changes that occur very quickly, because good or bad information can be very quickly obtained by students. So the teacher must be able to adapt and not follow the flow of negative information.

The results of the study showed that respondents who chose very well or a value of 4 were 83 percent. This proves that as a teacher, respondents already understand the personality that must be possessed by a teacher in carrying out their duties. However, not all respondents answered very well in this matter, because there were still 5 percent of respondents stated that it was good enough and 1 percent of respondents said that it was not good. Further interviews are needed in this regard, besides that it also needs to be linked to other factors such as years of service and professional certification.

c. Social Competence

Competency standards that must be possessed by teachers are Social Competencies, teachers must have these competencies because they are in the eyes of the community and students are role models that need to be modelled and emulated in their behaviour (Ireh, 2016). The process of educating is not only done by teachers, but also by parents and the environment. Therefore, a teacher must be able to establish relationships with parents and the community (the environment in which they live) so that the process of educating children (students) will go well. The social abilities that must be possessed by the teacher include communication, cooperation, sympathetic interaction, and having a pleasant soul.
Based on data obtained from respondents shows that as much as 69.6 percent expressed very good in socializing with students and the community. But 16.9 percent of respondents stated that they were good enough or gave a score of 2 in social competence. Even the percentage of respondents who answered well enough is greater than the respondents who answered well. This shows that not all teachers (respondents) socialize effectively with students and the community environment. The standard criteria for social competence include:

a) Acting objectively and not discriminatory because of consideration of gender, religion, race, physical condition, family background and socioeconomic status
b) Communicate effectively, empathically, and politely with fellow educators, education personnel, parents, and the community
c) Adapting to places of work that have socio-cultural diversity
d) Communicate with the professional community itself and other professions verbally and in writing or in other forms

The results of the description of this data have not been linked to the length of service, age of the respondent and other factors that can influence. One of them is the age difference can be an obstacle in communicating with students. Quite a lot of respondents who answered well enough on this competency indicate that as a teacher they need to be given training related to effective ways of communicating to students, especially students who have a vast age difference with their teachers.

d. Professional Competence

The ability to update material or information in the subjects they teach is an important part of professional competence(Hen & Goroshit, 2016). The teacher as a professional must continue to add insight and learn everything related to the subject area(Gibson, 2019). As technology and information develop, teachers must be able to adapt in using technology. So
that students will always be active and increase their knowledge, in this case the teacher can create a pleasant learning atmosphere (Gerich, Trittel, & Schmitz, 2017). Because teachers provide different variations in teaching methods, the use of varied learning resources because it adapts to technological developments results in students' interest in learning.

The results of the data show that respondents who chose unfavourably were 5.2 percent of the total 100 respondents who filled out the research questionnaire. These results indicate that there are respondents who do not feel professional, professional criteria based on Permendiknas include:

1) Mastering the material, structure, concepts, and scientific mindset that supports the subjects being taught
2) Mastering Competency Standards and Basic Competencies of the subjects / fields they support
3) Developing subjects taught creatively
4) Develop professionalism in a sustainable manner by taking reflective actions
5) Utilizing information and communication technology to communicate and develop themselves

The lack of respondents in professional competence is due to the lack of teachers in utilizing information technology in teaching and developing themselves, the need for knowledge and training in using technology needed by teachers.

**Teacher's Understanding of the Industrial Revolution 4.0**

The importance of teachers understanding the changes that occur today, especially in terms of information technology because it will have an impact on students' motivation in learning (Firman, Tersta, Riantoni, & Sekonda, 2019). In addition, it will affect the learning style and teaching and learning process. This study attempts to portray the readiness of teachers in dealing with this rapid change. There are 12 statements that are tailored to the teaching and learning process of teachers. Here are the results of the data obtained from respondents (Blömeke, Kaiser, König, & Jentsch, 2020).
The Industrial Revolution 4.0 has had a significant impact on various fields of human life in the current era by utilizing technology including the education sector (Álvarez Valdivia & Lafuente Martínez, 2019; Avis, 2018). Teachers as one of the important elements in education are now required to be able to adapt to the latest technology in the field of education in order to achieve success from the goals of education itself. As shown in the figure below, most teachers are positive in addressing the use of technology in the learning process. 68% of teachers feel able to teach the skills students need to live their lives at this time, 59% of teachers are ready to work without knowing the limits of space and time, and 53% are comfortable working in a virtual environment.

In general, the majority of teachers in the study area (72%) claimed that they kept abreast of news about the latest technological developments, while 5.6% claimed not to follow information about technological developments. This shows that most teachers are consciously aware and willing to adapt to technological developments. Most of them (83.2%) also continue to update the materials or teaching materials that they use in teaching using the internet. They also continue to encourage students to use technology wisely (88%) in learning. However, in a more specific subject, only 59.8% of teachers are fully aware of and find out the latest scientific developments and the use of technology in their effective subjects. In addition, only 52.3% of teachers are accustomed to collaborating with students virtually using technology.

1) Teacher Readiness in Making Technology-Based Learning Media

The industrial revolution 4.0 has an impact on changes in technology and information, it also affects the creation of technology-based learning media (Akman, 2017). The teacher's challenge now is the ability to create and prepare learning media that is aligned with existing information technology. In this study respondents were asked to choose statements related to technology-based learning media. The adjustment of technology-based learning media should be done by the teacher as an educator because at this time the teacher is no longer positioned as an all-knowing source. However, positioned as a facilitator, the presence of information technology should be able to lighten the task of the teacher. The existence of the internet should be utilized by teachers in developing creativity in preparing teaching materials.
a) Utilization of Digital Technology

The internet makes it easy for people to access information, with the internet supported by the development of telecommunications technology. Devices, laptops, and even watches are an inseparable part of daily life. In this study it was seen that respondents who always used digital technology were greater than those who did not use (figure 6).

![Figure 7 The use of digital technology](image)

Respondents who chose very well in utilizing digital technology as much as 54 percent, this is possible with the ease of information and supporting technology such as the availability of internet access and equipment owned by respondents (devices, laptops etc.). Whereas respondents who chose not to use digital technology were 2 percent, due to limited access.

b) Integrating Technology With Learning Curriculum

It is proper for technology to be aligned with the learning curriculum, because it will have implications for the teaching and learning process. In this study it was seen that 61 percent had integrated technology with the learning curriculum as shown in Figure 7.

![Figure 8 Integrating Technology with the Curriculum](image)
Respondents who answered well numbered 35 percent, it could be interpreted that they had not fully integrated technology with the learning curriculum. Respondents still feel that not all material can be integrated with technology and in accordance with learning done in class.

c) **Convenience in Using the Latest Technology**

The comfort factor in using the latest technology can be seen in respondents who have a service life of less than 20 years. In general, they are used to using technology, especially respondents who have a work period of less than 10 years.

![Figure 9](image)

*Figure 9* The comfort of using technology

Figure 8 shows that as many as 65 percent of respondents felt comfortable using current technology. Their daily life cannot be separated from access to information through various technologies such as devices or laptops. While 35 percent of respondents chose good, because respondents did not want dependence on existing technology.

d) **Utilization of Technology in Analysis of Learning Outcomes**

Advances in technology in the field of education look significant, marked by the presence of various kinds of learning applications both from abroad and the work of the nation's children. The presence of learning applications makes it easier for teachers to make learning and evaluate learning outcomes. The technology gives a positive value in helping teachers solve assessment administration problems.
Research data shows that 59 percent of respondents have used technology in analysing student learning outcomes. They are used to using applications that are available for free, in providing assignments and quizzes. While 37 percent of respondents have used the application even though it has not been used too often to analyse learning outcomes.

DISCUSSIONS

Data obtained from respondents that more than 50 percent already understand the 4.0 industrial revolution which is associated with the use of technology in the preparation of materials and teaching and learning process. Changes in information technology that is fast now causes teachers to be able to adapt to these conditions. In teaching practice in the classroom, only 59.8% of teachers are very accustomed to using technology. This can be in line with the convenience in using technology by new teachers by 66.3% of the total respondents. As many as 53.3% claimed to be easy to adapt to the latest technology, 48.9% of teachers were able to solve fundamental technological problems such as program installation and program settings, and 39.1% of respondents were able to learn the latest software independently.

Some see integrating technology into the learning plans they make. For example, such as integrase between Artificial Intelligence (AI), Virtual Reality (VR) and Mixed Reality (MR) by 40.2%, Utilization of geo-tagging technology features by 52.2% and delivering material in various media formats by 52.2%. The teachers generally explore the virtual world in renewing teaching materials 65.2%. In addition, 52.2% of respondents believe they are able to choose the most appropriate technology that is appropriate to the local culture and culture. As many as 57.6% of respondents felt very confident that they were able to adapt to the latest technology in the learning process, 27.2% felt quite confident, 15% of respondents still felt unsure.

The industrial revolution 4.0 has an impact on changes in technology and information, it also affects the creation of technology-based learning media. The teacher's challenge now is the ability to create and prepare learning media that is aligned with existing information technology. In this study respondents were asked to choose statements related to technology-based learning media. The adjustment of technology-based learning media should be done by the teacher as an educator because at this time the teacher is no longer positioned as an all-knowing source. However, positioned as a facilitator, the presence of information technology should be able to lighten the task of the teacher. The existence of the internet should be utilized by teachers in developing creativity in preparing teaching materials.

CONCLUSION

The results of the study showed that 80 percent of teachers were in accordance with the competency standards requested by the government. The teacher has to do with pedagogical competence, which is the ability in the management of learners which includes understanding insight or educational foundation, understanding of students, curriculum / syllabus
development, learning design, learning implementation is good. Teachers still need new innovations in renewing these competencies, because the development of technology and students who are currently very quickly received information. Whereas in personality competency, 90 percent of respondents have run the parameters contained in these competencies such as noble, mature, wise and wise and can be an example for students.

The readiness of teachers in making learning media in the era of the industrial revolution 4.0, shows that teachers who are new in teaching have a better level of readiness compared to teachers who are now entering the age above 40 years. They have already used technology in the teaching and learning process in the classroom, only that there is a need for ongoing guidance in terms of updating technological information so that it is not left behind.

Teachers' understanding of the industrial revolution in the field of education shows good results, 60 percent of teachers are very understanding of the changes in the use of technology today to be integrated in the field of education. While 40 percent of respondents do not fully understand, even though they also have used technology in teaching and learning activities and update information related to technology in the field of education. The need for strong support from the government and universities to collaborate with teachers so that social science teachers can better utilize technology in teaching and learning.

REFERENCE


