What Kind of Competencies Teachers Need In Industry 4.0 Era Especially In The COVID-19 Pandemic?

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Abstract. *The world of education in the era of industrial revolution 4.0 is currently facing big challenges, especially when there is a COVID-19 pandemic. One of the challenges is students have a low interest in learning. So, teachers are required to develop their competencies to design innovative, creative, and fun learning for students. Based on the need of times, in this paper, we conducted a literature review about education in Indonesia in the era of the industrial revolution 4.0, the challenges of teachers during the COVID-19 pandemic, as well as the competencies needed by teachers in responding to these challenges.*

Keywords: *Education, Industrial Revolution 4.0, COVID-19 Pandemic, Teachers challenges, Teachers Competencies.*

1. INTRODUCTION

The development of the current era is entering the digital era where the use of technology is the main thing. several sectors began to make changes, including education. Education in the era of the industrial revolution as it is today requires teachers to be able to present more innovative and creative learning by involving technology as a learning medium. Technology-based learning is the use of technology in learning activities to facilitate teachers and students in obtaining learning resources, processing learning outcomes, and reporting learning outcomes that have been carried out (Azhariadi et al., 2019). The use of technology in learning is an innovation that aims to increase student motivation in learning (Rohmatul Ummayah, 2018).

The use of technology in learning is increasingly emphasized during the current pandemic. The condition of the COVID-19 pandemic that has hit the whole world has certainly changed some of the orders of life, education is also included in it. Before the pandemic occurred, learning took place face-to-face in schools, but when the pandemic occurred the learning process shifted to using technology assistance such as utilizing the internet network and utilizing social media in conducting teaching and learning activities. This change increasingly requires teachers to be able to improve their competence in presenting more creative and innovative learning by utilizing technology.

Shifting this learning model is of course not easy for teachers, especially teachers who are in the regions. The obstacles experienced by teachers also vary, one of which is skills. This is in line with the results of research conducted by Tobondo & Retnawati (2018) which revealed that one of the obstacles for professional teachers is the low skill of teachers in utilizing technology as a learning medium. In addition, the elderly age of teachers is also an obstacle when using technology in learning, because for senior teachers technology-based learning media is a new thing so it takes a longer time to master it (Soewarno et al., 2016).

In addition, during the COVID-19 pandemic, several obstacles experienced by

teachers in Indonesia included inadequate networks, difficulty communicating remotely with students, and costs incurred due to purchasing internet packages (Agustin et al., 2020). Some of the obstacles experienced by teachers illustrate the current state of education in Indonesia. Therefore, competent teachers are needed so that education in Indonesia will be better in the future and ready to face any changes and demands of the times.

2. EDUCATION IN INDONESIA IN THE INDUSTRIAL REVOLUTION 4.0

The dynamics of technological and industrial development always raise new challenges. In the current industrial era 4.0, all lines of life move by utilizing digital technology. The development of industrial technology also has an impact on the field of education. The national education system is faced with very complex but interesting challenges. This principle is marked by the start of the democratization of knowledge which creates opportunities for everyone to use technology productively (Fuadi, 2019).

Education in Indonesia is currently still making various efforts to improve to achieve a quality education system. UNESCO data in the 2016 Global Education Monitoring (GEM) Report shows that education in Indonesia ranks 10th and fourteenth developing countries, while the important component in education, namely teachers, ranks 14th out of 14 developing countries in the world. On the other hand, the industrial revolution 4.0 has given birth to a learning revolution. Education in the era of the industrial revolution experienced a very great disruption. The role of the teacher, who has been the main provider of knowledge even the only one, has shifted a lot. If the teacher's function is only limited to transferring knowledge to students or just teaching in the classroom, then its role will be replaced by technology in this 4.0 industrial revolution era. In the future, the role and presence of the teacher in the classroom will be more challenging and require very high creativity (Agustina, 2020).

In this industrial era 4.0, teachers are required to be ready for change and able to adapt to developments. This is because one of the main problems of education in Indonesia is the low competence of teachers. Even though many teachers already have educator certificates, their pedagogic and professional competencies are inadequate. In addition, there are still many teachers who do not have the qualifications equivalent to a bachelor's degree (Setyo Utomo, 2019). Many teachers do not want to improve their competence by following per under the times. In addition to the low competence of teachers, the economic disparity of the Indonesian people also affects education in Indonesia. There are still many children who are studying with limited resources, for example, do not have digital equipment facilities which are generally needed in the learning process in this era. The uneven availability of telecommunication networks is still a problem in Indonesia. The education system requires a new movement to respond to the industrial era 4.0. One of the movements launched by the government is the new literacy movement as a reinforcement and even shifting the old literacy movement. The intended new literacy movement focuses on three main literacy, namely 1) digital literacy, 2) technological literacy, and 3) human literacy (Aoun, J. 2018). These three skills are predicted to become skills that are needed in the future or the industrial era 4.0. Digital literacy is directed at the goal of improving the ability to read, analyze, and use information in the digital world (Big Data), technological literacy aims to provide an understanding of how machines work. and application of technology, and human literacy directed at improving communication skills and mastery of design science. The new literacy provided is expected to create competitive graduates by perfecting the old literacy movement which only focuses on improving reading, writing, and math skills. The adaptation of the new literacy movement can be integrated by adjusting the curriculum and learning system in response to the industrial era 4.0 (Yahya, M. 2018)

3. EDUCATIONAL CHALLENGES IN INDONESIA DURING THE COVID-19 PANDEMIC

The Covid-19 pandemic has provided an overview of the continuity of the world of education in the future with the help of technology. However, technology still cannot replace the role of the teacher, in learning interactions between students and teachers

because education is not only about acquiring knowledge but also about values, cooperation, and competence. This pandemic situation is a challenge for the creativity of every teacher in using technology to develop the world of education. This learning model is an obstacle because there are still many teachers who do not have adequate competence in designing online learning and are less proficient in applying technology in learning. The uneven distribution of development has also become a polemic that adds to learning obstacles during this COVID-19 pandemic. This is in line with the statement of the Director-General of Higher Education's Public Relations (2020) which stated that online learning is a challenge for education in Indonesia, which has thousands of islands, wherein remote areas the availability of electronic goods without internet access has become a luxury.

During this pandemic, teachers have to play a dual role, namely as movers and coaches who have extraordinary abilities to conduct online learning. Teachers are required to carry out various additional tasks to ensure the achievement of educational goals and the fulfillment of academic and non-academic targets. In this case, the teacher has a dual role, namely being responsible for the education of his students, on the other hand, the teacher is also the head of the family. In addition, teachers are also required to be able to innovate and find ideas for subject matter, methods, media, and others so that learning can continue to be fun for students even though it must be limited by distance.

Technology is the most important thing in online learning, such technology can be in the form of smartphones, laptops, and other supporting objects. Smartphones are the most common thing used by students than laptops because they are more practical and have many advanced features (Subiyakto, et al., 2019). This is certainly a problem for senior teachers who in general they are only able to operate computer devices for typing with MS Word, and even then many do not understand all the facilities in the program, let alone run e-mail, Web browsing, and so on. so. However, during this COVID-19 pandemic, in online learning, teachers are required to be able to operate computers, laptops, and gadgets, run learning applications, create interesting learning materials, utilize various digital tools, conduct online classes, and prepare online administration.

Second, internet network constraints. The thing that is also a challenge for teachers in online learning is the problem of the internet. Among them, internet network access is difficult, especially in rural areas, with unstable internet networks. Due to the slow network, the information and learning materials delivered take a long time to be accepted by students, or vice versa (Arifah Prima Satrianingrum and Iis Prasetyo, 2021). The speed of internet access has not been felt by all regions in Indonesia. Remote areas, inland, and remote areas are still not able to enjoy the quality of the internet network. This ultimately affects teachers and the implementation of online learning, all of which use the internet network.

Third, the means of supporting student learning are inadequate. According to Arifah Prima Satrianingrum and Iis Prasetyo (2021) in the implementation of online learning, one of the limitations in its implementation is facilities and infrastructure that do not support, such as laptops, computers, smartphones, internet quotas, and so on. In addition, according to M. Wahyudi (2020) the facts on the ground, the obligation to study at home is a serious obstacle, especially for students from economically disadvantaged circles. This indirectly also becomes a challenge for teachers, because teachers must find ways so that students who do not have learning tools such as smartphones or laptops can still follow the lesson.

Fourth, the decrease in students' learning motivation and the lack of parental support in guiding their children to study at home. Students' learning motivation decreases because in online learning students are less able to absorb lesson information conveyed by the teacher because the internet network is less supportive and some teachers are less innovative in delivering subject matter. Manggoa (2020) once stated that during this pandemic the use of methodologies needs to represent and reflect the abilities of students or students after participating in online learning. This should be highlighted because the condition of online teaching during the COVID-19 pandemic is new. The majority of teachers and lecturers are not familiar with this situation. It is possible that some teachers and lecturers may continue to

apply the same methodology in online teaching as conventional teaching. This can potentially make teaching activities not run well and effectively.

Based on the challenges above, teachers are required to be able to adapt to all the changes and demands that exist. Even though online learning is a new experience filled with misunderstandings, colored by several challenges and obstacles, the teacher is still the teacher. They must continue to fulfill their obligations as educators and distributors of knowledge. All the challenges faced must be used as lessons and valuable experiences to continue to share knowledge with students.

4. COMPETENCIES NEEDED BY TEACHERS IN RESPONDING TO CHALLENGES IN THE INDUSTRIAL REVOLUTION-ERA 4.0

Based on the challenges faced by the world of education today, it is to improve their competence so that they can become good teachers for the nation's future. Referring to the article written by Nababan et al., (2020), the competencies needed in a teacher include:

1) Critical thinking skills and problem-solving skills

   Teachers who are considered capable of critical thinking are teachers who can provide meaningful learning for students in the classroom. Teachers are aware of the demands of today's era so that teachers can provide theoretical experience for students in the classroom. That way teachers can prepare students to enter into global competition.

2) Ability to communicate and collaborate in learning

   The communication and collaboration skills meant are teachers can design learning that does not only contain one method or media but can take advantage of various learning media to attract students' interest in learning (Sudiapermana & Muslikhah, 2020). Furthermore, Nessipbayeva (2019) revealed that the teachers needed in today's era are teachers who can manage classes, have many strategies in teaching, and can make appropriate assessments. The preparation of appropriate assessment techniques is intended so that through the exercises or tests given, students can construct their knowledge so that the knowledge they gain is effective, efficient, effective and can influence students' critical, creative, independent, flexible, ethical, and reflective attitudes (Ferrari, 2013).

3) Creative and innovative

   The ability to present innovative and creative learning includes the ability of teachers to design appropriate learning media so that teachers can transfer their knowledge appropriately and students' knowledge is increasing and developing (Nababan et al., 2020).

4) Digital Literacy

   Mastery of technology is a competency that must be possessed in the current era, so every teacher needs to have digital literacy competence. De Catalunya (2018) revealed that three aspects of learning can be influenced by teachers if they have digital literacy competencies, namely:
   a. Can provide a learning experience for students who can improve their ability in the digital field
   b. Can carry out learning innovations that adapt to changes and demands of the times
   c. Can do self-development as a professional teacher

   To achieve the three things above, it is necessary for teachers who can transfer good knowledge, appropriate learning strategies, and qualified skills shown through the teacher's attitude in using technology as a learning medium (Dias-Trindade & Ferreira, 2020). Ranieri et al., (2017) explained further, that the knowledge that a teacher needs to have in the digital era includes teacher knowledge in utilizing media and technology in responding

to social challenges that can be presented in learning, as well as the teacher's ability to use technology as a medium. learning in every field of science. So, it can be said that digital competence is influenced by management abilities and teacher knowledge (Dr Jayendrakumar N. Amin, 2016).

5) Contextual learning.

Contextual learning is meant that teachers can provide learning experiences to students by involving situations in everyday life. This is so that students can experience directly the learning provided and be able to apply learning in answering problems in real life.

These five competencies need to be possessed by teachers in the current era to be able to prepare students to be globally competent. Furthermore, Nessipbayeva (2019) revealed that as in the following picture:

It can be seen in the picture above that the competencies needed by teachers today are not much different from the previous era. It's just that in the current era, the ability of teachers to process information and utilize technology media as learning media is more emphasized.

CONCLUSION

Based on the description above, it is concluded that the teachers needed in today's era are teachers who can manage classes, have many strategies in teaching, make appropriate assessments, and can utilize technology in learning. Some of these opinions describe the skills needed by individuals in the current era of the industrial revolution.

REFERENCES

Agustina. 2021. Urgensi Kompetensi Profesional Guru Dalam Pendidikan Kreatif Gen-Z Di Era Revolusi Industri 4.0 . BDK Palembang, Kementrian Agama RI: Artikel Ilmiah Widyaiswara.

Agustin, M., Puspita, R. D., Nurinten, D., & Nafiqoh, H. (2020). Tipikal Kendala Guru PAUD dalam Mengajar pada Masa Pandemi Covid 19 dan Implikasinya. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(1). https://doi.org/10.31004/obsesi.v5i1.598

Aoun, J. (2018). Robot-proof : Higher Education In The Age Of Artificial Intelligence. https://doi.org/10.1080/02607476.2018.1500792.

Arifah Prima Satianingrum dan Iis Prasetyo. 2021. Persepsi Guru Dampak Pandemi Covid-19 terhaddap Pelaksanaan Pembelajaran Daring di PAUD. Vol 5, No.1

(2021). Akses tanggal 31 July 20201.

Azhariadi, Desmaniar, I., & Geni, Z. L. (2019). Pembelajaran Berbasis Teknologi Informasi Dan Komunikasi (Tik) Di Daerah Terpencil. *Jurnal INSYPRO (Information System and Processing)*, *121*.

De Catalunya, G. (2018). *Teachers' Digital Competence in Catalonia*. 27. http://ensenyament.gencat.cat

Dias-Trindade, S., & Ferreira, A. G. (2020). Digital teaching skills: Digcompedu checkin as an evolution process from literacy to digital fluency. *Icono14, 18*(2). https://doi.org/10.7195/RI14.V18I2.1519

Dr Jayendrakumar N. Amin. (2016). Redefining the Role of Teachers in the Digital Era. *International Journal of Indian Psychology*, *3*(3). https://doi.org/10.25215/0303.101

Ferrari, A. (2013). Digital Competence in Practice: An Analysis of Frameworks. *Joint Research Centre of the European Commission.* https://doi.org/10.2791/82116

Fuadi, Tuti Marjan. 2019. Era Industri 4.0: Peran Guru dan Pendidikan. Universitas Abulyatama: Jurnal SEMDI UNAYA

Humas Dirjen Dikti. 2020. Tantangan Dunia Pendidikan Di Masa Pandemi. Direktorat Jenderal Pendidikan Tinggi, Kementrian Pendidikan dan Kebudayaan. Tantangan Dunia Pendidikan di Masa Pandemi – Direktorat Jenderal Pendidikan Tinggi Kementerian Pendidikan dan Kebudayaan Republik Indonesia (kemdikbud.go.id) Di akses 1 Agustus 2021.

Manggoa, Ridolf. 2020. Tantangan Mengajar Pada Masa Pandemi Covid-19. Sekolah Tinggi Teologi Arastamar SETIA Ngabang: Jurnal Teologi dan Misi Volume 2 Nomor 2.

Nababan, T. M., Purba, S., & Siburian, P. (2020). *The Challenge of Being a Teacher in Industrial Revolution 4.0*. https://doi.org/10.2991/assehr.k.201124.047

Nessipbayeva, O. (2019). The Competencies of the Modern Teacher. *Pre-Service and In-Service Teacher Training*.

Ranieri, M., Bruni, I., & de Xivry, A.-C. O. (2017). Teachers' Professional Development on Digital and Media Literacy. Findings and recommendations from a European project. *Research on Education and Media*, *9*(2). https://doi.org/10.1515/rem-2017-0009

Rohmatul Ummayah, I. (2018). Model Pembelajaran Berbasis Teknologi. *Universitas Muhammadiyah Sidoarjo*, *10*(2).

Setyo Utomo, Susilo. 2019. Guru Di Era Revolusi Industri 4.0. Universitas Negeri Yogyakarta: Prosiding Seminar IKA UNY.

Soewarno, Hasmiana, & Faiza. (2016). KENDALA-KENDALA YANG DIHADAPI GURU DALAM MEMANFAATKAN MEDIA BERBASIS KOMPUTER DI SD NEGERI 10 BANDA ACEH. *Jurnal Pesona Dasar*, *2*(4).

Sudiapermana, E., & Muslikhah. (2020). *The Challenges of Online Learning in Covid-19 Pandemic Era*. https://doi.org/10.2991/assehr.k.201219.011

Subiyakto, dkk. 2019. Media Pembelajaran Sejarah Era Teknologi Informasi. Banjarmasin: Program Studi Pendidikan sejarah.ULM

Tobondo, Y. V., & Retnawati, H. (2018). Constraints and Strategy of Mathematics Teachers in the Implementation of Continuing Professional Development (CPD) in Disadvantaged Areas. *Journal of Physics: Conference Series*. https://doi.org/10.1088/1742-6596/1097/1/012113

Yahya, M. (2018). Era Industri 4.0: Tantangan dan Peluang Perkembangan Pendidikan Kejuruan Indonesia. Makasar.

Wahyudi, M. 2020. Covid-19 dan Potret Pembelajaran Berbasis E-learning. Di akses pada tanggal 1 Agustus 2020, dari website: https://republika.co.id/berita/q8gkaa374/covid19-dan-potret-pembelajaran-berbasis-elearning.