
E-Learning as Education Media Innovation in the Industrial Revolution and Education 4.0 Era.

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ABSTRACT

In the era 4.0 industrial revolution the development of digital-based information and communication technology is increased. This needs to be used as best as possible to support the education and learning process, especially Islamic Religious Education. This study uses a qualitative research approach, this paper examines in depth the use of e-learning in learning at Senior High School in Tangerang, as an effort to respond to the presence of the 4.0 industrial revolution era with all the developments and advancements it brings. This paper concludes that the use of e-learning in Senior High School in Tangerang learning is intended to support learning activities so that learning becomes more innovative, interesting, fun, and not monotonous. In the application of e-learning, Senior High School in Tangerang implements a blended-learning system, which is a combination of face-to-face and distance learning. As for the implementation stage, Senior High School teachers in Tangerang have taken important stages related to the implementation of e-learning which includes need analysis, making instructional designs, using and developing e-learning stages, and evaluation.

Keywords: Senior High School, E-Learning, Learning Media Innovation, Industrial Revolution Era 4.0.

1. INTRODUCTION

The era of education 4.0 is a general term used by educational theorists to describe various ways to integrate cyber technology both physically and not into learning. This is a leap from Education 3.0 (education 3.0) which according to Jeff Borden, Education 3.0 includes the confluence of neuroscience, cognitive psychology, and educational technology, using web-based digital and mobile technologies, including applications, hardware and software, and "anything else. with e in front of it. Education 4.0 is far above that and in some ways, education 4.0 is a phenomenon that responds to the need for the emergence of the fourth industrial revolution (4 IR) or (RI 4) where humans and machines are aligned to find solutions, solve problems and of course find new innovation possibilities. The Fourth Industrial Revolution (4IR) was announced in Davos in 2016, the various elements associated

with this new dimension have been going on for almost a decade. The term received wide publicity when German Chancellor Angela Merkel was highlighted at the Hanover Fair in 2011, the emergence of Industry 4.0 made German manufacturing more competitive.

Education 4.0 is a general term used by educational theorists to describe the various ways to integrate cyber technology both physically and indirectly into learning. This is a leap from education 3.0. Education 3.0 includes the confluence of neuroscience, cognitive psychology, and educational technology, using digital and mobile web-based, including applications, hardware and software. Education 4.0 is a phenomenon that arises in response to the needs of the 4.0 industrial revolution, in which humans and machines are aligned to find solutions, solve various problems faced, and find new possibilities for innovations that can be used to improve modern human life. The industrial revolution 4.0 occurred around 2010. The development of industry 4.0 had an impact on various fields including education. The process in teaching and learning activities currently utilizes digital technology (Davis, 2015). Teacher competence must also be improved to keep up with the flow of information and technology developments (Kagermann, 2014). Teachers as leaders in learning are required to be able to adapt and be ready to change, in order to face challenges in the industrial era 4.0 (Burritt and Christ, 2016). Teachers are needed to form student character, role models that foster enthusiasm, creativity and social empathy. In the industrial era 4.0 students must be equipped with skills including: critical thinking, problem solving, creative, innovative, and communicating and collaborating. Students in the Education 4.0 era are required to have skilled skills in using technology both in finding, managing and conveying information (Hussin, 2018). The skills that students must possess according to the World Economic Forum (2016) include: (1) Complex Problem Solving, (2) coordinating with others, (3) people management, (4) critical thinking, (5) negotiation, (6) quality control, (7) service orientation, (8) judgment and decision making, (9) active learning, and (10) creativity, so that it can meet the demands of future needs (Jack Ma, 2018). These skills must be mastered by students in order to meet the demands of industry needs in the future. The Indonesian government has prepared a curriculum that emphasizes STEAM (Science, Technology, Engineering, the Arts, and Mathematics) to achieve the successful implementation of the Making Indonesia road map (Hartanto, 2018). The government is trying to improve the quality of human resources. Superior quality human resources will be produced from teachers who are able to master super fast technology. Therefore, to answer the challenges in the era of Education 4.0 teachers not only change the way of teaching but must be able to improve and adjust competence, quality and professionalism. This increase in human resources is to meet future industrial demands. In improving human resources, the teacher plays a role in building student abilities. The role of teachers in the Education 4.0 era will not be replaced by any great technology. Teachers are not only to fill students' knowledge, but teachers have a role in educating students' character, ethics, and morals.

In this regard, the current development of information and communication technology can be utilized properly and maximally to support the effectiveness of the educational process. Likewise, Islamic Religious Education is very possible to get a touch from information and communication technology in the learning process. Providing material and implementing the learning process can be done by utilizing internet-based technology. This will certainly be able to support a teacher in delivering teaching materials about Islam to their students. Especially when viewed from the perspective of its application in general, learning so far tends to be monotonous, rigid, fixated on reading textbooks, is less innovative, and does not take advantage of technological developments, so learning tends to be boring. Of course this

will also have an impact on the ineffective achievement of the learning objectives themselves. Moreover, the characteristics of students being educated today are far different from previous generations, so that more innovative and progressive approaches and learning media are needed to accommodate their interests. As an alternative to solving these problems at the same time to accommodate the increasingly rapid movement of technology and information developments in the era of the 4.0 industrial revolution, the learning process and every component in the subject need to be developed by transforming them into virtual or electronic forms. This is also inseparable from the shifting needs of today's society, which consider the speed in accessing the latest information and knowledge to be almost the same as secondary needs. The transformation process is expected to be able to bridge the existing reality with ideals in the educational process, of course without neglecting the educational values contained in it. One alternative to learning development that can be done in the era of the 4.0 industrial revolution is electronic learning or what is often known as e-learning. The existence and urgency of e-learning in the learning process is something that cannot be denied as a logical consequence of the development and penetration of technology and information in this digital era. On the other hand, the use and utilization of e-learning is also expected to support policies and the role of the government in equitable access to education for every Indonesian citizen throughout the archipelago as well as to lead them to become superior and quality human resources capable of competing with the global world. This is as explained in the National Education System Law No. 20 of 2003 which states that in an education, the learning process can be done not only with a conventional approach but can also be done with a distance system. This means that education and the learning process are not only carried out monotonously in a closed room, with books and meeting with educators in class every time, but learning can also be done by taking advantage of advances in information and communication technology in education such as the internet and social media. This aims to motivate students to be more active in studying wherever and whenever and always thirsty for information, so that they become richer in knowledge.

2. LITERATURE REVIEW

History and Development of E-Learning

The development of e-learning itself is almost in line with the rapidly growing world of Information and Communication Technology. This started with the recognition of computers by the public at large, especially academics, which then began to be used and developed for educational purposes with the aim of increasing the effectiveness and efficiency of the educational process. E-learning is a product of the integration and innovation of Information and Communication Technology (ICT) into the world of education. As one of these integration products, e-learning is expected to be able to open a new chapter in the world of education that is able to provide convenience, comfort, efficiency, and learning effectiveness for learners or learners. Meanwhile, e-learning has developed quite rapidly from time to time. E-learning was first introduced by the University of Illinois at Urbana-Champaign using a Computer-Assisted Instruction (CAI) system and a computer called PLATO.²² Since then, the development of e-learning can be described as follows. The contents are in the form of learning material in written and multimedia form (video and audio) in the format MOV, MPEG1, AVI and so on. This is e-learning in a very simple form. Furthermore, 1994 was the era of developing Computer Based Training into more attractive CBT packages, such as the use of animation for teaching materials, and so on.

Furthermore, 1997 was the era of the development of LMS (Learning Management System). Since this year, the development of internet technology has been began to be used in learning activities, but it is still an early stage of the process. Continues to 1999 which is the era of Web-based e-learning applications. Since this year, the LMS (Learning Management System) has begun to be developed towards a comprehensive Web-based e-learning application, both for learners (learner) and the administration of teaching and learning. In addition, LMS has also begun to be merged with information websites, magazines and newspapers. Its content is also getting richer with a combination of video streaming, multimedia, and interactive displays in a wide selection of more standard and small data formats.²⁴ In 2000, many companies in the business sector began to adopt e-learning as a training center for their employees. Many kinds of tools for e-learning have emerged. Then from 2010 until now, social media began to be widely used, so that e-learning was increasingly inspired by social media because it was considered capable of providing innovation and a more fun learning atmosphere. Among the examples of social media in question are Youtube, Twitter, Instagram, Facebook, Skype, Hangout, and others. It should also be noted that initially, e-learning was designed and developed for the purposes of distance learning, which is an alternative form of learning that is intended to solve the problem of limited time and space faced in the learning process in the world of education, as also exists. in our country, Indonesia, where e-learning has begun to be utilized and developed as a distance learning support facility in line with the issuance of the Decree of the Minister of National Education (SK Mendiknas) No. 107 / U / 2001 regarding PTJJ (Distance Higher Education) which specifically allows the provision of education through Distance Education by utilizing information technology. Then, along with the times, e-learning has begun to be used to support face-to-face (conventional) learning, especially at the tertiary level (PT), high school (SMA), and junior high school (SMP).

Function or Role of E-Learning for Learning Activities

In relation to learning activities, e-learning can function as several role categories. Some of the functions of e-learning for learning activities or processes include being a supplement (addition), a complement (complement), and a substitution (substitute). For more details, the following is an explanation of each e-learning function for learning activities: E-learning is said to function as a supplement (addition) if students or learners have the freedom to choose between utilizing the material available on e-learning or not. This means that students are not required or obliged to access the e-learning platform and are also not required to take advantage of the material available in it but only optional. However, students who want to use it will certainly have additional knowledge, insight, knowledge and wider useful information. E-learning functions as a complement (complement), if the material available on the e-learning platform is intended and programmed to complement and support the learning material received by students from face-to-face learning in class. This also means that the material or practice questions available on the e-learning platform used are programmed as reinforcement material for students who are able to master and understand the material they get from face-to-face teaching and learning activities in class quickly (fast learners). In addition, e-learning material can also be directed as a remedial program for students who have difficulty mastering and understanding the subject matter of teaching and learning activities in class (slow learners) by providing opportunities for them to access e-learning materials that have been provided for them, so that they can have more time and opportunity to better understand the subject matter that has been studied with the teacher in the classroom. While the role of e-learning as a substitute (substitute) in conventional learning is

to help make it easier for students to manage their learning activities to suit their time and other activities. In this context, there are at least three options for learning activity models to choose from, namely: a) fully face to face (conventional); b) via the internet completely; c) combination or combination of face to face and via the internet. From the explanation above, we can understand together that e-learning can not only be used to realize distance learning, but can also be used as a means of support and support for face-to-face learning activities, for any subject or subject including Islamic Religious Education (PAI), both in formal and non-formal educational institutions.

The use and utilization of e-learning in learning cannot actually be separated from the use of the internet itself. That is, of course there are advantages and disadvantages in it. The internet has become an option and a very strategic alternative for learning activities with the creation of easy access to a wide variety of information anytime and anywhere. Munir stated that there are at least seven advantages and benefits of e-learning, especially internet-based e-learning as detailed below:

1. The availability of e-moderating facilities that allow teachers and students to interact and communicate more easily through internet facilities without being limited by time, distance, and place.
2. Teachers and students can access and use structured and scheduled teaching materials or learning instructions via the internet, so that both parties can evaluate each other to what extent the materials and teaching materials have been understood and mastered.
3. Students can study or review teaching materials anywhere and anytime. In addition, e-learning materials can also be stored on gadgets, computers, or laptops so that students can more easily repeat the materials and teaching materials.
4. If students need additional information about the materials or teaching materials they are learning, they can access it directly and easily through internet facilities.
5. Teachers as well as students in large numbers can still discuss online, so that they can add insight and knowledge more easily and broadly.
6. Students who usually tend to be passive become more active
7. Relatively more efficient in terms of time, place and cost.

Characteristics of E-Learning

The term e-learning consists of the letter e which stands for the word electronic and learning which means learning. So, in simple terms e-learning can mean learning activities that utilize or use electronic devices. As for the definition of e-learning itself, it is actually very diverse, but in general the diversity of definitions of e-learning starts from two basic views of e-learning, namely:

1. Electronic-based learning, namely learning activities that utilize information and communication technology, especially electronic devices. This means, not only the internet, but all electronic devices such as films, videos, tapes, OHPs, slides, LCD projectors, tapes, etc. as long as they use electronic devices.
2. Internet based, namely learning using internet facilities that are online as the main instrument. This means, having the perception that e-learning must use the internet which is online, namely computer facilities connected to the internet. This means that learners in accessing learning materials are not limited to distance, space and time, it can be anywhere and anytime (anywhere and anytime).

Both views or perceptions above are strengthened and supported by the opinions of several experts who argue about the definition of e-learning. One of the experts who support the notion of e-learning as electronic-based learning is Cisco and Cornelia who explain "e-learning is the delivery of content via all electronic media including internet, intranet, extranet, satellite broadcast, audio / video tape, interactive tv, and CD ROM." ¹² This opinion is in line with the definition of e-learning according to the American Society for Training and Development (ASTD) cited by Rusman as follows: "E-Learning is a broad set of applications and processes which include web-based learning, computer-based learning, virtual and digital classrooms. Much of this is delivered via the internet, intranets, audio and video tape, satellite broadcast, interactive TV, and CD-ROM. The definition of e-learning varies depending on the organization and how it is used but basically it is involved electronic means communication, education, and training. Meanwhile, the perception that e-learning is internet based learning is also supported by several experts, one of which is Rosenberg, who argues that e-learning is the use and utilization of internet technology to deliver a series of solutions and information that can expand knowledge and improve skills. This view is also supported by the opinion of Fernando Alonso as quoted by Lantip Diat Parsojo and Riyanto who said that "Learning Management Systems (LMS) or e-Learning platforms are dedicated software tools intended to offer a virtual education and / or on-line training environment, It is concluded that e-learning has two concepts, namely e-learning in a broad sense and e-learning in a narrow sense. In a broad sense, e-learning can be interpreted as a learning activity by utilizing various types and types of electronic media such as video, television, computer, radio, tape, LCD projector, telephone, etc., while in a narrow sense, e-learning can be interpreted as a learning process that uses internet facilities as the medium. Therefore, e-learning in a narrow sense is also often known as online learning or online learning and virtual learning.

Based on the brief description of the meaning of e-learning above, it can be understood that in essence, e-learning is a learning process or activity using various types of electronic tools and media, especially gadgets, computers or laptops and also the internet which aims to support the learning process either as a supplement, complement or substitute. The term e-learning is often referred to as distance learning or distance learning. This is because initially, e-learning was deliberately designed to facilitate distance learning which is implemented as an alternative to learning because of the limited time, space, and costs involved in conventional learning. So, in the process, the teacher and students are in separate places, so the teaching material that is delivered is in the form of electronic media that is delivered via the internet. The media in question can be in the form of websites, chats, video conferencing, and so on. However, in Indonesia, e-learning which has been implemented so far is still a combination of online learning and face-to-face learning.

3. METHOD

This research method is qualitative, namely a research method based on the philosophy of positivism, used to examine natural object conditions, where the researcher is the key instrument, data collection techniques are carried out by triangulation (combined), inductive / qualitative data analysis, and research results mechanize meaning rather than generalization. This research uses a qualitative research approach where qualitative research as a scientific method is often used and carried out by a group of researchers in the field of

social sciences, including education. A number of reasons are also put forward, the point is that qualitative research enriches the results of quantitative research. Qualitative research is carried out to build knowledge through understanding and discovery. A qualitative research approach is a process of research and understanding based on methods that investigate social phenomena and human problems. In this study the researcher created a complex picture, examined words, detailed reports of the respondents' views and conducted studies on natural situations. Based on the above background, through this research, the authors examine in depth the use of e-learning in Senior high schools as a form of innovation in PAI learning media in the era of industrial revolution 4.0. To answer this, the research approach used by the author in this study is descriptive qualitative. Research data collection techniques used in this study are in-depth interviews, observation, and documentation. The validity of the research data obtained was tested using triangulation techniques, then in-depth analysis was carried out using the data analysis technique of the Miles and Huberman model which included four main steps, namely data collection, data reduction, data presentation (data display), and data verification (conclusion drawing / verification).

4. RESULT AND DISCUSSION

The 21st century is the century of openness or globalization. Therefore, learning content is expected to be able to fulfill 21st century skills, namely 1) learning and innovation skills including mastery of diverse knowledge and skills, learning and innovation, critical thinking and problem solving, communication and collaboration, and creativity and innovation, 2) skills digital literacy includes information literacy, media literacy, and ICT literacy, 3) career and life skills include flexibility and adaptability, initiative, social and cultural interactions, productivity and accountability, and leadership and responsibility. 24 Today, individuals aged 18 and 23 known as Generation Z (Gen Z) have changed due to advances in technology. This generation has learning preferences which, they are fully involved in the learning process. They take on challenges and enjoy group discussions and a highly interactive learning environment. The learning process of subjects in many educational institutions in Indonesia has yet to take full advantage of the progress of ICT to support the learning process of students, including the use of e-learning as a product. Educational institutions that have started to use and utilize e-learning to support and support the learning process in it, especially for subjects, can be said to be still not too many. This happens because there is still a rooted view or mindset that Islamic Education is a sacred subject, full of meaning and value, and complicated, which requires face to face meetings between teachers and students in every learning activity. The existence and role of teachers in learning cannot possibly be replaced by the existence of electronic media, 29 so they persistently reject the use of e-learning in any form. However, on the other hand, there have also been parties who have begun to shift the paradigm by starting to try to utilize and develop e-learning as a support for the learning process, one of which is the Senior High School in Tangerang. When interviewed and asked about teachers' anxiety about being evicted or even the loss of values in education if teachers teach using e-learning, Senior High School teachers in Tangerang stated that this view is not completely wrong, that the role and existence of teachers in learning is not can never be replaced by electronic media that are used as tools in e-learning, especially in matters related to instilling values and attitudes in students. However, that does not mean that e-learning does not need to be used at all, instead e-learning in this case can be a solution option to answer problems that are often discussed, namely about the lack of lesson hours or time allocated for Islamic Education subjects in educational institutions, even though the scope and details of the material are numerous and broad. In addition, the use of e-

learning can also be directed and aimed at accommodating the characteristics of today's millennial generation who tend to be very close and like technology and social media.

The senior High School teacher in Tangerang also emphasized that one of the reasons why he without hesitation used e-learning as a medium for supporting learning for Senior High School in Tangerang is because it cannot be denied that PAI is now also in the era or era of the very industrial revolution 4.0. closely related to the 21st century, which means that different ways, methods and media are needed in educating and teaching students. It is well known that the 21st century is a time of rapid development of technology and information and is full of challenges that are very different from previous times. This requires people to have new competencies and skills in order to face all kinds of challenges and developments in them. For this reason, Islamic education which includes Islamic Education also does not escape the demand to be able to deliver students to have certain competencies and skills as provisions to face all kinds of challenges in the 21st century and beyond. In the context of education, the competencies or skills in question are often known as the Six 21st Century Skills or 6 21st Century Skills which include: 1) critical thinking and problem solving skills; 2) ability to communicate and collaborate (communication and collaboration skills); 3) the ability to create, discover and develop something new (creativity and innovation skills); 4) information and communication technology literacy (information and communications technology literacy); 5) contextual learning skills (contextual learning skills); and 6) information and media literacy skills, namely the ability to understand and use various media to convey opinions or ideas and carry out interaction and collaboration activities with various parties.

The six competencies and skills of the 21st century will certainly never be realized if the methods, approaches and learning media used are traditional, conventional, teacher center and there is no innovation at all. Therefore, today's Islamic Education learning needs to be designed as well and as possible in order to realize these ideals, one of which is an alternative solution by utilizing technology, the internet, and social media as an alternative source and learning media (learning resource and media).) for students.³³ This is as conveyed by the teacher in the following interview excerpt: Whether we realize it or not, education has now entered the 21st century and also the industrial revolution 4.0 which is closely related to technology. Now this era demands an educational process to be able to give birth to a generation that is not only smart academically, but also has to be skilled and ready to face all kinds of progress, developments, and challenges that occur today and in the future. Children must master at least 6 21st century skills. All of these will not be possible if learning and education in schools, including Islamic education is still like that, monotonous, not innovative, and apathetic to technological developments. Yes, you have to be responsive and welcome all kinds of changes. Children need to be treated to a learning model that is both fun and contemporary so that PAI does not become a boring subject, but fun and they like. However, regarding the use of e-learning in senior High School learning in Tangerang it is emphasized that the use of e-learning is only to support learning, and not to completely replace the role of teachers in educating and teaching material and religious values in the classroom and in schools. This is as stated by the Senior High School in Tangerang as follows: But here, the use of e-learning in this school, especially for PAI subjects, is to support learning. So, not to completely replace the role and duty of teachers to teach children. However, during a pandemic where the education process is required to take place online, e-learning is indeed used completely to replace face-to-face learning in schools, but usually and ideally of course not. E-learning still has to be balanced with face-to-face meetings in class.

Because after all, face-to-face meetings between teachers and students will never be replaced by technology, especially regarding the aspects of cultivating values, morals and character. All will be more relevant to the face-to-face process.

In connection with the interview excerpt, it can be understood that e-learning can be used and utilized to support and support learning activities in an educational institution, so that students both within the scope of schools and madrasah have the opportunity, adequate facilities and containers to expand information, knowledge, and insight into the material and also the realities of life that are in direct contact with the material. This means that students are not only fixated on the subject matter in textbooks or what the teacher says in class, but they can further explore various information from various learning sources via the internet. In this context, e-learning functions as a supplement or addition and complement or complement. E-learning does not seem appropriate if it is applied and functioned as a substitute or substitute for the learning process in class (except in emergencies such as the Covid-19 pandemic), because face-to-face meetings between teachers and students are still very much needed considering the main goals and objectives of Islamic Education learning not only focused on the realm of cognition, but more than that it also includes aspects of affection, psychomotor, inculcating values, attitudes and also character building of students. So, to bridge concerns about the loss of value planting in the application of e-learning, PAI learning can be done with a blended-learning system, 36 which is a combination of face-to-face and distance learning as has been done by senior High School teachers in Tangerang.

The e-learning platforms used to support high school senior learning in Tangerang are Google Classroom and WhatsApp. For the implementation stage, Senior High School in Tangerang has carried out several important stages related to the use of the internet for learning activities (e-learning) as mentioned by Munir, which include needs analysis, instructional design, use stages and e-development. learning, and evaluation. 3

1. Needs Analysis

At the initial stage, one thing that needs to be considered is whether e-learning is really necessary and possible to be applied in learning in an educational institution as a support or not. To answer this question, of course it is not enough if only armed with estimates or because there are suggestions from other parties or people, but needs analysis of needs first. After the needs analysis stage has been carried out and the answer is that e-learning is indeed needed, the next step is to make a feasibility study which includes several assessment components, including:

Aspects related to technical matters (technically feasible); for example, whether the internet network and all its supporting infrastructure exist, what e-learning platforms are possible to use, and so on. Ability and skills (skills and knowledge) of human resources. The application of e-learning which is thick with the nuances of digital technology and the internet certainly requires expertise and skills about this. For this reason, the preparation of human resources to manage e-learning in an educational institution needs to be considered. The human resources referred to in this case can be from one person who is truly focused on managing e-learning for all subjects taught by all educators at the institution or it can be that all individual teachers are equipped with the ability and skills to manage and develop e-learning for the eyes. each lesson, including the teacher. Economic factors, namely whether or not there are funds and budgets to realize e-learning. In this case, the purchasing power of students for the tools needed to carry out e-learning such as computers or smart phones and internet quotas also need to be considered and considered. Social aspects, namely regarding the response or attitudes of the community, especially parents towards the use and utilization of e-learning

for learning. This needs to be considered, considering that parents and the community are also inseparable parts of the existence of educational institutions in a community.

2. Compilation of Instructional Designs

At this stage, the teacher compiles lesson plans and tools starting from learning objectives, lesson content, material coverage, related topics, teaching materials, learning media both audio, visual and audio-visual, and so on, including in it determines what e-learning platform is used to support the learning of High School seniors in Tangerang.

3. The Use and Development Stage of E-Learning

After all the learning tools have been maximally prepared and ready to be applied in learning, the PAI teacher then takes the next step, namely the realization of the use of e-learning to support learning. Teachers can do many things in the virtual classroom that they have created, such as uploading material files, reading materials, learning resources or references, supporting audio or video, assignments, and so on. On the other hand, students can also access various kinds of material and learning resources, have discussions with teachers and fellow friends without being limited by space and time. After e-learning began to be implemented, the continuous development stage was also carried out. This aims to make learning more varied, innovative, and not monotonous so that it is fun for students.

4. Evaluation

In this case, both before the e-learning program began to be implemented and thereafter, the teacher conducted trials first and carried out continuous evaluation steps to ensure the efficiency and effectiveness of the implementation of e-learning as a support for Islamic Education learning. It is also intended that the teacher can determine the right next step as feedback for the learning process that has been implemented.

The development of technology creates new challenges in the industrial era 4.0, one of which is education. Where education will print human resources. With the development of this technology, human resources are required to have various skills to meet industry needs in the future. Figure 1. Student Skills in the Age of Education 4.0 Education 4.0 is a term used by experts in integrating cyber technology in learning (Davis, 2015). Education in the industrial era 4.0 makes more use of digital technology. Therefore, education in industry 4.0 needs to develop capabilities, including: thinking, acting in innovation and being creative (Greenstein, 2012). Education in this century is experiencing enormous challenges (Jack Ma, 2018). If the teaching method is not changed, we will have great difficulty. Learning must contain skills and attitudes, so that students are able to compete with machines. Students at Education 4.0 in the production and application of knowledge and innovation as connectors, creators, and constructivists (BrownMartin, 2017). This is what causes us to prepare quality teachers, and Teachers in the Education Era 4.0 Education Era 4.0 emphasizes the digital economy, artificial intelligence, robots and data (Ghani and Kamaruzzaman, 2019). So that the world of education and learning changes. Demands in this era of education 4.0, teachers face challenges to change the perspective and methods of learning (King, et al., 2010). If teachers in the education era 4.0 do not have quality, competence and qualified qualifications, one of their functions will be replaced, namely in transferring knowledge (Almeida: 2019). Teachers must respond quickly to this change. In other words, teachers have a duty more than just teaching, but also managing students. The teacher's role in education and learning will be a role model for students. Teachers need to carry out learning in a fun, interesting, creative, friendly, and flexible way (Leen, et al., 2014). Apart from that, the teacher is also a facilitator, inspirator, motivator, imagination, creativity and work team as well as a developer

of character values. And also the teacher is a social empathy for students. This is the role of the teacher that technology cannot replace. Teachers must train skills to face the education era 4.0. skills mastered by the teacher will be able to practice student skills. Picture . Teacher Skills in the Education Era 4.0 Teachers must also be able to meet the psychological needs of students. The psychological needs of these students include: (1) needs for competence, (2) needs for autonomy, (3) needs for relatedness, and (4) sustainable learning (Chou, et al., 2018) This is what makes the teacher's role irreplaceable. by any great technology. This is because technology cannot be a facilitator, inspiration, motivator, imagination, creativity, social empathy, and teamwork and developer of character values. However, teachers are still expected to always be able to develop competencies.

Even though the teaching profession did not have a significant influence with the 4.0 industrial revolution, teachers should not be complacent with the existing conditions, teachers must continue to improve their quality so they can become teachers who are able to produce higher quality human resources. Therefore, in addition to the opinions of Wahyuni (2018) and Latip (2018) as previously explained, according to the author's opinion, other attitudes or skills that teachers need to have in the face of the Industrial 4.0 era include: 1. Friendly with Technology The world is always changing and developing into a higher level, one of the changes marked by technological advances. Everyone will not be able to fight technological advances, therefore, in order not to be crushed by them, teachers must have the will to study continuously. Changes in the world by technological advances need not be made as a threat, but faced positively, learn and adapt, and are willing to share with colleagues or colleagues both success and failure. 2. Cooperation (Collaboration) Maximum results will be difficult to achieve if done individually without cooperation or collaborating with other people. Therefore, teachers must have a strong will to collaborate and learn with and or from others. This attitude is needed now and in the future. Doing it is not too difficult, because the world is interconnected, so there is no reason not to collaborate with others. 3. Creative and Taking Risks Creativity is one of the skills needed in the Top 10 Skills 2020, creativity will produce a structure, approach or method to solve problems and answer needs. Teachers need to model this creativity and work smarter how this creativity is integrated into their daily tasks. Educators also need not be too afraid of making mistakes, but are always ready to face the risks that arise. Mistakes are the first step in learning, and need not be a factor in keeping you going, they are to be corrected. 4. Have a good sense of humor. A humorous teacher is usually the teacher most often remembered by students. Laughter and humor can be important skills to help build relationships and relax in life. This will reduce stress and frustration, as well as give other people the opportunity to see life from a different perspective. 5. Teaching Whole (Holistic) In various learning and learning theories we recognize individual and group learning. And, recently, learning and learning styles that are individual, are increasing. Therefore, today's teachers need to identify students individually, including their families and how they learn (to know them completely, including the obstacles they experience both personally and within their families).

5. CONCLUSION

Literature studies regarding the role of teachers in education 4.0 produce an understanding that: (1) industrial development 4.0 Soft skills of teachers: 1. Critical Thinking, 2. Creative, 3. Communicative, 4. Collaborative. is a big challenge for the world of education. (2) the teacher's function is not only knowledge transfer. (3) teachers have an important role in education and learning. (4) teachers in the Education 4.0 era must improve their skills in

order to produce graduates who are ready to face industry 4.0. (5) teachers must be able to meet the psychological needs of students. (6) the role of teachers as facilitators, inspirers, motivators, imagination, creativity, social empathy, and work teams and character values developers cannot be replaced by technology. The progress and development of information and communication technology which is increasingly rapid in the era of industrial revolution 4.0 is already educators should make the most of it, one of which is by implementing an online-based learning system or what is often known as e-learning. This aims to support the PAI learning process so that it can be more innovative, not boring, interesting, not monotonous, and fun. More than that, e-learning based learning is also able to act as an alternative learning model that can lead the current millennial generation to have 6 21st Century abilities and skills which include: 1) critical thinking and problem solving skills); 2) ability to communicate and collaborate (communication and collaboration skills); 3) the ability to create, discover and develop something new (creativity and innovation skills); 4) information and communication technology literacy (information and communications technology literacy); 5) contextual learning skills (contextual learning skills); and 6) information and media literacy skills. To cover the concerns of many parties about the possible loss of aspects of the cultivation of values, attitudes and character in the learning process through the application of e-learning, the learning process can be carried out with a blended-learning system, which is a combination of face-to-face learning and distance learning as already done by seniors High School in Tangerang. In this context, e-learning is not intended and functioned as a substitute or substitute for learning in class, but instead functions as an additional, complementary or supporter of classroom learning. As for the implementation stage, the teacher has taken important stages related to the implementation of e-learning which includes need analysis, making instructional designs, using and developing e-learning stages, and evaluation. To ensure that the adjusted curriculum is implemented optimally, competencies What teachers must have is educational competence, competence for technological commercialization, competence in globalization, competence in future strategies and counselor competence. Teachers also need to have a technology-friendly attitude, be collaborative, be creative and take risks, have a good sense of humor, and teach holistically. Things that need to be considered by schools and teachers in deciding how education and learning are organized, namely student-centered learning, collaboration (collaborative learning), full of meaning, and integrated with society. To support the education and learning process, methods such as (1) flipped classrooms, (2) integrating social media, (3) Khan Academy, (4) project-based learning, (5) moodle, and (6) schoology, can be integrated. into the learning process.

6. REFERENCES

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