

PEDAGOGY IN THE ERA OF INDUSTRIAL REVOLUTION 4.0

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Abstract— This study is aimed to identify in-depth experiences of pedagogics students who work as educator in the formal and informal educational institutions on the phenomenon of pedagogic in the era of industrial revolution 4.0. This study uses phenomenological research methods and data obtained from in-depth interview with four participants. Data analysis through the 'horizontalization' and 'cluster of meaning' stages. The results of the study include influences on education, challenges to education, and education which is relevant to the industrial revolution 4.0. Influence on education, namely early digitalization and computerization, increased employment and educational opportunities, digital communication and information in education, administration and digital learning, as well as changes in the paradigm of students' thinking. Along with these influences, challenges for education also arise in the era of industrial revolution 4.0, that is the fulfillment of facilities and infrastructures, limited human resources, students who have not been able to sort out things wisely, digital technology and internet addiction, as well as changes in the behavior and character of students. Education that is considered relevant is internet-based education and character education.

Keywords: *Education 4.0, Pedagogic, Digital Education, Phenomenology.*

I. INTRODUCTION

Change is the part of world development which progress rapidly, namely the development of the industrial revolution. Each phase of the industrial revolution gives influence on the condition of the industry, economy, and social communities that might even be led to chaos in a Government (H. Prasetyo & W. Sutopo, 2018: 17-26; H. Suwardhana, 2017: 102-110). Society should be prepared to face the challenges that arise from changes that is happening, especially social change, so that the change will provide the positive impact for the community and minimize the negative impact.

We are now in the era of the industrial revolution 4.0 known as the era of digitalization or automation in various sectors of life (H. Suwardhana, 2017: 102-110). Expressed that the era of the industrial revolution 4.0 combines internet and manufacturing or so-called cyber-physical internet of things (H. Prasetyo & W. Sutopo, 2017: 488-495; H. Suwardhana, 2017: 102-110; M. Yahya, 2018). Technology sensors, interconnection, and data analysis are the ideas of the appearance of the fourth phase of the industrial revolution. As with the previous phase of the industrial revolution, industrial revolution 4.0 brings challenges at the same time new opportunities for people's lives. The industrial revolution 4.0 allegedly will bring challenges and opportunities for the industrial,

economic, and social conditions of communities globally (H. Prasetyo & W. Sutopo, 2017: 488-495; M. Yahya, 2018).

There have been various studies that examine the industrial revolution 4.0 in different sectors of life, among other "Industry 4.0: An Examination Of Classification Aspects And Directions Of Development Of Research" (H. Prasetyo & W. Sutopo, 2018: 17-26); "The Development Of Science Industrial Engineering Leading To The Industrial Age 4.0" (H. Prasetyo & W. Sutopo, 2017: 488-495); "The Industrial Revolution 4.0-Based Mental Revolution" (H. Suwardana, 2017: 102-110); "The Fourth Industrial Revolution" (Industry 4.0): "A Social Innovation Perspective" (R. Morrar, H. Arman, & S. Mousa, 2017:12-20). There have been studies that examine education in the era of the industrial revolution 4.0, among other "Industry 4.0 Era: Challenges and Opportunities of The Development of Vocational Education in Indonesia" (M. Yahya, 2018). These studies indicate the importance of the study and understanding of the industrial revolution 4.0, including in education.

Education aims so that every student is expected to be developed as individual and social human beings, including being a citizen who actively participate in the development of the world. Because we are now in the era of the industrial revolution 4.0, then there is necessary for having an education which is relevant to the era of the industrial revolution 4.0, which is understand how to educate students to become members of the society who are supposed to be and in accordance with the development of the times, without omitting the essence of humanity in him.

Sciences of education (pedagogic) in charge of investigating how to educate a child and young man reaches maturity, i.e. the extent particular developments in general terms to be accepted fully as citizens of the communities (W. Rasyidin, 2014). Practitioners of pedagogy, is expected to have an understanding of the development of education relevant to the era of the industrial revolution that now thrive.

It has been postulated that the industrial revolution 4.0 affects various sectors of life, including education. There has been also a variety of research related to the phenomenon of education in the era of the industrial revolution 4.0. However, such research needs to be enriched with the pedagogic phenomenon research in the era of the industrial revolution 4.0 based on the experiences of university students of pedagogics study program who work as educators as well. As for the formulation of research problems in this research is, "How Pedagogic in the Era of the Industrial Revolution 4.0?". The problem formulation is focused into the

research questions: (1) How is the influence of the industrial revolution era 4.0 to education?; (2) what is the challenge for education in the era of the industrial revolution 4.0?; and (3) how is the relevant education in the era of the industrial revolution 4.0? The research focuses on the experience of university students of pedagogics study program who work as educators in formal and non-formal educational institutions for learners aged approximately 6-14 years.

II. METHOD

The approach was conducted in this research is qualitative research with phenomenology research method. Phenomenology method is trying to find answers about the meaning of a phenomenon. Phenomenological research describes the general interpretation of a number of individuals against their various life experiences related to the concept or phenomenon (Cresswel, 2014). Phenomenology of research methods used because it is relevant to the purpose of this research that seeks to explore pedagogics study program students awareness about their experiences on the phenomenon of education in the era of the industrial revolution 4.0. The phenomenology procedures that stated by Stevick, Colaizzi, and is Ken (Hasbiansyah, 2005) are the determination of the scope of the phenomenon is examined, the preparation of a list of questions, data collection, data analysis, descriptions of the stages of the essence, and reporting research results.

Data collection is done with the in-depth interview techniques. The sample questions for the interviews is as follow.

“Based on your experience, how does the industrial revolution affect the World Education 4.0?”

“What are the challenges for educands?”

“What are the challenges for educator?”

“As an educator, is there anything that you have done or plan to face the challenges of the era of the industrial revolution 4.0?”

“According to you, how education should be developed to face the challenge of industrial revolution 4.0 in education?”

As for the data source (interviewees) selection phase is based on the following things.

- Students of Pedagogics Study Program SPs UPI are listed as active students at the time of the research takes place, i.e. January – July 2018.
- Students who have completed at least up to two semesters.
- Students who are active as educators in formal and non-formal educational institutions.
- Students who work as educators for students ages approximately 6-14 years old.

- Students who have run his profession (at third points) since at least six months prior to the study was carried out.

Based on these criteria, four selected students of Pedagogics Study Program SPs UPI consisting of two students (year 2015) and two students (year 2016), that is TD, RF, IK, and AW.

Instruments of the research used in this study are a list of interview questions derived from the formulation of research questions and issues. The data obtained are then analyzed using the analytical method research of phenomenology that is expressed by Stevick, Colaizzi, and is Ken (Hasbiansyah, 2005), which is the initial stage, the stage of horizontalization, and a phase cluster of meaning.

Table 1. The Stages of Data Analysis

Stages	Definition	Implementation
Initial Stage	Describe fully the phenomenon experienced by subjects in the written language	Transcript of interview of four interviewees, that TD, RF, IK, and AW
Horizontalization Stage	An inventory of important statements that are relevant to the topic. At this stage the postponed the assessment (bracketing), that there should be no element of subjectivity	Write down the important statements of the results of the interviews that are relevant to research topics
Cluster of Meaning Stage	Classify statements on ‘horizontalization stage’ into theme units of meaning. This stage is done by finding the meaning based on the reflection of the researcher	Grouping statements into a number of themes and then classifying it into three main points, 1) influence of the industrial revolution 4.0 for education which is experienced by participants; 2) challenges for education in the era of the industrial revolution 4.0; and 3) expectation of education in the era of the industrial revolution 4.0

III. RESULTS

The findings of the research include 1) Education 4.0: Digitalization of Education; 2) Challenges of Education 4.0; and 3) Relevant education of the Era of the industrial revolution 4.0.

A. Education 4.0: Digitalization of Education

Related the digitalization of education, first thing be findings in the study are digitalized and computerized

since early childhood. Digital technology has been used even by early childhood.

Now that uses a technology that not only adults, but children can use it. For example, what? Examples include social media. Before the using of a social media, smartphones. Not only the parents have smartphones, but the young children also have smartphones (RF4, 2-7).

Whew... Correctly, it's very influential. So, any elementary school kid, even kindergarten also holding cellphones, smartphones (TD14, 1-2).

Next, impact on job opportunities and education. In the digital age, job opportunities and education are also influenced by the industrial revolution 4.0. However, it would also have an impact on 'reduction of manpower'.

... every labor that can have the same opportunities to work anywhere, like that (AW2, 6-7).

... get rid of the power of man to do with computers (IK2, 3).

Another thing that is affected by the industrial revolution 4.0 is the digital information and communication in education. Communication and digital information influences in education is significant.

University assignments become much easier, communication with professors so much easier. Because of the ruling, does not collect, hmm ... collecting task by email, no need for face-to-face (RF14, 1-3).

Okay, on the one hand, we can access information from anyone, from any country ... (TD20, 1-2).

Digital learning and the educational administration also get direct influence from the development of the era of the industrial revolution 4.0, among others, logging students data with 'DAPODIK', that is, a system logging online at school, as well as learning using digital media.

Yes, so like this, from logging any student data in education is also the same (IK8, 1).

Means more to be video watching, internet (TD2, 10).

... we do not need to go to the bookstore, but from the internet book (RF14, 5).

The industrial revolution 4.0 also impacted on the changing of the paradigm of thought.

For me this is a challenge, but, if in for my personal, of course give influence. The influence of ... non material, okay? in terms more to ... the spirit and what is it name, a way of thinking or mindset. Keep there are two sides, on the one hand, I am encouraged and spirit (AW6, 1-4).

There are two sides for that matter. On the one hand, this spurs communities, particularly Indonesia, to be more creative, more innovative, and have high competitiveness ... (AW4, 1-2).

... on the other hand that the use of technology that greatly impacts once against the formation of character also (IK18, 3-4).

Now there are a lot of 'bimbel', eventually, the parents more focus on material study only (RF20, 7-8).

... where I was teaching, the kids indeed prefer to get information from the internet (RF16, 3-4).

Tend to be lazy for reading books, so... (IK12, 5).

B. The Challenges of Education 4.0

The first challenge for education related development of the industrial revolution 4.0 is the infrastructure that has not been evenly distributed.

At the time of SM3T, no electricity when I was teaching (TD16, 1).

... couldn't access the media, the only support is, the books, from the books, the books also old books (TD30, 1-2).

In addition to infrastructure, human resource limitations are also a challenge for the education.

However, with this case, when the industrial revolution 4.0 has been opened, with the progress of all of its science and technology, and our human resources are not ready yet, yes, the negative impact is that we will left behind (AW4, 8-11).

... If we missed it for example, the child is already open a site, when we haven't (TD30, 8-9).

The readiness of learners who have not been able to sorting out wisely also became another challenge that comes with the development of the industrial revolution 4.0.

Yes, it is, anyway, are less able to parse-pick which one is good for them, which is not (RF32, 1-2).

Because students haven't been able to filter directly, for students, of course the heavy challenge ... (AW24, 3-4).

The unpreparedness among educands in sorting out the impact of digital technology and internet addiction affects their behavior and character of learners.

... so the kids now turning, again, already addicted to gadgets, internet addiction, an addiction to online games. So, to release the mobile it rather difficult in my opinion (TD30, 4-6).

Well, actually, that's what finally make them learn less (RF16, 10-11).

The challenge, as they tend to be, what it is, tend to come ... tend to underestimate something ... (IK22, 1-2).

However, on the one hand, yes it is, there is always a concern, that our educands will tend to want a brief process, something that was not earned by hard work and the process of forging them well so ... (AW24, 7-9).

C. The Relevant Education in The Era of the Industrial Revolution 4.0

Based on the results of the study, education that is considered relevant in the era of the industrial revolution 4.0 is the internet based education and the digital world.

... so it's more digital developed, the era of the internet, in relation to education, yes, it means the current educational system attempted to lead there (TD2, 3-5).

I think the most happening is about internet-based learning. So, it's difficult anyway, based on the internet. So, the child may use the internet in learning ... (TD38, 1-3).

However, there is also a view better to postpone the introduction of digital technology to students until they are ready.

Anyway, what's the use of the results of the industrial revolution, it, they can use later, so, after they mature. Once they get used to the things the manual (IK32, 6-8).

... because in my opinion the automatic things that they can get later, after their, what, manual works were strong enough ... (IK34, 4-5)

In addition, character education should also be implanted for educands in a digital age.

... the direction of our education, want to go which direction, if it, even if 4.0, 5.0, 6.0, and others, when we already have a strong purpose and character, wherever our educational direction go on, of course we will easily confront any era (AW34, 3-5).

Instill a love of the motherland, Pancasila, and the character of the nation (RF38, 1).

Therefore, educators must also have the competence that is relevant to the era of the industrial revolution 4.0, among other digital and internet competency, rich information, as well as knowledge of human and humanitarian values.

So, the teachers also must be clever, more eloquent than their students about the internet, about the

gadget access, regarding the sites that can be accessed by their educands, must understand also about it (TD26, 8-10).

In the current era, should have recent information (TD36, 1).

A lot of information ... (RF40, 1).

Firstly, the characters that an educator must possess, of course, broad thinking. The second, deep. Broad and deep. But also, capable, knowledgeable about values in the life ... (AW30, 1-3).

... the educators also must love their motherland, love of Pancasila, a strong character ... (RF40, 2-3).

Educators, both at school or at home should understand its role and keep trying to improve their competencies.

... teachers can manage the students ... From the side of education, teachers must also play an active role in the industrial revolution. So, the teacher should limit their students ... So, once again the teacher should play an active role (TD22, 2, 10, 11, 17).

... the teacher just as facilitator (TD2, 8).

At least I had to learn to be able to predict and drive myself, to be able to understand, so, what it name was, I was able to keep up with the progress of the times, particularly in the industrial revolution 4.0 (AW26, 4-6).

First, parents should limit the use of gadgets. Not prohibited, yes, but limit it. So, be wise as parents . . . must also set a time, hmmm . . . smart in choosing the time (TD32, 4-6).

As per expectations from students in the era of the industrial revolution 4.0 is that they will understand the limitations and benefits of the use of digital technology, and want to make an effort and hard work, not relying on automation, digitalization, or an instant way in achieving something.

But, now it is understood, had its own limitations (TD10, 1-2).

... embodies the educands, exactly become wise, character ... (IK20, 6).

Because they would know how it feels to try, how it feels, how the tiredness of work on something, so they're not easy to do, not to think of other people's work is low, never underestimate everyone else that does not fit with them (IK34, 8-11).

IV. DISCUSSION

The research findings is examined in three categories, namely 1) digital age educands); 2) digital age educators; as well as 3) digital age learning.

A. Digital Age Educands

In the Era of the industrial revolution 4.0, digitalization has become a common occurrence. The use of digital technology is not only for the adult. But children too have been using these digital technologies, such as Smartphones and laptops, from an early age (RF4, 2-7; TD14, 1-2). Digital technology has become part of the educands 'needs;, whether in the daily activities of the academic or non-academic activities, such as gathering information for academic assignments and the use of social media. First, collecting relevant information. Digital technology and internet access become a choice for educands in gathering information, both general information as well as for academic activities (RF14, 1-3; TD20, 1-2). Based on other studies in Indonesia about the use of the internet by learners in the age range of the primary education, students use the internet for reasons given by educators at the school (S. Fitri, 2017: 118-123; Husni & Fatulloh, 2016: 6-16)). The statement shows that the main reason is the reason educands in using digital technologies and the internet are for the task given by the educator. However, educands not only use digital technology and the internet to work on academic tasks, but also for recreational, such as playing games and watching videos.

Second, with the development of the digital era, various social media are also developed (RF4, 2-7). Social media are not only used for socializing, social media has also become a place to explore and express the self. For example, YouTube, Tik-Tok, Smule, and Musical.ly. The society in the era of the industrial revolution 4.0, including educands, using social media as a place of 'showing' ability, such as singing, dancing, and other abilities. Social media is also used for sharing a variety of daily activities, for example through the vlog. There have been some children who use social media as a place of self-exploration, among other Ryan (6 years) who became a billionaire through YouTube and Bowo (13 years old) who is known from Tik-Tok.

Although the revolution comes with the digital development industry that provides opportunities for learners, but on the other hand, there is the challenge that comes with the emergence of various opportunities. The challenge is the students haven't been able to sort out wisely, which one is good or not good, which is worthy of being followed or not, which one they allow to access or not, e.g. accessing of adult content and violence (AW24, 3-4; RF32, 1-2). Therefore, educands tend to imitate what they get from digital media and the internet. What they follow can be either a positive or negative thing. Things that are not worthy to emulate, such as watching pornography and committing acts of bullying. Through the use of digital technology and freedom of access to the internet, educands can easily access contents of pornography and violence (Alia & Irwansyah, 2018: 65-77; Husni dan Fatulloh, 2016: 6-16). In addition, digital technology and the internet can also cause addiction on educands (TD30, 4-6; RF16, 10-11; IK22, 1-2; AW24, 7-9). It is also caused by the educands who

have not been able in sorting out wisely, including the duration of the use of digital technology and the internet, so that they are accustomed to using the technology most of the day, either at home, at school, or in other community environment. Unwittingly, educands then become addicted to digital technology (Alia & Irwansyah, 2018: 65-77). The addiction against the digital technologies even has an impact on the learning focus of the educands (RF16, 10-11). Digital technology such as Smartphones lead the learners did not heed the lessons at school and at home (Alia & Irwansyah, 2018: 65-77; Satrianawati, 2017: 54-61).

Development of digitalization is also changing the behavior and character of learners, among others in underestimate things, respect, less patient, want an instant process, following the foreign culture (IK22, 1-2; AW24, 7-9). It is because in the era of digitalization and automation, educands tend to get a lot of things easier, for example in the task, seek information, and even calculation, so they tend to be instant in doing something and can't wait to face a process that is not fast enough. Development of digitalization and the increasing use of digital media by educands, also affect their social abilities (Efendi, Astuti, & Rahayu, 2018: 12-24). It has to do with digital technology and internet addiction, so educands spend more time to play with digital technology compared to socialize with peers. Even if they are socializing or playing with peers, they will play the game using digital technology, which requires them to focus on the digital game not with friends who play with them. Whereas with regard to socialization in social media, generally they only focus on sharing photos and activity, not a discussion or dialogue with friends.

B. Digital Age Teachers

Not only the educands, the educators also obtain information through digital technology and internet access (TD26, 8; TD36, 1). Been studied previously that in the era of the industrial revolution 4.0, educands tend to get information through digital technology and internet access. The educators also obtain information from technology and internet access. Not only for their personal needs, but also in their role as educators. Educators should have rich information in the digital age (TD36, 1; RF40, 1). The information possessed by educands should be diverse and up to date (current) that can be acquired from various sources, among other things, digital technology and the internet. Therefore, educators in the era of the industrial revolution 4.0, should understand the digital technology. It is important for educators to understand the digital world in order not to be left behind by the educands in the digital age. Not only collecting information, but also leverage it for administration. Which includes the administration of education. Logging educands data is now done digitally or online via "DAPODIK" (IK8, 1). Because the world is always changing, educators must understand the changing of the world and educate the educands to be able to meet the demands in accordance with the development of the world as well as to develop civilization (R. Steiner, 1995a, 1995b, 1996). The world now is the era of the industrial revolution 4.0, the era of

digitalization and automation, so that educators must understand the development of the era.

Changes in the industrial revolution 4.0, is not just a change in information collection, communication, and technology. The industrial revolution 4.0 also changed the human, among others, mindset, behavior, and character, as has been examined in section later 'digital age educands'. Educands are human, have a dynamic nature, have the potential, and unique. Therefore, educators must also understand the human and humanitarian values (AW30, 1-3; RF40, 2-3). The educators must understand the facts that educands as human beings, among others, about the potential and the background of the educands. Educators need to understand educands thoroughly and deeply, through the understanding of their potential and abilities (Y. Purwanto, 2007). It has been postulated that the educand is unique and has potential. Education aims in order to make the educands potential develop holistically, as stated in the legislation of the Republic of Indonesia Number 20 Year 2003 About National Education System Chapter II Article 3,

National Education serves to develop the ability to form character and the civilization of the people's dignity in the framework of the intellectual life of the nation, aimed at the development of potential learners become a man of faith and piety to God Almighty, great moral value, healthy, knowledgeable, accomplished, creative, independent, and become a democratic and accountable citizens.

Based on the statement above, the educator should be able to help materialize the goal of national education of the Republic of Indonesia, namely the development of potential educands. It is important for educators to first have the capability of understanding the potential of educands. Because of the fact that all human beings have the potential in them. In addition to understanding the potential, educators also need to understand the background of the educands. Because an understanding of the background of the learners can make educators to understand the behavior of educands, so educators can organize learning appropriately (H. Insriani, 2011: 93-102). Therefore, it is important for educators to have an understanding of educands holistically.

Educators must be able to manage educands, limiting (TD22, 2, 10, 11, 17; TD32, 4-6). Educators must be able to 'controlled' and restrict educands, particularly in the use of digital technology and internet-related developments in the era of the industrial revolution 4.0 or era of digitalization. Educators should have the ability to restrict educands without them feeling burdened, that educands will understand and follow any restrictions given educators on the basis of his own will. Steiner (1995a, 1995b) gives the term a natural authority for such matters. The authority of the natural educators how educators positioned itself so that educands have the will to follow the educators without coercion but based on an understanding that educators are indeed worth it as the natural authority (R.P. Sari, 2018). Educators not only in schools, but also older people at home. Similar with

educators in schools, the role of parents is very important in limit and manage the educands (TD32, 4-6). To be able guide the educands properly, educators as natural authorities have the specific competencies, among other things, that intelligence, personality, and abilities (Gibson, Ivancevich, & Donnelly, 1997). Previously, as expressed that the educator must have an understanding of the use of digital technology and should also have an understanding of educands, it is indicated that educators have the intelligence and ability. Educators must also have a good personality.

C. Digital Age Learning

The presence of industrial revolution 4.0 improves opportunities for society in education and employment (AW2, 6-7). The increasing of such opportunities, demands the society to improve their ability, including the ability of digital technology. Digital technology has become an important part of the community. Therefore, the technology literacy competency should be developed. The ability of technology literacy, namely the understanding of the operation of the technology, which is one of the capabilities of the literacy demands of the era of the industrial revolution into 4.0 now. The increasing demands of digital technology and other expertise which are considered very important to increase the opportunities to compete internationally affects the content in learning activity. Learning content tends to focus on the intellectual ability and mastery of digital technology. However, character education tends to have fewer portion in education (RF20, 8). The character of the educand is as important as his intellectual development. Instead of being not important developing intellectual learners in education, but the intellectual and character should be balanced (AW34, 3-5; RF38, 1).

Education should not only develop the potential of thinking (M. Isfironi, 2015; S. Koni, 2014; Sujarwo, 2006), but also should directs the formation of attitude, behavior and personality (Sujarwo, 2006), including moral development of learners. The moral is derived from the Latin mores, as decency or behavior. Kohlber (H. Machmud, 2014) States that moral contain values which is universal about humanity. This means that moral development is closely related to the understanding of human and humanitarian values. Therefore, data literacy and literacy skills are also important in the era of the industrial revolution now (H. Suwardana, 2017; M. Yahya, 2018). The understanding of the human being is essential demands for society, including for educands. Moral education emphasizes the importance of the knowledge of moral (moral knowing), feelings of moral (moral feeling), and moral behavior (L. Fransisca & C.R. Ajikusumo, 2015: 211-221; H. Machmud, 2014: 75-84).

Another challenge that emerged with the development of the industrial revolution 4.0 and the digital age is the ability of the educands in sorting out (filter) and understand the use of digital technology wisely. Through a decent education, educands are expected to be wise in choosing and understanding the use of digital technology (IK20, 6; TD10, 1-2). Addiction or dependence of digital technology can be decreased.

Educands are also expected to have a spirit of hardworking, appreciative of a process, and not easy to underestimate things. Learning content should contain things that can help to meet the challenges. Educands must have the will to achieve the goal with hard work. Basically, each educand as human beings have the capacity of willing. Man is a creature who wants, desires to get what he liked, and choose what he wants (L. Leahy, 1985). Willingness which developed optimally can give impact on humans to become easier when learning the things given to him (R. Steiner, 1995a). The implication when educands already have strong will power, they will easily master a skill, including expertise in digital technology and a strong character.

Education must equip students with the competence-with relevant to community development and guide the educands to actively participate in the life of society (R.P. Sari, 2018). That is, the learning content as part of education should contain things relevant to the era of the industrial revolution 4.0, so that learners can take advantage of the opportunities and face the challenges that exist, among others, through learning which develops intellectual and character in a balanced way.

Research findings indicate that digital learning media has grown in Indonesia, although not yet evenly because it caused various issues of equalization facilities, such as electricity, roads, access and the internet, particularly in the area of 3T (TD16, 1; TD30, 1-2). Digital learning media that will be examined include the use of video and e-book.

Now, learning has been using video, not just looking at the pictures from the paper (TD2, 10). Although educators must be smart in choosing the right learning video for educands, the use of video in learning has a variety of advantages. As for the advantages of the use of instructional media videos (Batubara & Arini, 2016: 47-66) is as follows.

- Describes the State of the real process, phenomenon, or event.
- Enrich explanation when integrated with text or images.
- Can do repetition on certain parts.
- Assist in teaching material in the realm of behavior or psychomotor.
- Indicate clearly the simulation or a procedural step.

In addition to the use of video, digital books (e-book) can now become an option in the study. In contrast to the video that is audiovisual, e-book or digital book is a great reference book like other books. The difference between e-books and books (or commonly called Paperbook) exist in print materials. Same thing with videos that have a wide range of excellence in learning, e-book also has a variety of advantages. The advantages of e-book is in line with the goal of making e-books, namely the ease and speed of search, preserving library collections, digital library services, saving storage room, creating a collection that is not limited to space and time as well as cheaper cost (Sunardo, 2015).

Now, there is also the application for smartphones that provide video and e-books or articles for educands learning. Such applications have been made available in Indonesia Language as well as English, among others,

“Ruang Guru”, Udemy, Khan, and Coursera. Any content provided on a variety of learning content in schools with other knowledge, such as general knowledge, language, art, and technology. Although the use of digital technology and the internet are beneficial when used in learning, but its use should be limited and supervised by educators (TD2, 3-5; TD38, 1-3). This relates to the learners who have not been wise in sorting out (filter), including in the use of digital technology, as has been expressed in the section later 'digital age educands'. There is also an opinion stating that digitalization in education should preferably be postponed until learners have been ready (IK32, 6-8; IK34, 4-5; IK36, 1).

V. CONCLUSION

It can be concluded that the pedagogy in the era of the industrial revolution 4.0 focuses on digitizing education. Even tend to be less focused on character education. As for the special summary, this study is as follows.

- The industrial revolution digital media use is affecting 4.0 in education marked by digitization and computerization at early stages, namely learners have used digital technology early on, both in communication and information gathering, either non-academic or academic. As well as logging in education, has been utilizing digital technology. In addition, the paradigm of thinking and learner's personality was also influenced by the industrial revolution 4.0.
- The challenges faced by education in the era of the industrial revolution, i.e. 4.0 infrastructure that has not been evenly distributed, especially in the area of 3T (remote area). Besides, human resources, in this case, educators tend to be not ready to follow the development of education in the era of the industrial revolution 4.0. Learners who have not been able to sort out wisely became a challenge. This resulted in their not using digital technology wisely, resulting in addicted to digital technology, change behavior, and character of learners.
- Education that is considered relevant to the era of the industrial revolution 4.0 is the internet based education and the digital world. However, character education must also be balanced with education-related digital world. Educators must have the relevant competence also in order to be able to guide the learners in the era of the industrial revolution 4.0 or the digital age. Educators need to continue to develop the competencies, so that they are able to educate learners to become a wise man, capable of sorting out properly, what should or should not be done, including in the use of digital technology.

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