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Elementary Education Literacy in the Era of Industrial Revolution 4.0

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***Abstract*—Industrial revolution 4.0 is currently a prevalent term. The revolution is initiated by the advancement of technology in many aspects of life. Education is a medium to facilitate the advancement of skills and build strong mental. Suwardana believes that education is the easiest way to shape humans' appropriate behaviour and prepare humans in dealing with industrial revolution 4.0. Furthermore, it is also necessary to improve personal competence and literacy to be actively involved in the revolution. A keyword to understand and cope with the industrial revolution, literacy is important to be integrated into class activities as early as possible in one's education. New literacy concepts should be considered an integral part of humans' development, so they will be more aware of the challenges. This paper explores the new literacy concepts to be emphasized in elementary education name technological literacy and data literacy. In this regards however, this paper also shows that ethnic culture, as a national asset, should be preserved as it can function as a counterweight to the rapid development of the modern era. The existence of the new era should not make people forget about their ethnic culture and national identity.**

Keywords—elementary education; ethnic culture; industrial revolution 4.0; literacy

I. INTRODUCTION

Industrial revolution 4.0 is currently a prevalent term. The revolution was initiated by the advancement of technology in many aspects of life. Moreover, industrial revolution 4.0 is related to digital technology which humans are being gradually replaced by technology-based practices. Mc Kinsey states that 52.6 million types of existing jobs will be substituted by technology-based practices as the result of industrial revolution 4.0. Humans, in this sense, may no longer have jobs as everything is run digitally [1]. To cope with the situation, humans are required to equip themselves with highly refined skills and be mentally strong.

Education is a medium to facilitate the advancement of skills and build strong mental. Suwardana believes that education is the easiest way to shape humans' appropriate behaviour and prepare humans in dealing with industrial revolution 4.0 [2]. Furthermore, it is also necessary to improve personal competence and literacy to be actively involved in the revolution.

Literacy is an important element in dealing with industrial revolution 4.0. Rapid technological advancement should be faced with high-level literacy skills. It is confirmed by the speech of the Minister of Research, Technology, and Higher Education (*Menristek*), Mohamad Nasir at the 63rd Anniversary of Parahyangan Catholic University [3]. In that occasion, Nasir states that one of the higher education policies in industrial revolution 4.0 is implementing curriculum reorientation by developing and teaching new literacy concept (without ignoring basic literacy concept). Basic literacy concepts are reading, writing, and archiving. Furthermore, new literacy concepts in industrial revolution 4.0 are technological literacy and data literacy. In addition to these two new concepts, the quality of human resources is also necessary.

In regard to the topic, higher education is required to produce graduates who can compete in the global era. The elementary education program, therefore, which aims to produce qualified teachers, needs to put forward new literacy concepts in its class program. Issues of literacy, currently, are getting special attention from the Indonesian government. Compared to other nations, Indonesian competitiveness is inadequate [4]. The integration of new literacy concepts will equip students with high-level skills as literate people to cope with rapid changes in the era.

II. METHOD

This research employed qualitative approach that means an approach in which data processing does not involve mathematical and statistical calculations but emphasizes interpretative studies [5]. In addition, Creswell explained if qualitative research is an inquiry process of understanding based on distinct methodological traditions of inquiry that

explore a social or human problem. The researcher builds a complex, holistic picture, analysis words, reports detailed informants' views, and conducts the study in a natural setting [6]. This research involved literature review type. Literature review is an activities relating to the method of collecting references, reading, recording it, and collecting research materials from various literatures without requiring field research [7].

This research produced scientific reasoning ideas from the results of literature review and the results of the researchers' views about topic of research. This research examines elementary education literacy in the era industrial revolution 4.0. The technique of collecting data in this research used document analysis. Documents analyzed in this research consist of research journals, literature journals, and seminar reports. On the other hand, researcher collected data by reading, organizing topics, and recording important information on references.

The steps in this research included (1) exploring general ideas on research topics, (2) looking for literature that relevant with research topics, (3) empahsizing the focus of research topics and organizing relevant literatures, (4) reviewing literatures through content analysis, (5) synthesize and gain a new perspective on a topic, (6) make a new contribution on a topic. Meanwhile, data analysis employed analysis [8]. Content analysis is used to analyze the meanings contained in literature review then each analysis results is coded and interpreted. Then, data interpretation was done descriptively to draw an overview and explain the information that has been analyzed.

III. Results and Discussion

In industrial revolution 4.0, the relationship between human life and technology becomes more multifaceted. Humans can exploit technology more than they presently perform as it is still categorized as small-scale utilization. Industrial revolution 4.0 is able to design the use of the latest technology which has a significant impact on human life [9]. Furthermore, Schwab explains that industrial revolution 4.0 will significantly influence the way humans work, the way humans survive, and the way humans interact with others [10]. For example, in this era, humans can collect information effortlessly from many places just by accessing several applications. Humans can interact with others using video call or perform teaching-learning activity by teleconference. Humans, to some extent, are more flexible in completing intended activities.

Nevertheless, industrial revolution 4.0 seems to be more acceptable for those who are familiar with technological changes. The reason is that the role of humans will be substituted by robots that are able to work faster and produce more products than humans' capabilities. However, humans could do with wiser technology utilization to maintain their role [1]. Industrial revolution 4.0 is not simply about technology utilization as human resource is the utmost factor. Humans are the inventor of technology; therefore, education is a key in preparing graduates to have a significant role in the era.

Literacy is compulsory to be integrated into class activities. It is a keyword for humans to understand and cope with the industrial revolution. New literacy concepts should be considered an integral part of humans' development, so they are more aware of the challenges. In this paper, the new literacy concepts to be emphasized are technological literacy and data literacy.

A. *Technological Literacy*

Voogt, Tilya, and van den Akker state that many teachers and prospective teachers perform limited technological awareness in their class action [11]. They can be considered as the lowest level of computer user (can only operate Microsoft Office and Windows Media Player). The limited computer skills indicate that creativity has not been part of class activity yet. In a different context, elementary students are sufficiently skilled at operating computers; however, more positive things can be explored [12].

Based on the respective arguments, teachers are required to be familiar with technology so that class activities are more effective. For example, it is not effective, for today, to collect students' final scores by using a pen, paper, and calculator. Microsoft Excel can do arithmetic operations more accuratey and effectively. Therefore, students' scores can be calculated and displayed within seconds. Furthermore, the use of Microsoft word can be used in the description of students' development. It is more effective in doing class administration. Teachers can also use the internet to inform students about their score. The method will reduce the use of paper and control the information individually. It is undeniable that teachers and prospective teachers should use technology in their class appropriately.

Actually, technological literacy has been a popular topic with educational practitioners. Wang and Prado state that technological literacy is the ability to use, regulate, assess, and understand technology [13]. In the more specific description, Hovde and Renguette formulate that technological literacy is divided into four levels, namely (1) functional, (2) conceptual, (3) evaluative, and (4) critical [14].

The first level, according to Bailie and Huset, refers to the ability to operate a computer and differentiating the use of various applications in a computer [15]. This level is not appropriate for teachers or prospective teachers as elementary students, in industrial revolution 4.0, have been considered in functional level.

The second level is conceptual. At this level, individuals have been able to utilize technology to search for information, share information with colleagues or the world, and make technology a means to develop their potential [16]. Individuals consider the internet to be a daily menu for their life. In the context of teachers or prospective teachers, the internet is used to explore sources of inspiration for teaching, seek administrative needs, and communicate with colleagues to improve their professionalism. However, individuals at this level have not been able to use the internet wisely. They use the internet only for entertainment purposes which are not directly related to the betterment of the learning process. Most teachers in Indonesia are categorized at this level.

Evaluative is the third level of technological literacy. At this level, individuals are more selective in the use of technology. Individuals have already been aware of software useful for career and creativity development. The latest level is critical. At this level, individuals have been able to use technology wisely, effectively, and efficiently [17].

The level of technological literacy is an illustration of individual ability to operate technology. Teachers or prospective teachers in industrial revolution 4.0 are required to have a critical level in technological literacy. To create literate teachers, universities should provide technology-based learning and training for class activities in primary, secondary, and higher education. Higher education, therefore, should equip prospective teachers with knowledge and practices that are related to the real conditions as the preparation of being genuine teachers.

The integration of theory, practice, and natural condition in a learning process of higher education are exceedingly necessary for teachers and prospective teachers. There is a gap between what has been learned in university and what needs to be presented in formal educational institution. The condition, eventually, requires them to have training related to technology use. It is a fact that prospective teachers are deficient in the use of the application in a certain curriculum, therefore they have to attend a specific training to accelerate their skills. Teachers have a significant role in industrial revolution 4.0 to make students develop their potential through the use of the latest technology.

B. Data Literacy

Mandinach and Gummer define data literacy as the ability to use data effectively or the ability to transform data into information that can be received and reviewed by others [18]. Data literacy is not merely about analyzing data quantitatively but also qualitatively. Data literacy is related to information literacy. Both almost have identical concepts. The difference is reflected in obtaining data sources. Information literacy is a review of data or information from audio or audio-visual resources. In a different sense, data literacy is related to data in a text.

Data literacy is also related to language literacy; in this sense, reading comprehension skill. Data literacy is a key term for teachers to make a concise and acceptable topic for different characteristics of students. Teachers can select some data relevant to learning indicators and attach additional information to students. Related to this practice, Reeves and Honig state that teachers' responsibility is not simply to present data conclusion, but exhibit data by using attractive and understandable language [19]. Data literacy can be a crucial topic, as many teachers are not aware of delivering teaching materials which are suitable for students' characteristics. Teachers convey teaching materials without examining its appropriateness; therefore, miscommunication in-class activity happens [20].

In the education context, data literacy is also related to the way teachers calculate students' score as a measurement of students' progress. Data literacy, for teachers, is useful to assess students' results. By using data literacy, teachers and their colleagues can discuss and decide on scores along with descriptions of each score in each assessment [21]. In industrial revolution 4.0, students' data processing can utilize the use of technology, so it reduces the workload of teachers. In addition, teachers' task is not only to review the data for themselves but to provide explanations about the data to parents. Data literacy is not only important for teachers but also for parents as stakeholders to understand the core meaning of data.

C. The Integration of New Literacy and Local Wisdom in Inustrial Revolution 4.0

It is unquestionable that industrial revolution 4.0 changes the existence of ethnic culture. In this era, people tend to focus on the use of technology as a source for accelerating economic value. The awareness of local wisdom, therefore, is gradually diminishing. In fact, ethnic culture is a national asset, as the culture reflects national character. The existence of technology has two-sided effects, positive and negative effects. The advancement of technology, in this sense, affects negatively to ethnic culture.

Local wisdom is often considered to be a product from the ancient period. However, it must be preserved because it is a connecting point from generation to generation. Local wisdom needs to be developed in education as it is useful to construct a generation that is competent, dignified, and able to reflect cultural values, play a significant role in building national character, and contribute in creating the national identity [22]. The insertion of the foreign culture can be a serious threat for Indonesian national culture. For example, ethnic culture reflecting national character, currently, is influenced by promiscuity and individualistic attitude. Therefore, an inappropriate manner in responding to foreign culture will result in the vanishing of ethnic culture. In addition, inaccurate strategies also contribute to weakening the existence of ethnic culture in a community [23].

In this era, people are fond of foreign culture than ethnic culture. It can be seen from the changes in their consumption, dress, language, and community. The changes lead to the degradation of Indonesian cultural identity from time to time [24]. Technology can be implemented significantly in business and education to reintroduce Indonesian ethnic culture. Strategies that can be carried out to maintain Indonesian ethnic culture in the industrial revolution are utilizing technology access as a preserver and developer of ethnic cultural values [24]. In a modern perspective, the characteristics of ethnic culture can be used as a product with high added value. For example, batik (as an ethnic product) can be modified by fashion designers to increase its selling value.

Furthermore, in the education context, the integration between new literacy and local wisdom can be presented in the learning process. Teachers are the preservation of ethnic culture. They should put ethnic culture values in all subjects. In Indonesian language subject, teachers can write stories which carry the theme of ethnic culture by displaying cultural images. The stories about ethnic culture can also be presented by using digital media so that the introduction of culture is more fun and modern. Afterward, in mathematics, teachers can bring the study of ethno-mathematics; it is a combination of

understanding mathematical concepts with ethnic cultural values [22]. For example, teachers use replicas of traditional houses to make students understand the concept of building space. Teachers invite students to play *engklek* to learn addition or subtraction concepts. Teachers can also introduce ethnic culture through math story problems.

The new era should not make people forget about their ethnic culture or national identity. The disproportion of modern life will not bring an optimal achievement. In welcoming the industrial revolution 4.0, new literacy is an alternative solution to deal with the challenges. Although the industrial revolution 4.0 focuses on the use of appropriate technology, it would be wise to use the technology in a controlled way. Technology indeed helps humans' life. However, technology can change a sense of unity and harmony in life. Therefore, the presence of industrial revolution 4.0 should be faced with a commitment to preserve ethnic culture as a reflection of Indonesian national character.

IV. Conclusion

The industrial revolution 4.0 is initiated by the advancement of technology in many aspects of life. To deal with it, literacy and competence are solutions. New literacy is a concept which teachers need to understand and the higher education institution should consider. New literacy concepts in this sense refer to technological literacy and data literacy. The concepts should be integrated into all class activities so teachers and prospective teachers have a firm understanding about it. Moreover, ethnic culture preservation is also an important topic to discuss.

Ethnic culture, as a national asset, must be preserved as it can function as a counterweight to the rapid development of the modern era. The existence of the new era should not make people forget about their ethnic culture and national identity. The disproportion of modern life will not bring an optimal achievement. Some strategies to introduce and preserve ethnic culture are promoting ethnic culture through the use of technology and the integration of ethnic culture and class activities.

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