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The Genealogy of Digital Literacy

Noor Qomaria Agustina [1,*]

[1] *Universitas Muhammadiyah Yogyakarta/Kent State University. Ohio USA*
** Email: nagustin@kent.edu*

ABSTRACT
The advance of technology will influence human life in many ways. This paper presents the genealogy of digital literacy, and how the technology influences the education. The year of 1970 through 1980 is the mark of the technological leap by fast amount of big inventions. The invention of personal computers and internet along with the development of mobile phones changed the way people life. The world is on your hand when the features of computer became the features in the mobile phone. The advancement of technology also changes the way people read and write, which then change the concept and definition of literacy, from the traditional literacy to digital literacy. Part of the development is the integration of technology in education that change the way teachers conduct teaching and learning as well as the way they learn along their teaching career.

Keywords: *Genealogy, Digital Literacy*

1. BACKGROUND

According to Merriam Webster dictionary, genealogy means "an account of the origin and historical development of something". This paper discusses about the genealogy of digital literacy that comprises two aspects, the advancement of technology especially the computers and the ever-changing definition of literacy. It is interesting that the literacy is no longer defined as the ability to read and write, but it broadens up in line with the advancement of technology. The computer and internet enable the process of reading and writing not in the linear way from the top to bottom and from the beginning to the end. The technology makes it possible to understand the information in a simultaneous way and using the multiple media, no longer the domination of writing. It may comprise the pictures and the link to browse and surf to the other source of information. The way the technology gives the possibility affect the way people seek and understand the information. As the technology becomes part of everyday life, the integration of the technology in the education is undeniable to make students get used to technology and as a mean to contribute to the teaching learning process. This paper will present the genealogy into three parts, the chronology of the computer development, the history of literacy and new literacy and the integration of technology in education.

2. CHRONOLOGY OF COMPUTER DEVELOPMENT

The development of technology influences the human life in every aspect, especially the development of computers that dated back long time ago. Henderson (2009) and Rojas (2001) summarize the development of computers in a very vivid way [1] [2]. The beginning of computer history was the development of calculation machine, later became calculator. This era is also notable as to put the basic concepts of the modern computation system logic, and computer. At least there are three inventions that give notable development to the recent development in the era of 1600-1800. They are the fundamental of computer hardware, integration of language in the computing machine and the long-distance connection by the invention of telegram. Until 1960s, the invention is partially, when in the later time all of that partial inventions are combined together became more sophisticated technology, so one invention led to the others and support each other. The era of 1960-1970 is considered as the early steps of computer that it gained more powerful influence, then it has the expansive movements form 1970-1980 [3].

Since 1980 onwards, the connection of personal computers and internet had the fastest development by integrating internet to the personal computers and mobile phone. The integration of computer technology into mobile phone is the quantum leap for this century. The latest development put people in the open access

information and unlimited sharing through the internet, as there is a fast development on the artificial intelligence and open sources connection [4].

3. THE HISTORY OF LITERACY AND NEW LITERACY

Literacy has gone to a long history since the traditional literacy until nowadays with the advancement of technology that also impact the concept and definition of literacy. Lankshear and Knobel (2003) discussed about the history of literacy in a very comprehensive way that I will share in this paper [5]. The beginning of literacy is prior to 1970 that the literacy is in the domain of non-formal education and the view of the literate and illiterate also depending on the setting whether it is in the first world setting or third world setting. Literacy is associated with the non-formal education that offered to adult to be able to have the basic abilities of reading and writing, and it is associated with the unfortunate, poor, and marginalized people. This is the meaning of literacy in the first world setting. For the third world countries, where there are still many illiterate people because only few go to the formal education, the level of literacy is used to measure the economic power, and their readiness to participate in the economic involvement. Again, this literacy is considered as non-formal education, and literacy is simply denoted as the ability to read and write. After 1970, there was shift of the literacy in the domain of non-formal education become the concern of formal education. One of the pioneers in this matter is Paulo Freire (1970) who proposed the concept of humanistic pedagogy that promote critical thinking in the concept of learning [6]. Thus, literacy is not only seen as the process of being able to read written text and write, but it goes beyond the ability to read the socio-cultural condition. It is in line with Lee (2007) who sees the learning as cultural process that includes the understanding of the social phenomena in the society [7].

The next development of literacy is influenced by the change of the American economic condition that becomes post-industrial society, and "large number of people were seen as poorly prepared for these changes [4]." The objectives of literacy move toward considering the education process to prepare the learners to have function as a good citizen that have role to develop the society for the betterment. Thus, the literacy process moves to view that education should aims to make the learners to be able to participate in the society [8] [9] [10] [11]. The next movement is that there is new concern on the literacy impact to the conceptual and theoretical understanding underpinning the literacy that moves toward the cognitive process within the individual learners and how the experience as the medium to get the learning [6] [12] [13]. In this concept, learning is viewed from the process acquired by the individual.

The definition and concept of literacy had radical movement along with the development of the technology especially the computer and internet. The term New Literacy and multiliteracies emerged along with the integration of technology in education and the fast array of the technology development. Kress (2003) stated that there is "the broad move from the now centuries-long dominance of writing to the new dominance of the image...and the move from the dominance of the medium of the book to the dominance of the medium of the screen (p.1) [14]." The literacies are beyond reading from the screen. Baker, Pearson and Rozendal argued that "...by the ways we help our populace engage in technology-based communication. Finally, new perspective may shed new light on the phenomena of reading and writing with technology (2010, p.3)" and proposed that there are four characteristic of literacy, namely semiotic, public, transitory, and product-oriented, where the literacy is a process of understanding "multiple sign system" that it is shared with others and endure different dynamics of making to make communication to specific audience [15]. Furthermore, they claimed that "Literacy was shaped by the culture of a technology-rich...that used technology to find and share information and insight. Given socio cultural perspective, focus shift from individual cognition to cultural norms (p.16)." According to Cole & Pullen (2010, p.2), "multiliteracies is therefore a platform for the multiple elements that converge in educational practice as it is performed in formal and non-formal situation …to explain the ways in which emotion work in human cognition by making connections between the mind desire, rationality, language, and the unconscious [16]." The literacy is now a viewed as the socio-cultural activities that involved many different skills from the cognitive to metacognitive ones.

On the emerge of the new literacies, there are also many different terms accompanying the literacy. Reyna, Hanham & Meier (2004, p.177) listed the terms given to the new literacies as online literacies, media literacy, new media literacy, multimodal literacy, and digital [17]. Lankshear and knobel (2003) gave the various names for literacies as oral literacy, visual literacy, information literacy, media literacy, science literacy, and emotional literacy [18].

4. TECHNOLOGY INTEGRATION IN EDUCATION

The early integration of technology in education can be traced in 1983 when IBM made a less expensive

product to be used as the PC for home and school users [1]. It is in line with Sauvie (2014) who had experience of her mother, a teacher in high school, bringing computer from school in 1982 so that she could learn how to use it for the school purposes [19].

However, the computer is still for the purpose of the administration, not yet for the classroom practice. The integration of technology in the education will involve the teachers a lot because they are as the implementer of the curriculum and the actors to do the teaching learning process [20] [21]. The integration will fall mostly into two broad categories [5] [17] [22]. The first is the technological knowledge or technical skills that is needed to operate and use the technology and computers, software and applications to develop digital content. The other aspect is the "pedagogical knowledge and skills that are necessary for the appropriate and effective integration of the technology into the teaching and learning process [21]." While Eshet-Alkalai [5] put the "cognitive and socio-emotional aspects" as another aspect for working in a digital environment. Thus, the integration of technology will have much to do with how the teachers acquire the technical skills as well as pedagogical knowledge and skills that include cognitive and metacognitive skills to do the teaching learning process [23] [24] [25]. For the technical skills, the teachers should be able to acquire the basic knowledge of operating the computer and internet. According to Sauvie (2014) the basic skills including but not limited to operate the features of the computers such as word processor, designing the web, doing the email, give links to video and music, blogging, using social media like Facebook and YouTube [18]. In short, it is how the teachers incorporating digital materials in the class. O'Brien and Scharber (2008) added that the technical skills including anything that "digitally literate people produce (blogs, wikis, podcasts); or activities that digitally literate people can engage in such as digital storytelling, social networking, and web page creation (p. 65)." While the State and National Education Standards in the United States stated that the skills are using computers, critically reading webpages, and understanding how to view digital images [26].

To be able to integrate the technology in the education setting, the teachers should be able to implement the pedagogical knowledge and skills that include the cognitive and metacognitive skills. Cope and Kalantzis (2015) proposed a knowledge acquisition under the name of Learning by Design or (L-b-D) [27]. They made the schema of Learning by Design as follows:

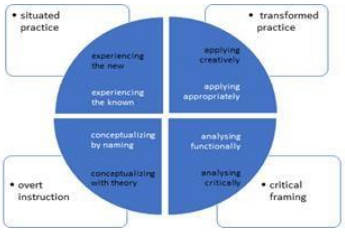

Figure 1. Learning by Design

The Learning by Design concept will enable the teachers to acquire the skills of digital literacy, the skills that is needed to be able to implement the integration of the technology in the classroom. To have more understanding about the cognitive skills, it can be seen also from the knowledge acquisition proposed by Bloom that is popular with Bloom's taxonomy [28]. How the teachers can acquire the information evaluation is based on their knowledge base and value and how they can respect others' too. In short, there are seven steps based on the summary of different digital literacy skills and competences, namely need, search, analysis, synthesis, creation, evaluation, and sharing or communication.

To know more the new literacies, it is important to know about the aspect of these literacies. Saphiro and Hughes in Bawden (2008, p. 23) proposed seven components to understand the technical skills, cognitive and meta-cognitive aspects [28]. Those seven aspects are: (1) Tool literacy- competence in using hardware and software tools, (2) Resource literacy-understanding forms of, and access to, information resources, (3) Social-structural literacy-understanding the production and social significance of information, (4) Research literacy-using IT tools for research and scholarship, (5) Publishing literacy-ability to communicate and publish information, (6) Emerging technologies literacy-understanding of new developments in IT, (7) Critical literacy- digital literacy competence can be seen from the steps here. The first is that when there is a need to find information, so there is a motivation to fulfil the lack of information or to solve a problem. The second is the ability to search and locate the information needed. The third is the ability to do the analysis on what is useful, needed and which information is not valid upon a vast array of information in the internet and doing the synthesis of those information for the next step. The last is how the teachers can create, evaluate, and communicate or share the information that they already learn and have the knowledge on it based on the right judgement, social-cultural perspective and ethical issues. All of the ability to evaluate the benefits of new technologies (note this is not the same as "critical thinking," which is often regarded as a component of information literacy).

Another aspect to understand about the new literacies is by looking at the competence required in the digital literacy and the formation literacy. Fieldhouse and Nicholas (2008) made comparison of four sources to view the digital literacy and information literacy [29].

5. CONCLUSION

Human behavior and way of thinking is influenced by the technology they have at present. The advancement of the computer is one of the examples on how technology affect the human life. The computer does not affect only in a certain part of the human life, but all aspects that sometimes total changes are necessary. The ability to make use of the technology is called the digital literacy that comprises two aspects namely technological knowledge or technical skills to operate the computer and pedagogical knowledge and skills that is needed to manage the information obtained from the internet. In the broader sense, it is also closely related with the socio-cultural aspects since the integration of technology in the daily life involved the language and cultural symbols. The integration of technology in education is as the answer to the demand in the society since the students should be able to live within the social function, then the mastery of technology in their daily life becomes crucial. Besides, the advancement of technology help the teachers to conduct the teaching learning process.

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