Developing Digital Literacy Practices in Yogyakarta Elementary Schools

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Abstract: The expansion of digital technology presents both obstacles and opportunities, particularly for young people. Consequently, educational institutions have been developing digital literacy curriculums. Since digital literacy is not yet included in the national curriculum as a compulsory subject, private schools have constructed digital literacy programmes based on local resources. This study investigates how digital literacy practices are carried out in selected private elementary schools in Yogyakarta, Indonesia, based on ICT learning, an information and media literacy approach, educators' role, and learning points. The data were collected in interviews with: (1) principals, (2) Information and Communication Technology (ICT) teachers, (3) librarians and (4) classroom teachers because, according to previous research, they are the main actors of digital literacy in school. The structured interviews use research instruments derived from two earlier studies and are tailored to the study's needs. This study demonstrates that (a) the digital literacy approach is implemented mainly through an ICT learning and media literacy approach while the information literacy approach is undermined; and (b) principals, classroom teachers, and ICT teachers are the three actors who play the most important roles in digital literacy, while librarians play a minor one. The majority of digital literacy training takes place in computer laboratories, while training in classrooms and libraries is less frequent. The study recommends the school blend ICT learning, information literacy, and media literacy pedagogy more comprehensively, with the library serving as the primary locus. In parallel, school principals should encourage school librarians to collaborate with the computer and class teachers to enhance the inclusive digital literacy curriculum.

Keywords: Digital Literacy, Schools, Media Literacy, ICT Learning, Information Literacy

1. Introduction

According to the Indonesian Internet Providers Association (APJII), Indonesia's Internet penetration rate was 73.7% in 2019 (APJII, 2019). In other words, more than 196 million Indonesians have access to digital media. Specifically, UNICEF reports that at least 30 million children and adolescents in Indonesia are Internet users, accessing the network via mobile devices, smartphones and tablets (UNICEF, 2019). In addition, the frequency of accessing information (primarily content on social media) on digital media platforms in Indonesia is relatively high (Rahma, 2015).

Unfortunately, the high Internet penetration is accompanied by rampant online abuse cases such as scams, child trafficking, fraud, and cyberbullying. Mafindo reports 997 scams proliferated on the Internet in 2018 (https://www.mafindo.or.id). During 2017-2019, the Minister of Women's Empowerment and Child Protection recorded 1940 online cases of abuse of minors, mainly involving sex, pornography and bullying (https://news.detik.com). These cases demonstrate that unlimited access to digital media is not synonymous with Internet users' high level of digital literacy in Indonesia (Puspitasari and Iishi, 2016).

The proliferation of digital technology provides challenges and opportunities, especially for young people. Accordingly, education institutions have responded to the current situation by implementing digital literacy practice in the classroom (Bhatt, 2012; Hall, Nix and Baker, 2013; Derbel, 2017). Gilster (1997) describes the concept of digital literacy as the ability to use technology and information from digital devices effectively and efficiently in various contexts such as academia, careers and everyday life. However, some scholars criticised that he has oversimplified this terminology into technical skills only. Eshet (2002) challenges the Gilster conception as she argued that digital literacy involves a particular way of thinking built from various disciplines. Digital literacy is a set of knowledge that involves at least three forms of literacy, which had previously been practised, media literacy, information literacy and computer literacy/information technology communication (Chen, Gallagher-Macka, Kidder, 2014).

In America and the United Kingdom, media literacy learning, including digital literacy, has been implemented. In the UK alone, media education began to be rolled out in primary and secondary education in the 1920s. Even in

2007, media education was determined as a compulsory curriculum throughout the European Union as the initiative of the UK. In the United States, media learning had already started in the 1990s (Fedorov, 2008). On the other hand, media literacy has not yet become a compulsory subject in Indonesian primary schools. The 2006 curriculum in Indonesia had integrated ICT subjects in elementary schools, however, due to the change of curriculum paradigm, the subject was removed in 2013 (Warsihna, 2015). Despite the reconstruction of the national curriculum, some private primary schools offer ICT subjects and implement digital media for classroom learning.

Previous research on digital literacy in schools has typically focused on implementing an integrated national curriculum (Polizzi and Ros, 2019; Javorsky and Horvath, 2014; Polizzi, 2020; Berge, 2017; Sefton-Green et al., 2009). However, this study aims to learn more about applying a school-based digital literacy programme integrated with existing educational resources. The overarching question of this study is the implementation of digital literacy in elementary schools associated with the ICT learning, information and media literacy approach, the role of educators and the location of learning.

2. Literature Review

2.1 Digital literacy

Many scholars associate digital literacy with ICT learning as they define digital literacy as the ability to utilise technology and information using digital devices effectively and efficiently in various contexts such as academia, workplaces and daily life (Riel, Christian and Hinson, 2012). This definition simplifies literacy issues and is less relevant to the current situation because it considers digital literacy and computer or ICT literacy as the same thing (Simpson and Obdalova, 2014).

Digital literacy is also often considered similar to media literacy (Koltay, 2011) because it aims to improve the capabilities needed to access, analyse and evaluate various forms of information and communication (Berson and Berson, 2003). In this sense, digital literacy is considered to be the same as digital media literacy. Nevertheless, this definition is not entirely appropriate because it ignores the technical education of digital media, which is more complex than conventional media (Buckingham, 2015).

According to Ng (2012), digital literacy comprises three parts: cognitive, technical, and socio-emotional, including numerous types of literacy. Information literacy, critical literacy, and multiliteracy pictures, audio, gestures, spatial, and linguistic make up the cognitive component. Digital literacy's socio-emotional component comprises interacting, socialising, and learning effectively on the Internet. The capacity to use software and hardware in learning and everyday life is referred to as the technical component (Buckingham, 2009). Digital literacy is the result of the interaction of cognitive, socio-emotional, and technical components. In other words, digital literacy is a combination of knowledge about tools (competencies using software and hardware), critical capabilities (evaluation and contextualisation) and social awareness (understanding self-identity, collaboration, and communicating with the audience in certain contexts) (Hague and Williamson, 2009). Digital literacy is attributed to the skills, knowledge, and understanding required to reinvigorate digital participation in professional and social life (Bawden, 2008).

Hobbs and Coiro (2016) propose a digital literacy curriculum at schools that consists of 6 elements. *First*, a context, which deals with an understanding of the student, community, and educator needs. *Second*, goals, which cover determining learning goals, standards, and achievements. *Third*, the content, which includes the resources to be used (text, visual, sound, tools and digital devices). *Fourth*, teaching that deals with the type of learning methods to use. *Fifth*, an assessment that determines the products developed by students and the criteria used to measure their quality. *Sixth*, the task or activity, which includes a learning scenario that will be used (Hobbs and Coiro, 2016).

The digital literacy curriculum is useful for at least three crucial goals. *First*, it encourages students to do personal reflection in their social context. *Second*, it promotes cognitive and emotional learning using digital tools. *Third*, it creates a circle of learning, including risk-taking, experimentation, creative experiments, rapid creation, and innovative process design (Hobbs and Coiro, 2016). The purpose of digital literacy learning is to enhance student participation in digital media as early as possible so that they become active, creative, productive and innovative individuals (Knobel and Lankshear, 2006).

As explained above, digital literacy is a combination of computer literacy (technical aspects), information literacy (cognitive aspects) and media literacy (socio-emotional aspects). Therefore, it is necessary to develop a learning curriculum that covers those three aspects. Besides performing classroom and laboratory learning, the learning process should be carried out outside of schools, such as in the community and family, so that students can link their digital experience with real-world experiences.

2.2 The role of ICT teachers in promoting digital literacy at schools

ICT learning in Indonesia was initiated in the 1990s in high schools. Then, in 2003, the primary school curriculum began to include ICT as an academic subject. Teachers train children to use computers to process images, writing, and numbers, with the main programme taught being Microsoft Office. In the 2013 curriculum, ICT subjects were excluded from the national curriculum by the government. However, some private schools still provide this subject to the students.

ICT learning offers excellent benefits to the students and provides technical learning to operate and use computers but also other learning experiences such as active engagement, collaboration and participation in groups, interaction and feedback, and connections with real-life contexts (Roschelle et al., 2013). Furthermore, the research revealed that ICT learning improves student comprehension in essential subjects such as math, science and literacy. Teacher training, student assessment, and school capacity are necessary to optimise computer-learning effectiveness.

Furthermore, ICT learning in schools has transformed learning in some way. *First*, it changes the philosophy of instructivist into constructivist education. *Second*, teacher-centred learning turns into student-centred. *Third*, the utilisation of local resources shifts into global resources. *Fourth*, it increases the complexity of tasks and promotes information from various sources (Way, 2009). At the same time, ICT learning encourages student-centred learning, active, explorative and research-based education, collaborative work, creativity, critical thinking, information-based decision making, involvement in the real and virtual world, and the dissemination of skills and knowledge (Nasah et al., 2010).

The ICT learning framework can be designed based on three leading indicators: ICT infrastructure, ICT motivation and usage, and teaching and innovation. Each indicator can be further split into four categories. ICT is placed as innovative learning in the first category, which is isolated from other learning processes. In the second category, ICT is directed at learning operational, technical skills. The third category, ICT, is used as a new learning environment so that educators and students are required to use it in various forms of learning. The fourth category is the ideal form of ICT learning when ICT infrastructure, motivation for use and the school environment have fully supported the framework. The explanation of the framework is presented in the following table.

Table 1: Analysis Framework of ICT Learning

Dimensions	Category 1	Category 2	Category 3	Category 4
ICT Infrastructure	Unconnected environment	Initiation of connecting the environment	Form a connected environment	Different sides of a connected environment
Motivation and use of ICT	Reactive-situational	Skill orientation	Proactive-higher order	
Pedagogy and Innovation	ICT as an innovative object	ICT as media of curriculum	New learning environment	

Source: (Way, 2009, p. 594)

In general, digital literacy is often defined as the ability to use computers, which is related to using text-based software and data without reference to the socio-cultural dimensions (Gruszczynka, Merchant and Pountney, 2013). In this sense, schools that teach ICT skills are considered the same as those teaching digital literacy. The assumption is that someone who can use digital tools can also understand the digital world. However, ICT learning will only be instrumental if it is not equipped to teach the concept of digital media, know of the challenges of digital era teaching, and explore participatory media culture growth (Buckingham, 2007; Chu, Tse, and Chow, 2011).

3. Research Methods

This study employs a descriptive qualitative method (Neuman and Kreuger, 2003). The data were collected by conducting interviews with: (1) principals, (2) ICT teachers, (3) school librarians, and (4) classroom teachers. The

research used structured interviews utilising research instruments compiled by the research team based on two previous studies adapted to the research context. The reference used to develop the instrument was a study on Media Literacy in Montenegro conducted by Jelena Perovic (Perovic, 2015), which developed devices to interview ICT teachers and librarians. Meanwhile, the principal and classroom teachers were interviewed with the Digital Literacy Activist Network (Jaringan Literasi Digital/JAPELIDI) (Kurnia and Astuti, 2017; Jordana and Suwarto, 2017).

Three stages are used to analyse the descriptive qualitative research data from interviews: data reduction, presentation, and conclusion (Miles and Huberman, 1994). Data reduction relates to a complex process regarding selecting, focusing, simplifying, abstracting and transforming information from field notes or transcriptions. The interview responses from ICT teachers, librarians, and school principals were collected and categorised to find common ground as meaningful facts. The categorisation follows the determinant aspects such as ICT learning, media literacy approach, information literacy approach, educators' role, and learning space. Next, the data display involves organising and comprising information in many display types such as matrices, graphs, charts and networks to compact the data. This is a significant stage for the researcher to evaluate the quality, uniqueness, and profoundness of the data. Therefore, the researcher would determine the relationship among beneficial topics to draw the common thread about digital literacy effort in each school. Lastly, conclusion drawing and verification disclose regularities, patterns, explanations, configurations, causal flows and propositions. In this study, the researchers attempt to conclude inductively from one or more facts about digital literacy practices in all elementary schools. The researchers strive to frame the similarities and differences of digital literacy pedagogy that may contradict previous research. This step may start from the beginning of the study; however, the final arguments and confirmations emerge from the robust data and intersubjectivity consensus.

This research employs a purposive sampling technique, i.e., determining research subjects based on the requirements, which have been determined. The specified requirements are (1) being a private school, (2) implementing ICT subjects, (3) having libraries equipped with digital media, (4) conducting learning using digital media in the classroom. Based on these terms, this study was conducted in four private primary schools (sekolah dasar/SD) in Yogyakarta Municipality namely, SD Tumbuh 2, SD Muhammadiyah Sapen, SD Budya Wacana, and SD Tarakanita.

4. Results and Discussions

4.1 ICT Learning Approach

4.1.1 ICT Infrastructure

Regarding the dimension of ICT infrastructure, the four schools are at level 3 as they have adequate ICT infrastructure in which the Internet and intranet have been functioning. There are computer spots such as computer laboratories and technology centres. Nevertheless, a few teachers can utilise technological devices, and multimedia began to be used for teaching and learning. Schools intend to develop additional infrastructure sources (Way, 2009).

The four schools (Muhammadiyah Sapen Primary School, Tarakanita Primary School, Tumbuh 2 Primary School, and Budya Wacana Primary School) have adequate computer laboratories and digital media devices in the classroom. In addition to the laboratory, the classrooms in those four schools are equipped with projector screens and LCDs. Teachers also use laptops in teaching.

In Muhammadiyah Sapen Primary School, the teachers' ICT skills are varied since there are many teachers. Teachers who are over 50 years old tend to be unskilled in using ICT.

> *Of the 137 teachers and students, 50% are technology literate. It takes three years to transition: train the upper-class (grade 4-6) teachers to introduce the programmes on the computer, apply the programme for the learning process, make presentations, and create blogs. Each class is equipped with ICT facilities (projectors and computers) for the daily learning process: class and subject teachers sometimes use these facilities. There is also unique IT learning in which children go to the lab to specifically learn IT* (A, Principal of Muhammadiyah Sapen Primary School, June 15 2019).

Additional facilities at Tumbuh 2 Primary School are iPads used alternately by all students in specific lessons, and they are stored in the library.

> *iPads were chosen because they offer more supporting applications for temporary education. Keynote, iMovie, games, language dictionaries, puppet character applications, daily prayers, stories of the Islamic prophet, and holy books can be accessed from iPad and computer* (Y, Principal of Tumbuh Primary School, 20 June 2019).

Whereas in other schools, digital media production by students is usually carried out by students in a computer laboratory or at home.

4.1.2 Motivation and Use of ICT

In the second dimension, regarding teachers' motivation and use of ICT, all four schools are at different levels. Three schools, Budya Wacana Primary School, Muhammadiyah Sapen Primary School, and Tarakanita Primary School, are at level 2, whilst Tumbuh Primary 2 is at level 3. The three schools at level 2 direct ICT learning to improve student skills. The assignments are directed at a structured and multilevel curriculum. For example, grade 1-3 students are to study image-based hardware and software. Meanwhile, grade 4-5 learning aims to develop skills in processing words and numbers and combining added images and sounds.

As mentioned above, the three schools refer to the 2009 curriculum, but the curriculum applied by Tarakanita Primary School is more sophisticated than the other two primary schools. At the end of learning in grade 6, the teacher directs students to create simple computer programming. Meanwhile, Budya Wacana Primary allocates the longest time regarding the duration of learning, i.e., 3 hours @ 35 minutes per week. Tarakanita Primary School allocates 2 hours @ 35 minutes while Muhammadiyah Sapen Primary School uses only 1 hour @ 35 minutes. The difference is influenced by the orientation of the school, which will be explained in another section.

> *Children are taught to operate, produce, share and protect from negative content on the Internet. We have slogans to avoid those useless words that become a guideline in various subjects, including ICT* (D, Principal of Budya Wacana Primary School, 18 June 2019)

At Tumbuh 2 Primary School, the orientation and motivation for using ICT are designed somewhat differently. Although Tumbuh 2 Primary School is slower to adopt ICT in learning than the other three schools, the foundation has set digital learning as a school's flagship. They designed a digital learning programme, and the school attempted to incorporate digital media as part of a proactive effort to new ways of teaching and learning as a new way of thinking. The teachers develop their knowledge, perform critical reflection, open their minds, collaborate within and outside the school, and conduct multimedia creations, criticisms and global publications (Way, 2009).

> *Digital learning is a learning approach employing digital media. The material from the book can be presented using various media, so learning is more fun compared to conventional media, and presentation material is easy to understand* (Y, Principal of Tumbuh 2 Primary School, 24 June 2019).

4.1.3 Pedagogy and Innovation

The final dimension is pedagogy and innovation. The four schools have the same positions as the previous dimension. Muhammadiyah Sapen Primary School, Budya Wacana Primary School, and Tarakanita Primary School are at level 2, whilst SD Tumbuh 2 Primary School is at level 3. At level 2, teachers have utilised ICT as part of learning. Still, they do so as a mere learning support tool to improve material delivery, enrich learning resources, and promote skills enhancement. At level 3, as in Tumbuh 2 Primary School, digital media is used to develop a new learning environment. Innovation in this school allows students to produce new and creative learning environments based on students' needs that move beyond school. Learning in this way involves several forms of intelligence, collaboration, new ways of learning (personal, realistic, self-speed, self-direction, non-linear, self-assessment), networking, global community and digital learning space (Way, 2009).

For comparison, grade 4 students in the three primary schools at level 2 have been encouraged to browse information through the Internet with assistance from the teacher to find a specific page. Students were taught to find learning sources through digital media. Whilst at Tumbuh 2 Primary School, ICT teachers show how to search for information sources on the Internet and apply the curriculum so that assignments in ICT classes are suited to the learning material in the classroom. In this situation, there is an integration of learning between ICT teachers and classroom teachers. Classroom assignments submitted in writing, pictures, and videos are

compiled in each student's folder before reporting to parents and other school exhibition events. They plan to prepare a separate channel for students' work on social media.

> *Children's work is uploaded on social media (YouTube), public school exhibitions, shown to comparative study guests, and sent to parents. The comments are optimistic because the library is considered a pleasant place, a place to gain knowledge, play, and create works. The digital media has changed the mindset which has been developing in which the library is seen as a strict and boring place* (B, Librarian of Tumbuh 2 Primary School, 21 June 2019)

Table 2: Level of ICT Learning Dimension

Dimension	Category 1	Category 2	Category 3	Category 4
ICT Infrastructure			Budya Wacana Primary School Muhammadiyah Sapen Primary School Tarakanita Primary School Tumbuh 2 Primary School	
Motivation and ICT use		Budya Wacana Primary School Muhammadiyah Sapen Primary School Tarakanita Primary School	Tumbuh 2 Primary School	
Learning and Innovation		Budya Wacana Primary School Muhammadiyah Sapen Primary School Tarakanita Primary School	Tumbuh 2 Prary School	

Source: Processed data

4.2 Information Literacy Approach

Apart from ICT teachers, another vital role in digital literacy in schools is the librarian. Librarians are interested in increasing the literacy level of students through the reading of books and utilising information from various sources. Digital media is one of the sources of information, and its role is increasing all over the world. Accordingly, librarians are expected to develop information literacy in schools.

Compared to ICT teachers and classroom teachers, the principal gives limited time to librarians to develop digital literacy. They do not have direct access to students to teach particular information literacy skills. On rare occasions, the classroom teachers ask the librarian to teach the students Internet exploration skills to find references. According to the school principal's perspective, the librarian's main task is managing the library. However, the role of the librarian is strongly influenced by the principal's policy. The following table describes the different roles of librarians in each school.

> *I rarely become involved in the classroom. Sometimes, the teacher asks the librarian to teach about how to find information sources on the Internet. The most are about differentiating between reliable and untrustworthy websites* (X, Librarian of Muhammadiyah Sapen Primary School, 25 June 2019).

Table 3: Approaches in Information Literacy

	Technicality		**Pedagogy**	
Schools	**Availability**	**Authority**	**Integration**	**Independence**
Muh. Sapen Primary School	Five desktops	A digital catalogue is available. Librarian responsible for controlling,	The librarian helps students to find references	Librarian teaches students in classes 4, 5, 6 to read, write, find print, digital references, and

	Technicality		Pedagogy	
Schools	**Availability**	**Authority**	**Integration**	**Independence**
		directing and utilising the library		coaches students for a scientific writing competition
Tumbuh 2 Primary School	12 iPads	Librarian manages iPad utilisation, provides learning application in classroom and library	Librarian schedules library visits and helps to find references	The librarian leads students in the class to read and tell stories
Tarakanita Primary School	TV and DVD Player	-	Librarian arranges library visit schedule	-
Budya Wacana Primary School	-	-	--	-

Source: Processed data

4.3 Media Literacy Approach

There are various approaches to media literacy programmes, including digital media. Each school emphasises different approaches based on the school needs. All elementary schools apply a protectionist and creative media approach. Tarakanita Primary School adds another approach, such as critical analysis, whilst Tumbuh 2 Primary School also employs approaches such as media fun and social participation. A summary of each school's approach is presented in Table 4.

Table 4: Approaches in Media Literacy

Schools	Protectionism	Critical Analysis	Creative Media	Media Fun	Social Participation	Active Audience
Muh. Sapen Primary School	√			√		
Tumbuh 2 Primary School	√		√	√	√	
Tarakanita Primary School	√			√		√
Budya Wacana Primary School	√			√		

Source: Processed data

Following world trends, the protectionist approach is mainly affirmed when schools educate children about the media (Jordana and Suwarto, 2017). All schools emphasise aspects of protection for students in many different ways. *First*, learning to search for resources from the Internet is directed at the designated site. The teacher provides little opportunity for students to find learning resources from search engines independently so that students are not confronted with harmful content. *Second*, they install parental control applications on the computers that students use in computer labs and libraries. The goal is to ensure that children can only access positive content. *Third*, they discuss positive and negative values in classroom learning to protect against harmful content. In addition, these materials are also presented in meetings with parents. The emphasis is mainly placed on violence and pornographic content.

> *Parents are also educated so that every Sunday morning, when taking care of their children, they are recommended not to let the children play with mobile phones. Parents are proud to provide smartphones for their children, but they should consider the knowledge that children need prior* (A, Principal of Muhammadiyah Sapen Primary School, 22 June 2019).

The second approach, which is also popular, is media fun. Almost all material content delivered in ICT classes is directed at media production to learn productivity and creativity. As discussed in the previous sub-chapter, creativity for grade 1-3 students was directed at image processing, while in grade 4-5, creativity was intended for processing words, numbers and sounds. This approach assumes that taking pleasure in using media from a subjective perspective is an encouragement. ICT teachers choose this approach because ICT skills are considered successful if products are created. In addition, this learning method is considered to increase interaction, encourage participation and improve student confidence.

> *We teach children to utilise technology for learning: making pictures, working with the office, creating simple graphic designs, and editing videos into PowerPoints. The goal is to encourage children to be creators. We also hold animation competitions for students. Moreover, they are supported to join the competitions at the provincial level* (C, Vice Principal of Tarakanita Primary School, 17 June 2019).

Interestingly, Tarakanita Primary School employs an active audience approach in learning through sexuality subjects taught in grades 5 and 6. This subject has been taught for a long time as the school's response to higher grade students' physical growth and social environment. In those subjects, students are educated to avoid sensitive sexual content on the Internet. They are taught to access, understand needs, choose and analyse content, and protect themselves from the dangers of the Internet, especially from narcotics and sexually explicit matters.

> *Especially in grades 5 and 6, the students learn about sexuality and drugs. From grade 3 to 6, the materials on sexuality are incorporated in the physical and health lessons. When the students participated in orientation, grade 1 to 6 students socialised using cell phones and computers, including social media* (C, Principal of Tarakanita Primary School, 19 June 2019).

Tumbuh 2 Primary School utilises four perspectives in digital literacy, which are applied in classroom learning, computer laboratories, and libraries. Besides the protectionism and media fun approach, the school also adopts creative media and social participation approaches. The innovative media approach is employed to provide mechanisms and spaces for expression for students. The teachers encourage the students to produce works during classroom learning and in computer laboratories. The students' work is suited to the curriculum contents and presented in class, while teachers select certain materials that are easy to display in the form of photovoice. While in the computer laboratory, students are asked to produce works and then compile them in a portfolio folder. The social participation approach encourages students to recognise environmental problems and take the initiative to solve them. Some topics that are often raised include multiculturalism, disability, and social inequality. Students are encouraged to recognise differences and produce works to express their opinions. The works are exhibited for parents on certain days.

> *By collaborating with university students, children in Tumbuh 2 Primary School use several applications to write novels and learn about science and mathematics. We want to foster a distinctive, inclusive character, where all children can follow (various) developments in learning using digital technology* (Y, Principal of Tumbuh 2 Primary School, 24 June 2019).

4.4 Digital educators and digital literacy access points

The main access point for digital literacy shows the dominant role of educators. The location affects the digital literacy approach because each educator has a different workspace. In this research, four educators: principals, class teachers, ICT teachers and librarians, were involved in digital literacy.

The principals of Tumbuh 2 Primary School, Budya Wacana Primary School and Tarakanita Primary School are accommodating and facilitative. Because the schools are under the foundation, the school principal often formulates curriculum policies based on the direction of the foundation. The headmaster acts to accommodate the proposals of students, teachers, and parents. Furthermore, they are responsible for ensuring the availability of facilities to achieve the school's/foundation's vision and mission.

Muhammadiyah Sapen Primary School has two principals because the school is enormous, and sometimes the principals organise independent school programmes. Therefore, they do not strictly follow the foundation's direction. For example, the librarian teaching in the classroom or the flexibility of the class teacher in using learning applications based on their initiatives can be implemented based on the headmaster's policy. Muhammadiyah Sapen Primary School is often appointed as a pilot school in the Muhammadiyah Foundation, so they are expected to design progressive programmes. In this case, the principals are given autonomy within a specific range.

Class teachers also play a significant role in the adoption of digital literacy. At the beginning of curriculum transformation, they were trained intensively in the early stages of adoption. They also provided initiatives such as computer loans from schools to encourage them to use digital media. In Tumbuh 2 Primary School, the transformation started in 2014, while Budya Wacana Primary School transformed their curriculum in 2014, and Tarakanita Primary School began to digitalise their school in 2009. Teachers in three schools, Tumbuh 2 Primary School, Budya Wacana Primary School, and Tarakanita Primary School, have advanced using digital media for varied quality learning. Budya Wacana Primary School argues that they still have significant obstacles in the third

year of digital media adoption. However, the teachers gradually adapt and improve skills after teaching an overview of the challenges of the future of education. Teachers at Tumbuh 2 Primary School could adopt digital media quickly because most of them are young. In addition, the schools encourage the use of iPad technology and its applications in learning. Each semester, Tarakanita Primary School retrains the teachers to keep maintaining and improving their skills.

> *In 2009, young teachers mostly had basic ICT skills, so that a larger portion of the training focused on development. The foundation provides a loan for teachers who want to buy a personal laptop* (C principal of Tarakanita Primary School, 19 June 2018).

> *In 2004, changes were made in BW by encouraging the teacher to develop a module. All teachers were given training, and now it has become necessary for them to create their learning modules using digital media* (D, principal of Budya Wacana Primary School, 18 June 2018).

A different condition exists at Muhammadiyah Sapen Primary School, as there are many teachers, but only 50% are ICT proficient. Teachers over the age of 50 tend to be reluctant to use digital media for learning and seem to be passive Internet users. Because of the difficulty in motivating senior teachers, the principal had devised a strategy. Each parallel class teacher always combines senior and young teachers. In this way, younger teachers prepare the digital media, so senior teachers can still use it to teach, even though their capacity to actually use it may be minimal.

At the same time, some teachers want to develop digital learning because they are aware of and understand the advancement era. In this case, the principal also provides excellent support for teachers who wish to undertake personal development. Some teachers are promoted to join advanced training both in Indonesia and abroad. Some teachers have started using the Edmodo application as performed by Mr. E, a teacher of grade 3 students. He and some other teachers have blogs that are used to accommodate students' materials and projects. Now, the teachers initiate using an intranet that contains material, administration, and evaluation of learning. Although the network is not optimal, the headmaster and class teacher are trying to improve their roles.

> *I developed a closed system. It is only for children in the class, using the edmodo.com and WordPress blog applications. This Edmodo application allows parents to get notifications about children's assignments, information on children's attendance, and the like through Edmodo for parents* (E, School Teacher of Muhammadiyah Sapen Primary School, 20 June 2018).

As explained above, the school puts the centre of activity using digital media in different places, determining the teachers' role. The four schools place the class setting as a digital literacy locus. In the classroom, children see how to use or attempt to use and produce straightforward digital content. Besides classes, libraries and computer labs are also used.

Tarakanita Primary School and Budya Wacana Primary School focus on conducting digital learning in computer laboratories. ICT teachers play a greater role and are responsible for the quality of digital literacy adoption by students and teachers. Most digital literacy is understood as mastering technology, and information literacy aspects are considered additional. Librarians in these two places have almost no role in organising programmes, training skills and making decisions to improve digital literacy, and they only provide regular library services.

Meanwhile, Tumbuh 2 Primary School and Muhammadiyah Sapen Primary School are given space for computer laboratory and library use as the digital learning space in different portions. The ICT teachers focus on computer usage skills, while the librarians emphasise information utilisation ability. Although both competencies are equally important, the principals give more allocated time for the ICT teachers rather than the librarians. Most of the time, the librarians get additional tasks as substitute teachers and writing competition trainers to enhance the students' information literacy skills.

5. Conclusions

This research reveals that the digital literacy strategy is mainly implemented through ICT learning and media literacy. However, the information literacy approach is considered less critical. The elementary schools establish a proper computer laboratory and develop a robust ICT curriculum as the main focus of digital literacy learning. Although all the schools deliberately provide digital technology in the classroom, most do not optimise the

utilisation because the senior teachers struggle to adopt the gadget for pedagogy. In terms of the media literacy approach, the four schools apply protectionism, and media fun approaches. Even though the two schools employ other strategies, the protectionism strategy remains the greatest priority because most educators focus on the harmful effects of the Internet rather than the benefits. Concurrently, the two schools that provide library computers do not optimise library computer usage. In comparison, the other two schools do not equip the library with computers because they less comprehend the urgency of information literacy as part of digital literacy training.

The three most significant actors in digital literacy are principals, classroom and ICT teachers, with librarians playing a minor part. Consequently, most digital literacy training sessions occur in computer labs, occasionally in classrooms and rarely in libraries. Although some principals devote allocated time for the librarian to teach information literacy in the classroom or library, the duration is minimal compared to the classroom and ICT teachers. Pragmatically, the principals appoint the librarian as a substitute teacher or writing competition trainer. In such cases, the students have the opportunity to learn about information literacy.

The study suggests that the school should integrate ICT learning, information literacy, and media literacy to improve the digital literacy curriculum. In doing so, the principals should encourage the librarian to play a significant role equal to that of the classroom and ICT teacher and encourage close teamwork to develop a digital literacy training programme for the students. Consequently, the library should also be set up as one of the important digital literacy learning spaces for students and teachers.

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