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Measuring Digital Literacy of Students with Visual Impairments

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Abstract

Students with visual impairments turned out to be heavy internet user. They had the ability to use digital media such as smartphone and computer. They used it with the help of a screen reader on the device. Changing in communication pattern in blind children also occurs in the educational environment, especially in the learning process that has shifted not only to the use of traditional media and learning method based on printed material, but also to the use of communication technology based on digital media. Therefore, digital literacy is needed by students with visual impairments. Digital literacy is the ability to search for information and evaluate its credibility to create creative content. The purpose of this study was to determine the use of the internet through digital media and digital literacy of adolescent students with visual impairments, namely, blind and low vision students, in Indonesia by using the technological, cognitive and socio emotional dimensions. This study used a quantitative approach by taking a sample of 39 blind students who have blindness and low vision of State Special Needs School A of Bandung City, Indonesia. The results of this study were that the digital literacy of students with visual impairments is quite good, especially regarding the understanding of responsible and polite behavior in communicating in the digital space. There were also a number of students who were able to use this digital media to create creative contents, such as tutorials, which were later uploaded on the YouTube channel.

Keywords: Digital literacy, Student with visual impairments, Communication technology, Internet.

Introduction

The result of the world report on disability told that over one billion people who lived with some forms of disability faced a wide range of barriers, including barrier to the access to information and education (UNESCO Global Report, 2013). Currently, formal, non-formal, and informal educational environments are using digital communication technology. Communication technology in the educational environment is very much needed, and is not only used by normal students but also by students with disabilities, one of them is students with visual impairments (Ludíková & Finková, 2012; Pacheco, Lips, & Yoong, 2017). Most of students with visual impairments, even students who have total blindness are in fact accustomed to using communication technologies such as computers and smartphones (Hakobyan, Lumsden, O'Sullivan, & Bartlett, 2013; Kim, Han, Park, & Park, 2016; Osiceanu & Popa, 2015).

Blind children use smartphone with the help of a screen reader that can be obtained by downloading from the Playstore on an Android-based smartphone or by changing the settings. To change the phone settings, users can select Settings, Accessibility, Vision, Voice Assistant, OK, then the smartphone held by a blind child will have sounds that help them access the devices. Blind children can also use computers that are facilitated by application such as Jaws (Griffin-Shirley et al., 2017; Sulthan & Istiyanto, 2019). By using digital communication technology, individual becomes part a network of interaction between humans who uniformly accept and apply several rules for communicative action aimed at effective information exchange (Szécsi, 2012) .

The presence of global information and communication technology in the internet network that has developed massively today has changed social, cultural, and political institutions, economics, technology, communication, and human civilization on this earth (Iványi, 2017; Rahmah, 2015). Internet opens the way to new communication media that are based on computer, internet, and digital systems such as e-mail, radio streaming, TV streaming and cell phone (Porat, Blau, & Barak, 2018; Puspitasari & Ishii, 2016).

Further, internet usage in the world continues to increase. In April 2019 of a total population of 7.697 billion people, as many as 64% , or 5.110 billion people, were using smartphone, then 58% or 4.437 billion people, were using the internet, and 45% or 3.499 billion people, were actively using social media. It showed an increasing from the previous year with

increasing in smartphone usage by 1.1%, 82 million people, an increase in internet use by 2.6% or 130 million people, and an increase in the use of social media by 6.1% or 601 million people (www.wearesocial.com).

The large number of internet users, and the high frequency of accessing information content and social media, does not guarantee the maturity of the community in using the internet (Puspitasari & Ishii, 2016). In addition to the gaps that occur, various cases of internet abuse are also rife, ranging from violation of privacy, addiction, reality bias, hoax, to accessing pornography content (Arif, 2016; Noë et al., 2019; Steel, 2015).

Accessing pornography content is very dangerous, especially for children and adolescents (Steel, 2015). A study conducted by the Yogyakarta Center for Social Welfare Research and Development, in collaboration with End Child Prostitution, Child Pornography and Trafficking Of Children for Sexual Purposes (ECPAT) found that the determinant factor that influenced children to commit sexual violence was pornography. Istianah Hermawati, the head of the research team explained that 43 percent of children committed sexual violence because of exposure to pornography. Meanwhile, other factors were the influence of friends (33%), the influence of drugs (11%), the influence of victimization history (10%), and the influence of family 10%. From this research finding, they were exposed to pornography through cellphones at 28%, computer at 24%, pictures at 18% and VCD at 12%. (www.viva.co.id/gaya-hidup/parenting/983308-access-pornography-best-pada-anak-terjadi-passing-ponsel). Based on the information, accessed pornography mostly through cellphone or smartphone that had internet connection.

The use of the internet via communication technology also occurs in almost every human activity including the activity of children and adolescents. Digital technology is becoming a very familiar tool that is used in daily life, for example, to communicate in social media (Gulsecen, Ozdemir, Gezer, & Akadal, 2015; Porat et al., 2018; Veglis & Maniou, 2018). It is again noteworthy that children easily and quickly adapt in using digital technology, especially smartphone (Gulsecen et al., 2015).

Through smartphone and computer, they spend a lot of time to access social media on the internet such as YouTube, Google, Facebook, and various other social media, and they are not spared from the possibility of being exposed to negative things from the internet such as pornography, and for that, digital literacy is needed.

This research is in line with some previous studies, but will be more focused on students with visual positions as the subject. The aim of this research to see the use of the internet via digital media and digital literacy in adolescent students with blindness and low vision in Indonesia, using the technological , cognitive and socio-emotional dimensions.

Literature Review

Digital literacy is the ability to search for information, and evaluate its credibility to create creative content(Rahmah, 2015). Digital media literacy must be present as a defense for the public to be critical in using digital media(Perbawaningsih, 2013). Digital media literacy is an individual ability to harness internet devices through smartphone, computer. and other digital devices as better support of communication activities in digital media and responsibility (Gulsecen et al., 2015; Piper, Bulat, Kwayumba, Oketch, & Gangla, 2019). Digital literacy also means how digital media users can take control of the media and use digital media wisely as needed (Fernandez-Villavicencio, 2010).

According to Potter (Sulthan & Istiyanto, 2019), media literacy is a skill to assess meaning in each type of message as well as to provide guidance on how to take control of existing information. Digital literacy can also come from oneself who always asks about something, or come from openness to others in using digital media with an interactive communication process.

Digital literacy can be measured through technical, cognitive and soci-emotional dimensions (Ng, 2012). The first dimension, namely, technical dimension, is a dimension in which there is an operational/fundamental mastery of digital technology devices. Meanwhile, the cognitive dimension includes the ability to think critically in evaluating and creating a digital information, choosing software, and understanding the ethical, moral, and legal issues surrounding digital information. The Socio-emotional dimension is related to how to use ICT (digital technology) for socializing, learning, and collaborating, such as in social-media literacy.

Methodology

Participants

This study used quantitative approach. Thirty nine students with visual impairment, 15 students with blindness (visual acuity less than 20/400), and 24 students with low vision (visual acuity less than 20/200 and greater than 20/400) took part in this study. Participants were Junior High School students and Senior High School students at Public Special School A Bandung City,

Indonesia. This school is the oldest special school in Southeast Asia which was founded in 1901, and it is the largest center of education and training for the blind in Indonesia. This school has one of concentration program named Communication Information Technology for the blind at the high school level.

The number of students of junior high school and senior high school here were 46 students, consisting of 15 students with blindness, 24 students with low vision and 7 students with multiple disabled visual impairments (MDVI). Students with Multiple Disabled Visual Impairments (MDVI) were not included in this study because they did not use or rarely used digital devices such as smartphone and computer, so that the total sample taken was 39 students, consisting of 15 junior high school students and 24 senior high school students, and when viewed by gender, it consisted of 23 male students (39.13% from junior high school level and 60.87% from senior high school level) and 16 female students (37.5% from junior high school level and 62.5% from senior high school level). This is shown in table 1.

Table 1 Distribution of participants gender

	Junior High School Level	Senior High School Level	
Male	9	14	
Valid female	6	10	
Total	15	24	39

Assessment Instrument

The instrument used to carry this study out was a list of 15 questions. The first four items identified their gender, school grade, duration daily internet usage and the purpose of internet usage. The following eleven items included statement about their digital literacy competencies and the items have to be answered by choosing “strongly agree”, “agree”, “quite agree”, “disagree” or “strongly disagree”.

Furthermore, the statement items were measured for validity and reliability. Validity indicates the extent to which measuring instruments are used to measure what is measured. The way to do this was to correlate the scores obtained from each question item with the individual total scores. Validity testing was done with the help of the SPSS Statistics 25 software for

Windows, making decisions based on the calculated value (Corrected Item-Total Correlation) > rtable of 0.316 , for df = 39-2 = 37; if $\alpha = 0.05$ then the item / question is valid and vice versa.

Table 2 Validity Test Results

Statement Item	Corrected Item Value- Total Correlation	R table	Criteria
1	0.437	0.316	Valid
2	0.607	0.316	Valid
3	0.397	0.316	Valid
4	0.662	0.316	Valid
5	0.686	0.316	Valid
6	0.759	0.316	Valid
7	0.442	0.316	Valid
8	0.641	0.316	Valid
9	0.543	0.316	Valid
10	0.576	0.316	Valid
11	0.515	0.316	valid

Based on Table 2, it can be seen that all questions had valid criteria, because the value of r_{count} (Corrected Item-Total Correlation) > r_{table} 0.316.

Reliability test was performed on question items that were declared valid. A variable is said to be reliable if the answer to the question is always consistent. The reliability coefficient of the instrument in this study was 0.869 so it was declared reliable because it was greater than 0.6.

Result and Findings

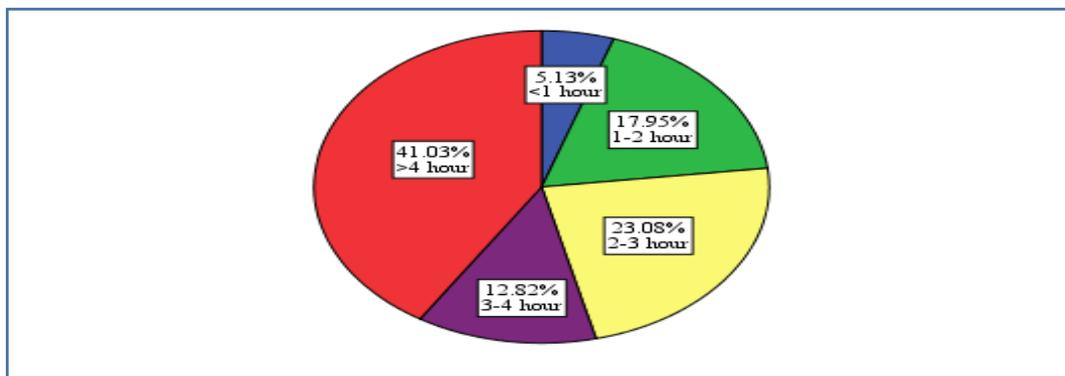
Internet usage in Indonesia continues to increase. Based on the results of the survey by APJII (Association of Indonesian Internet Service Providers) in 2016, there were 132.7 million internet users of the total population of 256.2 million, or around 51.8% of the total Indonesian population, and then in 2017, internet users increased to 143.26 million people from a total population of 262 million people, or around 54.62% of total population. The number of internet users in Indonesia continued to increase in 2018. It increased to 171.17 million people from a total

population of 264.16 million people, or 64, 8% (www.APJII.or.id), and students with visual impairments were also included in active internet users.

The findings of this research showed that students with visual impairments were accustomed to accessing the internet through digital communication technologies, such as smartphone and computer, both for classroom learning and for interaction outside the classroom. This is shown in table 3.

Table 3 Duration of Daily Internet Usage

	Number of Participants	Valid Percent
<1hour	2	5.1
1-2 hours	7	17.9
2-3 hours	9	23.1
3-4 hours	5	12.8
>4 hours	16	41.0
Total	39	100.0

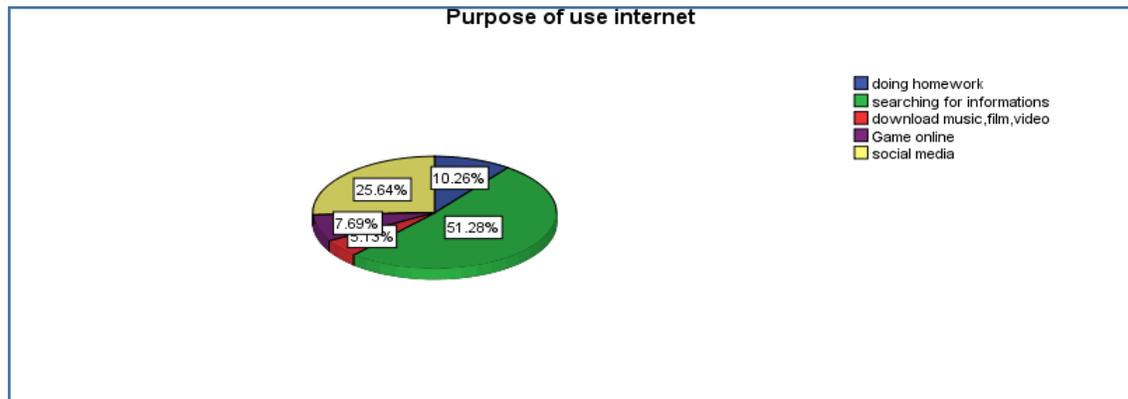


In the table 3, it can be seen that 16 participants (41 percent) accessed the internet for more than 4 hours a day, and only 7 participants (17.9 percent) accessed the internet for less than 1-2 hours a day, meaning that most of blind students belonged to heavy internet users. The internet has now undergone a transition to digital capitalism. The political economy of information communication technology refers to the power of new media (Iványi, 2017), so that new media that comes equipped with internet access are able to be part of the development of learning for students with visual impairments.

Furthermore, other findings from the question “what is the purpose of using the internet?” shown in table 4.

Table 4 Purpose of Internet Use

	Number of Participants	Valid Percent
Doing homework	4	10.3
Searching for information	20	51.3
Downloading music,film,video	2	5.1
Game online	3	7.7
Social media	10	25.6
Total	39	100.0



The results of this study indicated that most students with visual impairments used the internet to search for information and then to communicate through social media. The social media they had were such as WhatsApp and Facebook.

The development of Communication technology, such as computer and smartphone, equipped with a screen reader greatly helps blind students in finding the information they need through the internet or in communicating through social media. They had social media accounts on WhatsApp and Facebook, so they were always connected to a wide network of friends.

The use of the internet is related to digital literacy, which is the ability of student with visual impairments to use digital media intelligently and wisely. Digital literacy of students with visual impairments and is shown in table 5.

	N	Mean	Std. Deviation
I have the ability to type on a computer	39	3.23	0.485
I have the ability to browse and/or download files from email	39	3.13	0.732
I have the ability to use Microsoft Word dan Microsoft Excel	39	2.95	0.647
I have the ability to search and select information	39	3.51	0.854
I have the ability to think critically in receiving information	39	3.13	0.833
I have the ability to evaluate and analyze information	39	3.23	0.810
I have the ability to create creative content	39	2.41	0.595
I understand the legal, ethical and moral rules in a digital space	39	2.87	0.951
I uphold responsibility in communication processing	39	3.77	0.902
I communicate politely in digital space	39	3.82	0.790
I am able to protect myself from the dangers in digital space	39	3.46	0.822
Valid N (listwise)	39		

Table 5 Digital Literacy of Students With Visual Impairments

Based on table 5, the digital literacy of students with visual impairments on the technical dimension showed that the students had good enough ability to type items on a computer (mean = 3.23, SD = 0.485), the ability to browse, and download a file and send email (mean = 3.13, SD = 0.732) and the ability to use Microsoft Word and Microsoft Excel (mean = 2.95, SD = 0.647). The students with visual impairments had the ability to use computers because in this school, computer

education has been taught since junior high school level. The education material is about operating Microsoft Word and Microsoft Excel, and continues until high school level. In some subjects, teachers teach by using smartphone as a learning tool. They give instructions to students to find information through Google on a smartphone, or give assignments to be typed on a computer and the results should be sent via email.

Furthermore, on the cognitive dimension, the average ability and understanding of students were quite good. The statement items showed that students with visual impairments had the ability to search and select information (mean = 3.51, SD = 0.854) students were also able to think critically in receiving information (mean = 3.13, SD = 0.833), and students with visual impairments had the ability to evaluate and analyze information on the internet (mean = 3.23, SD = 0.810), This capability is by the network of friends both at school and in social media, such as WhatsApp and Facebook or certain application such as TeamTalk, so they can exchange information and expand their insight. Meanwhile, the ability to create creative content (mean = 2.41, SD = 0.595) and having an understanding of ethical and moral rules of law on the internet (mean = 2.87, SD = 0.951), resulted in scores that were on average lower, but some of the blind students had been able to create creative contents such as making tutorials on Information and Communication Technology or radio plays, and then uploaded them on the YouTube channel.

Finally, on the social emotional dimension, upholding responsibility in communication process (mean = 3.77, SD = 0.902), behaving politely (mean = 3.82, SD = 0.790) and being able to protect themselves from danger in digital space (mean = 3.46, SD = 0.822) had a higher ability value than other items.

Conclusion

The ability of student with visual impairments to utilize digital media was quite good in terms of operation of digital media. They were able to type in Microsoft Word and Microsoft Excel, and there were some students who were able to use digital media to create creative contents to be uploaded on YouTube, or make poetry online. They also had an understanding of the legal, ethical and moral rules in the digital space.

Students with visual impairments understood that they had to be responsible and behave politely in communicating in digital space. They simply understood and that accessing pornography or bullying friends in a digital space were not good things to do. It would be better

if their understanding and ability to use digital media wisely and intelligently are more guided, for example by adding material on digital literacy in the curriculum, or making digital literacy training for blind students, so that they can use the existing communication technology well and wisely, and they can continue to work at the normal job.

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