

The Effect of Socio-scientific Issues Assisted of Virtual Learning to Improve Digital Literacy of student

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Abstract

This research aims to describe and explain vi-learning-assisted socio-scientific issues implemented. That is to improve digital literacy capabilities. The participants of this study were 17 students of the Science Education Department who programmed the Household Chemistry course class of 2016 in the odd semester. The type of research used is descriptive quantitative. It uses one group of pre-test-post-test design. Data were analyzed descriptively using the Minitab program 16. The results of the research showed four digital skill indicators. There are reference search skills on student internet by 100%, hypertextual navigation by 25%, information content 56% and the ability to compile knowledge is still 0%, while the post-test results obtained 100% of the student's internet search skills, hypertextual navigation by 92%, information content 82% and the ability to compile knowledge 49%. The conclusion from this research is the vi-learning-assisted socio-scientific implementation to be able to improve digital literacy skills in prospective science teacher students.

Keywords: digital literacy, science, socio-scientific, vi-learning,

Introduction

Along with the global-digital education trend (Pramono et al., 2018), currently technological development is becoming a trend that is increasingly needed by everyone (Subekti, Taufiq, Susilo, Ibrohim, & Suwono, 2018). Predicted, this phenomenon of industrial revolution era 4.0 has reduced (eliminated) various human activities (Subekti, Yuhanna, Susilo, Ibrohim, & Suwono, 2018) that exist today. Therefore, preparing the of quality human resources in terms innovation and meeting the challenges of the industrial revolution 4.0 is a must (Subekti, Rudi, Susilo, Ibrohim, & Suwono, 2018) to the world of education. Science education is currently directed at preparing students for success in the 21st century (Suwono, Rizkita, & Susilo, 2015) one of which is the ability of digital literacy. Support and role of higher education are expected to increase the competitiveness of the Indonesian people amid global competition for the rapid development of information technology and science.

Acceleration of digital technology in social media platforms, encourages the pace of interaction between humans (Chabiebie, 2017). *Socio-scientific issues* (SSI) are representations of social problems that are significantly related to science in social aspects (Anagün & Özden, 2010). One of the latest reforms and recommendations on science teaching and learning for students is learning to use their conceptual understanding of scientific phenomena to reason with complex global problems with environmental, social, economic, and political implications (Zangori, Peel, Kinslow, Friedrichsen, & Sadler, 2017). Ethical issues can be included in educational science (Berne, 2014). The ability to argue students in the socio-scientific context shows a higher increase than the task of solving scientific problems (Khishfe, Alshaya, BouJaoude, Mansour, & Alrudiyan, 2017). In the 21st century, gaining accurate knowledge controversial of socio-scientific topics (Brandmo & Bråten, 2018), was relatively important when compared to the previous times. Social-scientific issues can contain questionable and uncertain scientific knowledge (Foong & Daniel, 2010). SSI's teaching and learning has been suggested as an effective approach to support meaningful learning in the school context; however, there is a

need for supporting facilities by designing and implementing these approach (Sadler, Foulk, & Friedrichsen, 2016).

One of the directions of the Kemenristekdikti policy (Minister of Research, Technology, and Higher Education) is to increase and equalize access to higher education through a strategy to increase capacity (Pramono et al., 2018) through the Virtual Learning (Vi-Learn) program, also called online learning. Virtual learning is one of the distance education systems that aims to streamline and make effective learning methods using the internet (Erman, Hidayati, & Maulida, 2018). Literacy correlation with virtual learning in research conducted using virtual-based learning media. It is expected that students' literacy skills can be trained through digital literacy. In the Socio-Scientific Issue (SSI) contextual issue on classroom teaching provides new insights into innovative curriculum design and teaching practices (Wang, Chen, Lin, Huang, & Hong, 2017).

Literacy is very important in the era of globalization because, through it, one can know, understand, apply, and create something useful to himself, others, and society (Ahmadi & Yulianto, 2017) one of which is digital literacy. Digital literacy has become an important pillar for the future of education (Chabiebie, 2017) and is a topic that is increasingly discussed (Belshaw, 2012) at the concept level to become a public discourse (Spante, Sofkova, Lundin, & Algers, 2018).

The ability of students to use IT media is quite good, but it is still not focused on finding the right information for their academic needs. Therefore, one of the subjects that has the potential to develop digital literacy is a household chemistry course. The themes in this subject's learning material are a matter of social-specific content. Vi-learning is the most appropriate way to guide students to practice their digital literacy skills. The response variable in this study is digital literacy skills. The hypothesis of this study is that Social-Scientific Problems using Vi-Learning can improve digital literacy of students in science education studies.

Household Chemistry Learning that has been done has not used virtual learning as a medium in learning (Wang et al., 2017). In this semester virtual learning applied to Home Chemistry subjects is limited to subjects of perfume, cosmetics and psychotropics. From the background above shows that there are no research activities on social-scientific problems that are assisted by vi-learning to improve digital literacy for science education students. Thus it is important to conduct research related to this phenomenon.

Methods

The approach of this research is a quantitative approach (Creswell, 2014) with one group pre-test-post-test research design (Creswell, 2015). The subject of this research is the third year student who took the Household Chemistry course in the academic year 2018/2019 academic year from the 2016 U class (17 students) in the Science Education Study Program at Universitas Negeri Surabaya in East Java, Indonesia.

The research instruments used was developed based on the digital skills indicator with four indicators namely *internet searching, navigation, evaluation content and assembly knowledge*. Before the application of learning using virtual learning, students were given the task of compiling papers and searching for library resources using the internet as a source of information. Task results must be traced with tracking history. Then the assignment was assessed by measuring instruments for digital literacy (this is the data pre-test). The instrument used is to measure the digital literacy abilities of students before and after learning with virtual learning. The assessment is based on the digital literacy rubric that has been developed previously which includes 4 indicators (Gilster, 1997). The task is given a review for the improvement of the tasks given. Furthermore, learning uses vi-learning to train students' digital skills. In this learning, the students in addition to getting the material are guided by the links of digital information sources correctly. Material related to digital literacy is provided. On the subject of perfume, cosmetics and psychotropics is entirely vi-learning and must use digital literacy skills. In each task the tracking history must be attached.

The research data in the form of assignments to access digital media in obtaining information and processing it become accurate sources of information and instruments for assessing digital literacy skills. Data collected from these tests were analyzed using quantitative descriptive methods using the Minitab 16 program (Pochampally & Gupta, 2014).

Results and Discussion

Data obtained in this research activity are data pre-test and post-test students about digital literacy. The results are presented in more detail about the results of the research presented in Table 1 and Table 2.

Table 1. Results of pre-test and post-test digital literacy skills of student

pre-test	literacy digital indicators											
	<i>Internet Searching</i>			<i>Hypertextual Navigation</i>			<i>Content evaluation</i>			<i>Knowledge Assembly</i>		
	a	b	c	a	b	c	a	b	c	a	b	c
Sum	17	17	17	0	13	0	13	7	9	0	0	0
Percentage	100%			25%			56%			0%		
post-test	literacy digital indicators											
	<i>Internet Searching</i>			<i>Hypertextual Navigation</i>			<i>Content evaluation</i>			<i>Knowledge Assembly</i>		
	a	b	c	a	b	c	a	b	c	a	b	c
Sum	17	17	17	13	17	17	17	17	8	17	4	4
Percentage	100%			92%			82%			49%		

The pre-test students on free of assessment tasks students who are given to students at Home Chemistry courses who before studying with virtual learning. Assignments are given input for revision. The tasks before the midterm test of learning are not based on virtual learning. Assessment is done by using the instrument of literacy skills already in interest. After the semester exams learn to use vi-learning and trained digital literacy skills. Position examination is conducted specifically on the three subjects that are set. Based on the result of the assessment of student assignments, the results of the initial test and the testes of the beginning.

Table 2. Results of analysis of initial tests and final tests digital literacy skills of student

Description	Digital literacy skills aspects											
	Internet Searching			Hypertextual Navigation			Content Evaluation			Knowledge Assembly		
	A	B	C	A	B	C	A	B	C	A	B	C
\sum initial tests	17	17	17	0	13	0	13	7	9	0	0	0
\sum final tests	17	17	17	13	17	17	17	17	8	17	4	4
Enhancement	0	0	0	13	4	17	4	10	-1	17	4	4

Digital use to get the information in the need for learning now has become indispensable. This digital utilization is a must-have for developing digital literacy skills. Although often Digital literacy, it is often misunderstood by digital skills. Digital literacy plays an important role in influencing positive change when digital technology changes academic culture (Hallam, Thomas, & Beach, 2018). Digital literacy is not a skill and consists of ease of using the Internet, word processing language, or social media (Greene, Copeland, Deekens, & Yu, 2018). The success of young people as educators, involved citizens, and future employees have been associated with digital literacy (Pangrazio, 2016). Technology has transformed learning at higher education and significantly

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increased the prevalence of digital learning (Sharp, 2018). Developing efficiency in digital literacy is an essential component of education to increase confidence in accessing the best evidence (Terry, Davies, Williams, Tait, & Condon, 2019). Literacy for digital culture should not be too focused on technological use technologies, but in the process of acquisition and ICT acquisition (Vélez, Olivencia, & Zuazua, 2017). Improved visualization percentage value of pre-test and test digital student literacy skills are presented in Figure 1.

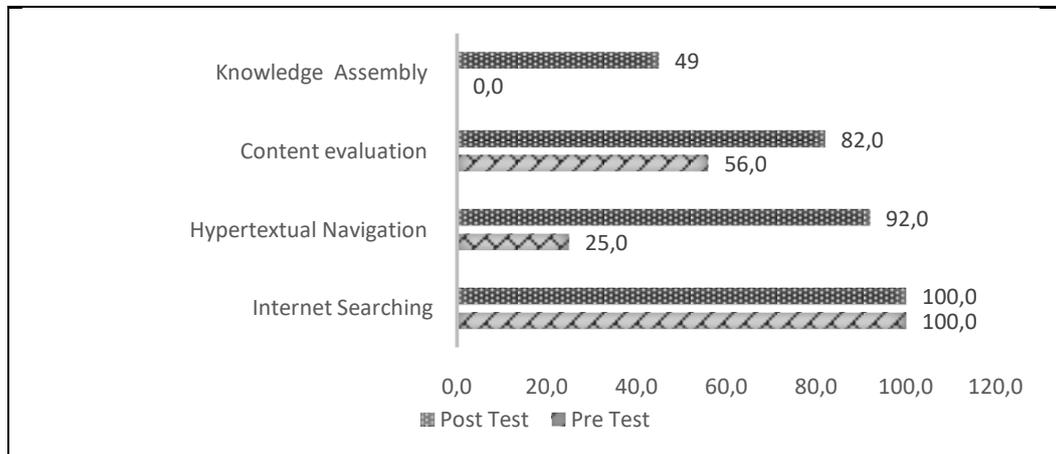


Figure 1. Percentage of pre-test value and literacy digital post-test exam

Referring to Figure 1 above, it shows digital literacy skills using four indicators namely the *internet seeking* 100% of students can apply them in the task. The second indicator is *hypertextual* able to create a guide to create a 92% hyperlink, the three *content assessments* get an overall percentage of 82%, the student can set the source relevant to the information needed, and the fourth per cent with *knowledge* overall ready reaches 49%. Based on the results above digital literacy capabilities, not all aspects of the indicators are dominated by students. However, all aspects are improving. It is then necessary to make a habit of continuing to learn digital literacy skills for students.

Conclusion

Referring to the above discussion, it can be concluded that learning by using virtual learning in household chemistry (socio-scientific issues) can be used to train students' literacy digital skills. Recommendations advanced research activities include (1) digital literacy training repeatedly to familiarization their digital literacy skills development; (2) it is necessary to better literate digital literacy through learning, especially in other fields with many features that require a theoretical review in its discussion; and (3) it is necessary to design a dedicated learning strategy for digital literacy in accordance with the indicators of digital literacy capability to begin training to students, so that they can be used further.

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