

Pre service elementary teacher's digital literacy with cognitive style and self-regulated learning

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ABSTRACT

The Covid-19 pandemic has forced many educational institutions to implement online learning through distance learning. However, there are many obstacles that occur in its implementation, one of which is the low level of digital literacy as a mandatory ability in distance learning. This study aims to determine students' digital literacy skills based on factors within students, namely the ability of Cognitive Style and Self-Regulated Learning. This study uses a quantitative approach, with the type of ex post facto research. The population in this study were all prospective elementary school teacher students at one of the universities in Majalengka Regency who carried out distance learning, with a sample of 30 respondents. Data was collected using a questionnaire in the form of a digital literacy ability questionnaire, cognitive style and self-regulated learning during distance learning. The results showed that students with cognitive style and self-regulated learning in the high category had better digital literacy skills than the medium and low categories. The conclusion obtained from this study is that Cognitive style and self-regulated learning affect digital literacy skills.

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INTRODUCTION

Virtual learning by implementing e-learning has become a popular and accepted approach in education in the modern era (Yilmaz, 2015). Especially nowadays digital technology has become an inseparable part in the world of education (Benson & Kolsaker, 2015). Digital technology which includes a variety of computer hardware and software, as well as applications, and communication services can be a means of implementing e-learning (Mohammadyari & Singh, 2015; Ng, 2012). E-learning is distance education, where time and geographical location separate students from their teachers (Holmberg, 2005; Moore, et al., 1992). E-learning is carried out in a virtual classroom, which is a synchronous or asynchronous virtual room using various tools (such as a laptop or smartphone) with internet access (Zhu & Liu, 2020). Students can use digital technology for learning activities such as reading and sending emails, accessing learning management systems, reading journals or e-books, and so on. E-learning can be an alternative so that learning activities can continue during the COVID-19 pandemic (Ng & Peggy, 2020).

However, several obstacles arise in implementing distance learning, including students being required to have skills in using digital technology. The application of distance learning will be in vain if students themselves are not able to use technology appropriately as a learning tool. Currently, students

are familiar with digital technology and generally know how to access, create, and share digital information (Ting, 2015). However, although students are generally considered capable of using technology, many of them are less able to use it appropriately (Tang & Chaw, 2015). Another obstacle is that the internet is a news source that provides all kinds of digital information needed, even negative information can be found (Rodhin, 2011). Many students start to leave conventional media to find information, but they do not yet have the critical skills needed to evaluate any information on the Internet (Baumgartner & Morris, 2006; Flanagin & Metzger, 2007; Flanagin, & Medders, 2010; Colón-Aguirre & Fleming- May 2012; List, 2019). Although advances in information technology are difficult to avoid, efforts to protect the younger generation from hoax news must still be made. This condition can be a problem in implementing e-learning in schools, because if students are not able to sort out information, it can create stuttering in the use of information. In fact, until now there are still many students who use this information as a reference for their academic assignments (Kurnianingsih et al., 2017). In the application of e-learning students are required to have analytical and critical skills in processing information obtained from the internet. Digital literacy skills are needed so that students can use the Internet properly and well (Adiarsi et al., 2015).

Digital literacy ability is one of the important skills for students at this time (Chan, et al, 2019). This ability is needed to live in the 21st century (Tejedor et al, 2020). Digital literacy is an individual's awareness, attitude and ability to use digital tools and facilities appropriately to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, build new knowledge, create media expressions, and communicate with others, in the context of certain life situations, to enable constructive social action; and to reflect on this process (Martin, 2006). Digital literacy is needed because it is a skill and competency in using the internet and digital technology effectively (Martin, 2005; Cartelli, 2010; Ala-Mutka, 2011).

Digital literacy is in fact still a problem for most students in implementing e-learning. Several previous studies have shown that students' digital literacy is very low (Misbah et al., 2018; Yusuf et al., 2019; Prasutri et al., 2019; Mustakim et al., 2019), so efforts are needed to improve it. Misbah et al. (2018), Yusuf et al. (2019), and Prasutri et al. (2019) conducted research in an effort to improve students' digital literacy through the application of learning models and strategies. As for Mustakim, et al. (2019) conducted research by developing learning tools oriented to increasing students' digital literacy. If observed, these studies have made more efforts to increase students' digital literacy by considering external factors while students' internal factors still have not received the attention of researchers, so a research on students' digital literacy is needed by looking at factors from within students.

One of the important aspects to improve digital literacy in the application of e-learning is skills in managing and processing information obtained from digital sources. This skill is called Cognitive Style (Oh & Lim, 2005). Although initially Cognitive Style was thought of as unchangeable attitudes and preferences, recent theory and empirical findings suggest that cognitive styles can be forged and enhanced (Bendall et al., 2016; Kozhevnikov et al., 2014; Zang, 2013). Students with Cognitive Style ability can perceive and organize the information they get from the internet, such as how to remember, think, solve problems, and make conclusions. With Cognitive Style, students are able to receive, store, form, and utilize information (Vendiagrys & Junaedi, 2015). This ability is the ability needed so that students have digital literacy, so it is very difficult to improve students' digital literacy without considering their cognitive style.

Another aspect that can support the increase in digital literacy is the skill to find sources of information independently without depending on others. These skills are commonly known as Self-

Regulated Learning (Independent learning). Self-Regulated Learning is the readiness of individuals who are willing and able to learn on their own initiative, with or without the help of other parties in terms of determining learning goals, learning methods, and evaluating learning outcomes (Tahar, 2006; Hendrayana et al., 2016; Prayuda et al., 2016; Janah, 2016). Self-Regulated Learning is needed so that students are responsible for obtaining information in regulating and disciplining themselves, as well as in developing their learning abilities of their own accord (Nazar & Andrian, 2018). Self-Regulated Learning emphasizes individual autonomy and self-control to direct, monitor, and regulate learning to achieve goals and expertise (Siddaiah-Subramanya et al., 2017; Huh & Reigeluth, 2017). Students with good self-regulated learning are able to independently search for digital information scattered on the internet. Students will have their own initiative in finding the learning resources they need. This ability is needed to support digital literacy.

This study aims to look at students' digital literacy based on the ability of Cognitive Style and Self-Regulated Learning in the application of e-learning. This research is important because it can be useful for academics and education practitioners in implementing e-learning which requires students to have good digital literacy skills.

METHODS

This research uses a quantitative approach, namely the scientific approach used to view a reality that can be classified, concrete, observable and measurable, the relationship between variables is causal where the research data is in the form of numbers and the analysis uses statistics. This research is ex post facto so that no treatment or manipulation is made on research variables, but only symptoms that have occurred in students before this research was conducted.

The population in this study were prospective elementary school teacher students at one of the universities in Majalengka Regency who carried out distance learning. The sample in this study was selected randomly with purposive sampling technique, and obtained 30 students as respondents. Data was collected using a questionnaire in the form of a questionnaire on students' digital literacy skills, cognitive style and self-regulated learning during distance learning. The data that has been collected is then analyzed by inferential statistics using analysis of variance.

RESULTS AND DISCUSSION

The data from this study were obtained from the results of measuring digital literacy skills, cognitive style and self-regulated learning through the provision of questionnaires. Before analyzing digital literacy skills, students are first distributed based on cognitive style and self-regulated learning levels, namely high, medium, and low levels. Based on the measurement results of cognitive style and self-regulated learning, data on the number of students based on the level of cognitive style and self-regulated learning were obtained in the high, medium, and low categories as can be seen in table 1.

Table 1. The number of students based on the level of cognitive style and self-regulated learning

Variabel	Level	N
Cognitive style	high	9
	medium	10
	low	11
Self-regulated learning	high	8
	medium	13
	low	9

The results of measuring digital literacy skills, based on each level of cognitive style and self-regulated learning, are descriptively presented in table 2.

Table 2. Results of measuring digital literacy skills based on the level of cognitive style and self-regulated learning

Cognitive style	Self-regulated learning	Mean	Std. Deviation	N
high	high	89.8000	1.30384	5
	medium	80.5000	4.43471	4
	Total	85.6667	5.67891	9
medium	high	83.5000	2.12132	2
	medium	80.4000	2.19089	5
	low	78.3333	1.52753	3
	Total	80.4000	2.59058	10
low	high	80.0000	.	1
	medium	78.7500	.95743	4
	low	72.8333	3.43026	6
	Total	75.6364	4.08100	11
Total	high	87.0000	4.20883	8
	medium	79.9231	2.72218	13
	low	74.6667	3.93700	9
	Total	80.2333	5.82316	30

From the data presented in table 2, it can be seen that the highest average digital literacy ability of 89.8000 was obtained by the group of students with high cognitive style and high self-regulated learning. There is also the lowest average test result is 72.8333 obtained by the group of students with low levels in Cognitive style and self-regulated learning.

To determine the effect of Cognitive style and self-regulated learning on students' digital literacy skills, a two-way analysis of variance was conducted. The results of the two-way analysis of variance data processing are presented in table 3. Based on the data in Table 3, it can be seen that the digital literacy ability of students with cognitive style obtained a p-value (sig) of $0.002 < 0.05$, so there are differences in students' digital mathematical literacy based on the level of cognitive style (high, medium, and low). Students with high cognitive style got the highest average score compared to the medium and low levels. Thus, the digital literacy skills of students with high cognitive style are better than those with medium and low cognitive styles.

Table 3. Analisis of Varian

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Cognitive style	113.050	2	56.525	7.984	.002
self-regulated learning	136.585	2	68.292	9.646	.001
Cognitive style * self-regulated learning	70.539	3	23.513	3.321	.039

The digital literacy ability of students with self-regulated learning obtained a p-value (sig) of $0.001 < 0.05$, so there are differences in students' digital literacy abilities based on the level of self-regulated

learning (high, medium, and low). Students with high self-regulated learning obtained the highest average scores compared to medium and low levels. Thus, students' digital literacy with high self-regulated learning is better than medium and low self-regulated learning. The interaction between Cognitive style and self-regulated learning on digital literacy ability obtained p-value (sig) of $0.039 < 0.05$, so there is an interaction between Cognitive style and self-regulated learning on digital literacy ability. The existence of this interaction shows that Cognitive style and self-regulated learning together have a significant impact on increasing students' digital literacy skills.

The findings in this study reinforce the opinion conveyed by Vendiagrys & Junaedi (2015) which states that cognitive style is able to receive, store, form, and utilize information from various sources, including the internet. This kind of ability is needed in developing digital literacy. In addition, the findings of this study also strengthen the results of research conducted by Anthonysamy et al (2020), Muthupoltotage & Gardner (2018) and Sudyana & Surawati (2021) which state that self-regulated learning has a significant positive effect on digital literacy. , and there is a strong reciprocity between the two so that it is impossible to implement e-learning without the support of high digital literacy. Students with good learning independence will always seriously study the subject matter given by the teacher even at home. High learning independence will make students want to learn on their own.

CONCLUSION

Based on the results obtained, it shows that the digital literacy skills of students who have high cognitive style and self-regulated learning are better than other students. From these results, the conclusion in this study is that cognitive style and self-regulated learning have a very large influence on students' digital literacy skills in distance learning.

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