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The effect of digital media on elementary school students' ecoliteracy development

Windy Ivanka[1*], Dwi Cahaya Nurani[2]
[1,2] Elementary Scholl Teacher Education, Universitas Sriwijaya, Palembang, Indonesia

*Corresponding author: windyivanka@student.unsri.ac.id

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ABSTRACT

This study aims to evaluate the effect of digital media use on the development of ecoliteracy of elementary school students. Digital media offers an interactive and interesting method way to deliver ecological concepts, that make students easy to understand the relationship between living things and the environment. This study used quantitative approach with a pre-experimental design of one group pretest-posttest design. The subjects of this study were fifth grade elementary school students in North Indralaya City, Indonesia. Data were collected through multiple-choice tests consisting of pretest and posttest, each consisting of 10 questions to measure students' abilities before and after treatment. The results of this study showed that the average pretest score was 44.28 and 80 in post-test, it was found that 17 students achieved the Minimum Completion Criteria after treatment. Hypothesis testing using the Paired Sample T-Test showed a significance of 0.000, which means there is a significant difference between the pretest and posttest scores. This study concludes that the use of digital media has a positive effect on the development of students' ecoliteracy, which can help them understand ecological concepts and increase environmental awareness.

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INTRODUCTION

The digital era has changed various aspects of life, especially in education. The development of this technology affected the environmental education or ecoliteracy where the use of digital media in education brings various new opportunities to introduce ecological concepts and foster environmental awareness to students. Animated videos offer a more interactive, visual and interesting way to visualize the complex ecological concepts that make students east to understand the relationship between living things and the environment. Using media is very relevant in today's era, where awareness of the importance of maintaining ecosystem balance is increasing.

The development of digital media has brought advantages to Ecoliteracy that allows students to access information anytime and anywhere, without limitations of space or time. This gives students the opportunity to learn independently and explore environmental materials according to their speed and interests. In addition, digital media also enriches students' learning experiences by presenting more interesting and interactive materials (Rahma et al, 2021; Pradita et al, 2023). Animated videos allow students to learn through a more immersive experience, which encourages their emotional involvement and motivation to learn. Digital media helps teachers create learning

that is more relevant to the needs of today's digital generation, where learning does not only focus on theory, but also on its application in everyday life (Abdullah, 2023).

The digital era also provides great opportunities for educators to use digital media as an ecoliteracy learning tool. Emphasized that ecoliteracy includes an understanding of natural systems and ecological principles that support life on earth (Kazazoglu, 2025). Instilling ecoliteracy values from an early age is important to form a generation that is able to face environmental challenges in the future. Digital media greatly helps this process, especially because today's elementary school students are part of the "digital natives" generation who are accustomed to technology in their daily lives . However, behind its potential, challenges such as "nature-deficit disorder" can arise when students are too dependent on technology, so that they are less connected to nature. Thus, teacher need to balance on the use of digital media and direct experience in nature so that students not only understand the concept but also develop an emotional connection with the environment.

An experimental study by Zhang et al. (2023) confirmed that a ten-week digital media literacy program was able to increase the digital citizenship participation of elementary school students, which supports the role of teachers in providing appropriate learning support. In addition, Cannon (2018) in his work presented a creative literacy framework through student-produced digital media, showing that students' active engagement with digital media improves the meaning of the material and multimodal literacy skills. Both studies reinforce that the use of digital media in elementary education is not only effective in cognitive aspects, but also builds students' active and reflective involvement in broader social and environmental issues.

In line with the findings of Turner et al. (2025), the importance of digital media literacy in 21st-century learning has been emphasized as a primary prerequisite for students to understand and be critical of complex and evolving environmental information. In this context, Antink-Meyer (2023) emphasized that early childhood sustainability education should be an integral part of the elementary school curriculum, with the use of interactive digital media as the main learning medium. Furthermore, McBride et al. (2013) stated that ecoliteracy not only transfered knowledge about ecology, but also built awareness of ecological values and responsibilities. The use of digital media in science and social studies learning is important to provide a more contextual, interesting, and meaningful learning experience for students.

The relationship between digital media and ecoliteracy is very strong that digital media not only improves students' understanding of ecology, but also implant their environmental attitudes and awareness. Through the cycles implemented, students can access global environmental information and connect with broader ecological issues, such as climate change and ecosystem damage. Digital media help students to develop skills in environmental problem solving throught the access to relevant resources and information to support more concrete actions in protecting the environment.

This study aims to examine "The Effect of Digital Media on Elementary School Students' Ecoliteracy Development". The focus of this study is to evaluate the extent to which digital media can improve students' understanding of ecological concepts and form more proactive attitudes and actions in protecting the environment. Based on the results of this study, it is expected that teachers

and educational institutions can utilize digital media effectively to teach ecoliteracy, thereby helping to create a generation that is more concerned and committed to environmental sustainability.

METHOD

This study used quantitative method with a pre-experimental design type of one group pretest-posttest design. In this design, the study was only conducted on one group, because the pre-experimental design given to one subject without a control group. The pretest was conducted before being given treatment, while posttest given after being given treatment to see the differences.

This study was conducted at State Elementary School 14 Of North Indralaya in the odd semester of the 2024/2025 academic year. The population of the study were 43 fifth grade students of Elementary School 14 Indralaya Utara in the 2024/2025 academic year. The sample selected using purposive sampling technique were 21 students of fifth grade consisting of 11 male students and 10 female students. The data were collected using tests and documentation. The paper-based test was multiple choice with questions 10 questions. The score was 1 for correct answer and 0 for incorrect one. Meanwhile, documentation was conducted by recording the data in the study and being evidence that the research was carried out using digital media.

The data analysis technique used was hypothesis testing. Before the hypothesis testing analysis was carried out, it is necessary to first know whether the data meets the requirements for using statistics in hypothesis testing. Data normality testing was carried out to determine whether the data obtained from the subjects was normally distributed or not from the 21 samples to be tested. Data normality test was obtained from pretest and posttest values. Hypothesis test used in this study is T-Test.

RESULT AND DISCUSSION

In this study, The students of class fifth grade were given a pretest and posttest to determine the differences in the results before and after being given treatment. The learning outcomes of using digital media on the development of elementary school students' ecoliteracy through pretests and posttests with 10 multiple-choice questions are as follows:

Table 1. Results of Using Digital Media

No	NAME	*Pretest*	*Posttest*
1	AKNA	40	80
2	ABR	40	70
3	APT	30	80
4	BKS	50	100
5	FA	70	90
6	HIC	50	80
7	IS	60	90
8	J	40	90

No	NAME	*Pretest*	*Posttest*
9	KK	30	70
10	MERB	20	60
11	MHAIS	70	100
12	MHS	80	100
13	MKP	30	60
14	MRR	30	70
15	RE	40	80
16	SA	40	80
17	SOR	80	100
18	SSM	10	40
19	SRI	30	50
20	WTH	40	90
21	MT	50	100
	AVERAGE	**44,28**	**80**

Table 1 shows that the average pretest score obtained by students before treatment was 44.28, while the average posttest after treatment using digital media was 80. The comparison between the average pretest and posttest scores shows a significant increase after treatment, where the posttest score is higher than the pretest score. This shows that the use of digital media has a positive impact on students' understanding of ecoliteracy, which can be seen from the increase in their scores after learning.

To find out whether the difference between the pretest and posttest scores is statistically significant, an analysis was carried out using the t-test. This test aims to determine whether the changes that occur in students can be explained by the effect of treatment or just by chance. Before conducting a hypothesis test, the data obtained in Table 2 must be tested to determine the normality of the data. The normality test data obtained from the SPSS application can be presented as follows.

Tabel 2. Normality Test

	Klomogrov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.209	21	.017	.931	21	.145
Posttest	.167	21	.131	.914	21	.066

a. Lilliefors Significance Correction

The normality test was conducted using the Shapiro-Wilk test. This test was chosen because the number of samples used was <50 data. Based on the results shown in Figure 1, the significance value for the pretest was 0.145 and for the posttest was 0.066. Both significance values are > 0.05. This means that the pretest and posttest data are both normally distributed. Thus, this shows that the data meets the normality decision-making guidelines needed to proceed to the hypothesis testing stage.

After normally distributed data, the hypothesis test was conducted using the Paired Sample T-Test technique to test whether there is a significant difference between the pretest and posttest averages. Based on the data obtained from the SPSS application, data is presented in table 3.

Tabel 3. Hypothesis test (*t-test*)

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	-35.714	10.757	2.347	-40.611	-30.818	-15.215	20	.000

The decision to accept or reject the hypothesis is determined at a 5% significance level (α = 0.05). The results of the hypothesis test can be seen in Figure 2, where the significance value obtained is 0.000. A value of 0.000 <0.05 indicates that H0, which states that there is no significant difference between the pretest and posttest scores, is rejected. While H1, which states that there is a significant difference, is accepted. This shows that the use of digital media has a significant effect on the development of ecoliteracy in elementary school students.

DISCUSSION

The ecoliteracy was developed through integration in Natural Science learning, especially in ecosystem material. Ecoliteracy is the ability to understand the basic principles of ecology and the reciprocal relationship between living things and their natural environment. This is an important foundation in building awareness and responsibility for students towards environmental sustainability. In addition, as explained by Farid et al. (2024), the development of culturally inclusive learning in elementary schools also contributes to the instillation of more holistic sustainability values. Digital media can be a bridge between ecological and multicultural values, which are relevant to the context of students' daily lives in a pluralistic society. Ecosystem material directly includes a discussion of the interactions between various living things (such as plants, animals, and humans) with environmental elements such as water, soil, and air. Understanding this interaction is expected to increase students' concern in maintaining environmental balance. Therefore, ecosystem material is considered very relevant to support the development of ecoliteracy in elementary school students.

Figure 1. Teacher Introduces Digital Media to Students

The use of innovative learning media is important to optimize the development of ecoliteracy (Chu & Karr, 2016). Digital media has great potential to deliver complex materials such as ecosystem concepts interactively and interestingly (Demmans Epp et al., 2020). Presenting ecosystem concepts through digital media makes it easier for students to understand the material through clear visualizations such as videos, animations, and images that represent the environment in real terms. This makes it easier for students to understand the concept and increase their interest in environmental issues.

Figure 2. Implementation of Digital Media

The comparative data of obtained pretest and posttest scores show that the pretest and posttest scores of fifth grade students at state elementary school 14 of North Indralaya have a number of differences. The pretest data can be seen that the lowest score is 10, in contrast to the posttest data, the lowest score is 50, while the highest score of the pretest data is 80 and the highest score in the posttest is 100. The average pretest score is 44.28 and the average posttest score is 80. In addition, in the pretest only 4 students completed and 17 other students did not complete. Meanwhile, in the posttest there were 17 students who completed and only 4 students who did not complete. This shows that the scores obtained by students in the posttest are higher than the students' scores in the pretest.

To strengthen the validity of these findings, a normality test was conducted using Shapiro-Wilk, because the number of samples was less than 50. The significance value of the pretest was 0.145 and the posttest was 0.066, both of which were greater than the limit of $\alpha = 0.05$. This indicates that the data is normally distributed and meets the requirements for parametric testing. The difference between the pretest and posttest results did not occur due to data deviations, but have influence after the treatment.

After data was normally distributed, a hypothesis test was conducted using the Paired Sample T-Test. The results of the analysis showed that the average difference in value (mean difference) was -35.714, with a t value of -15.215 and a significance value of 0.000 ($p < 0.05$), meaning that statistically significant difference exists between the pretest and posttest. The high t-score shows the improvement of students' ecoliteracy score after using media is very strong. This suggests that the differences observed between the pretest and posttest scores are not due to data anomalies, but rather result from the actual effects of the treatment.

According to Pradita et al. (2023), the integration of digital media in environmental-based learning produces relevant and effective content. The study stated that digital media helps convey environmental concepts more realistically and concretely. Videos and animations that show the impact of environmentally friendly or unfriendly behavior make students better understand the importance of preserving the ecosystem (Burbules et al., 2020; Engerman & Otto, 2021). The advantages of digital media such as ease of access, interactivity, and real visualization make it an effective tool in ecoliteracy learning in Elementary Schools.

Interactive and interesting visualizations make digital media an effective learning experience, so that students not only understand the concept of the ecosystem but are also inspired to behave in an environmentally friendly manner (Braun et al., 2018). The results of this study confirm that digital media is not only a learning aid, but also an important means of developing ecoliteracy for Elementary School students.

CONCLUSION

The use of digital media can support teachers in improving students' ecoliteracy. Interactive digital media simplifies the delivery of complex material, enabling students to grasp difficult concepts more easily. Ecoliteracy is essential for students from an early age, as fostering this awareness in elementary school helps them understand the interrelationship between living beings and their environment that bring understanding for students to prepare to face future environmental challenges. Based on findings and data analysis, it can be concluded that the use of digital media has a significant effect on the development of ecoliteracy among students of fifth grade from State Elementary School 14 Norht Indralaya, Indonesia. This study has found that the average pretest score was 44.28, with the highest score 70 and the lowest 10. Following thetreatement, the posttest average increased to 80, with the highest score reaching 100 and the lowest 50. The results of the Paired Sample T-Test show a significance value of 0.000, which is less than 0.05. This indicates a statistically significant difference between pretest and posttest scores, confirming that digital media positively influences students' ecoliteracy development.

REFERENCES

Abdullah, K. H. (2023). Eco-literacy and social media: A bibliometric review. Journal of Scientometric Research, 12(3), 631-640.

Antink-Meyer, A. (2023). K-8 Sustainability Education. In The Palgrave Handbook of Global Sustainability (pp. 1197-1211). Cham: Springer International Publishing.

Braun, T., Cottrell, R., & Dierkes, P. (2018). Fostering changes in attitude, knowledge and behavior: Demographic variation in environmental education effects. Environmental Education Research, 24(6), 899-920.

Burbules, N. C., Fan, G., & Repp, P. (2020). Five trends of education and technology in a sustainable future. Geography and sustainability, 1(2), 93-97.

Cannon, M. (2018). Digital media in education. Digital Media in Education, 12, 1-4.

Chu, E. W., & Karr, J. R. (2016). Environmental impact: Concept, consequences, measurement. Reference module in life sciences, B978-0.

Cutter-Mackenzie, A., & Smith, R. (2003). Ecological literacy: the 'missing paradigm'in environmental education (part one). Environmental education research, 9(4), 497-524.

Demmans Epp, C., Phirangee, K., Hewitt, J., & Perfetti, C. A. (2020). Learning management system and course influences on student actions and learning experiences. Educational Technology Research and Development, 68(6), 3263-3297.

Engerman, J. A., & Otto, R. F. (2021). The shift to digital: designing for learning from a culturally relevant interactive media perspective. Educational Technology Research and Development, 69, 301-305.

Farid, M., Murtadho, N., Muslihati, M. A., Minghat, A. D., & Othman, N. (2024). Enhancing cultural inclusivity in primary schools: insights from Springer multicultural education data. Int. J. Eval. Res. Educ, 13(4), 2083-2094.

Kazazoglu, S. (2025). Environmental Education Through Eco-Literacy: Integrating Sustainability into English Language Teaching. Sustainability, 17(5), 2156.

McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here?. Ecosphere, 4(5), 1-20.

Papademetriou, C., Anastasiadou, S., Konteos, G., & Papalexandris, S. (2022). COVID-19 pandemic: the impact of the social media technology on higher education. Education Sciences, 12(4), 261.

Pradita, L. E., Rachmawati, U., Ulyan, M. (2023). Buku Digital Berwawasan Lingkungan Sebagai Upaya Menumbuhkan Ekoliterasi Anak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(6), 7262-7276.

Putra, D. A., & Saputra, I. R. (2021). Peran Pendidikan Sekolah Dasar dalam Mengembangkan Ekoliterasi Anak-Anak. *Jurnal Ilmu Pendidikan*, 12(3), 45-56.

Rahma, R. A., Affriyenni, Y., & Widyaswari, M. (2021). Cybergogy as a Digital Media to Facilitate the Learning Style of Millennial College Students. World Journal on Educational Technology: Current Issues, 13(2), 223-235.

Syam, N., Hasnah, Syahreni. (2022). Pengaruh Model Pembelajaran Kooperatif Tipe Two Stay Two Stray Terhadap Hasil Belajar Siswa Tentang Siklus Air Kelas V UPTD SPF SD Negeri 51 Tonronge Kabupaten Soppeng. *Juara SD: Jurnal Pendidikan dan Pembelajaran Sekolah Dasar* (Vol. 1, No. 3).

Turner, K. H., Eisenstock, B., Hicks, T., Jolls, T., O'Byrne, W. I., Paciga, K. A. & Hagerman, M. S. (2024). The importance of digital media literacy. Handbook of Children and Screens, 541.

Tyas, D. N., Nurharini, A., Wulandari, D., & Isdaryanti, B. (2022). Analisis kemampuan ekoliterasi dan karakter peduli lingkungan siswa SD selama pembelajaran daring di masa pandemi COVID-19. *Faktor: Jurnal Ilmiah Kependidikan*, 9(3), 213-226.

Zhang, H., Zhu, C., Sang, G., & Questier, F. (2024). Effects of digital media literacy course on primary school students' digital media literacy: an experimental study. International Journal of Technology and Design Education, 34(1), 1-17.