

The implementation of the Science Technology Society Model

by

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<p>Article History Submitted: 26 July 2024 Revised: 24 August 2024 Accepted: 24 December 2024</p> <p>Keywords: <i>science technology society; environmental literacy; social studies</i></p>	<p>Abstract</p> <p>The development of technology is inseparable from the role of humans as creators of culture; technology is a product of creation and human initiative. Technology produced by humans has both positive and negative impacts on humans themselves. The negative effects of this latest technological invention are often used to over-exploit nature and make it easier for humans to meet their daily needs. Awareness of the importance of preserving nature by realizing green or life-friendly behavior towards the environment can be started from the formal education pathway from elementary school to university. To realize awareness about green behavior, knowledge and competence in environmental literacy are needed. Its literacy competence relates to head/mind or aspects of knowledge (learning to know), heart/hand skills (learning to do), and spirit / spiritual (learning to live together). Its aim to build a community that agrees on how to understand conceptual ecology in the practice of special education in elementary schools. In addition, it is also to realize pedagogical processes that are based on local wisdom and directly require the participation of the community in their implementation. The purpose of the research was to improve eco-literacy in fifth-grade students of Mekarsari State Elementary School, Bogor Regency, West Java. The research used a classroom action research method with 21 fifth-grade students as research subjects. Data collection techniques were carried out by interview, observation, and documentation. The model of interactive qualitative data analysis techniques was used to analyze the research. The results of the research showed that the science, technology, and society model could improve the eco-literacy of students of Mekarsari State Elementary School, Pulo Merak, Cilegon, from 70 to 76. learning using the science technology society model in social studies learning can help teachers improve students' ecoliteracy and help students to better understand the material on social issues or problems in their environment</p>
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Introduction

Social Studies is a field of study that studies, examines, and analyzes symptoms and social problems that occur in society by reviewing various aspects of life or a combination. IPS is an integration of various branches of social sciences and humanities, namely sociology, history, geography, economics, politics, law, and culture. Social sciences are compiled based on social reality and phenomena that embody an interdisciplinary approach from aspects and branches of social sciences (Susanto, 2014; Widiastuti, et al., 2024; Budiman, et al., 2024; Lailatussakdiah, et al., 2025). Waste is a problem faced by all of humanity, and it has not been resolved properly. For the Indonesian nation, waste is still a very frightening specter with various natural disasters, most of which are caused by waste (Aladwan, 2024; Lailatussakdiah, 2024, Susanto, 2014). Environmental pollution and flooding are two natural disasters caused by these problems. Therefore, ecological literacy is an important thing that must be taught in social studies subjects in schools so that the chain of issues can be broken properly.

Eco literacy etymologically comes from two words, eco and literacy. Eco is an abbreviation of ecology, which is a basic science to understand and investigate the workings of nature and the existence of living things in their life systems. Numerous scholars have argued that the terms environmental literacy, ecological literacy, and eco-literacy have been used in so many ways and/or are so all-encompassing that they have very little useful meaning. However, despite the seemingly arbitrary and, at times, indiscriminate use of these terms, tremendous efforts have been made to explicitly define and delineate the essential components of environmental literacy, ecological literacy, and eco-literacy, and to firmly anchor their characterizations in deep theoretical and philosophical foundations (Muhammad Nur, D., & Zubair, A., 2024; Dina et al., 2024; Tianti et al, 2024).

Ecology also talks about survival in its habitat, how to meet its needs, forms of interaction with other components and species, adaptation and tolerance to changes that occur, about growth and reproduction that occur naturally in an ecosystem (Mufid, 2010; Dina, et all, 2024; Tianti, et all, 2024). Developing students' character through the cultivation of school literacy ecosystems, which is manifested in the school literacy movement so that they become lifelong learners. Environmental problems caused by human ignorance are increasing, especially waste problems. This is supported by the fact

conveyed by the director of waste management at the Ministry of Environment and Forestry that 72% of Indonesian people are less concerned with waste problems and the composition of plastic waste continues to increase, precisely in 2015, the percentage increase in plastic waste reached 11%. Understanding how to maintain the balance of the natural environment (eco-literacy) needs to be given from an early age (Siregar et al., 2020; Dina et al., 2024; Tianti et al., 2024).

The literacy of the students at Mekarsari State Elementary School is still low, indicated by the large amount of food packaging waste scattered around the school environment. Even in grade V, a lot of waste was found in the drawers of students' desks and outside the classroom. This is because many students throw garbage in the wrong place. In addition, the consumption patterns of students are quite consumptive, many students buy packaged food and drinks. This results in a lot of waste production by students at the school. In addition, the lack of cleaning staff at the school makes waste management at the school less controlled. Despite a shared concern for the environment and recognition of the central role of education in enhancing human-environment relationships, researchers have adopted widely differing discourses on what it means for a person to be environmentally literate, ecologically literate, or eco literate. We approached the multiplicity of theoretical and practical perspectives by developing a classification of the literacy conversation. This involved considering similar propositions within groups (i.e., within the fields of environmental education, ecology, and the humanities), describing each of these groupings and differentiating it from the others, and highlighting areas of similarity and divergence (Siregar et al., 2020; Dina et al., 2024; Tianti et al., 2024).

This science-technology society model was developed through longitudinal research conducted since 1978. The purpose of this model is to form individuals who have science and technology literacy and have concern for the problems of society and their environment. The term science technology society is translated from English, ie, science technology society, which was originally put forward by Kohn Ziman in his book *Teaching and Learning about Science and Society*. Science, technology, and society learning means using technology as a link between science and society (Poedjiadi, 2019). Goleman (Rusmana & Akbar, 2017:2) eco-literacy or ecological intelligence is our ability to participate in the ecology of the place where we are. Understanding eco-literacy must start early, understanding environmentally friendly attitudes is an attitude that must be possessed by every individual.

Individuals who are aware of the environment will be able to align development with the environment so that a harmonious relationship is created between society and the environment. Like plastic waste that is often thrown away by students at school, the amount is currently very worrying. Currently, waste, especially plastic waste, is a very scary specter for society. Ineffective waste processing and utilization are one of the causes. One of the plastic waste processing is the manufacture of Eco Bricks where this processing is very useful in reducing plastic waste because used plastic bottles can be used by filling them with used plastic waste, there is no word for burning plastic waste, but the plastic waste is put into a plastic bottle until it is full by being pushed by a stick so that the bottle is solid (Muhammad Nur, D., & Zubair, A.,2024; Rusmana, 2017). This research on the application of the science-technology-society model to improve students' eco-literacy in social studies learning on the theme of the environment. This research is urgent to be carried out to improve eco-literacy in students from an early age and can be a model for other educational units.

Methods

The research uses the Classroom Action Research method as cyclical actions to improve and enhance learning quality. In one cycle there are four stages, namely planning, implementation, observation, and reflection. If the location of success and obstacles from the actions that have been carried out in the first cycle is known, then the researcher and collaborator design activities for the second cycle, while the cycle of implementing Classroom Action Research starts from planning, implementation, observation, and reflection (Arikunto et al., 2007). The subject of the research was the V Grade of SD Negeri Mekarsari located in Pulo Merak, Cilegon. The class consists of 21 pupils, of which 11 are women and 10 are men. The data was gathered by several methods, ie, observation, test, and in-depth interviews. The technique for data analysis was conducted by interactive qualitative by Miles & Huberman models. The techniques consist of data collection, display, reduction, and conclusion.

Result and Discussion

This classroom action research was conducted in one of the Elementary Schools in Pulomerak District, SDN Mekarsari. SDN Mekarsari is located on Jalan Laksamana RE Martadinata, Link. Sukajadi, Mekarsari Village, Pulomerak District, Cilegon City. The

learning process at SDN Mekarsari is carried out from Monday to Saturday, teaching and learning activities start at 07.15 WIB until 12.10 WIB, with a total of 12 teachers 214 students, and seven classes.

The researcher's choice of research in class V with 21 students, 11 female students, and 10 male students, and the teacher, Mr. Asep Mochamad Hendi Hidayat, S.Pd. The reason the researcher chose class V was that the problems studied by the researcher were like the problems found in class V of SDN Mekarsari. It is in the form of low levels of student awareness of caring for the environment (eco-literacy competence), especially in class V of SDN Mekarsari.

Cycle 1 was conducted on March 12, 2024, using the group discussion method. Moreover, the class was divided into 5 groups and given the task of conducting a discussion related to the responsibility of community members towards their surrounding environment. By reading the hand-out prepared by the teacher and the research team, students then discussed and filled in the results of the discussion into the prepared worksheet. At the end of the session, the research team gave a test that students completed within 5 minutes. After reflecting with teachers and observers, the research team decided to continue the action to Cycle 2 because it was considered that the improvements were not below the research target.

Table 1
Teacher Activity

No	Aspect of Teaching	Score
1	The conveys information regarding the competencies	3
2	The delivering the material	3
3	Presenting problems regarding environmental issues	4
4	Methods regarding environmental issues	3
5	Apply environmental concepts to everyday life	3
6	Reinforcing the concepts	4
7	Conclusion	3
Total Score		23
Percentage (%)		82%
Criterion		Good

The percentage value of teacher activity during learning by implementing the science-technology-community learning model to improve students' eco-literacy in social studies learning shows a good category. The researcher observed student activities to ensure an understanding of the topic. The aspects assessed from student activities include activities

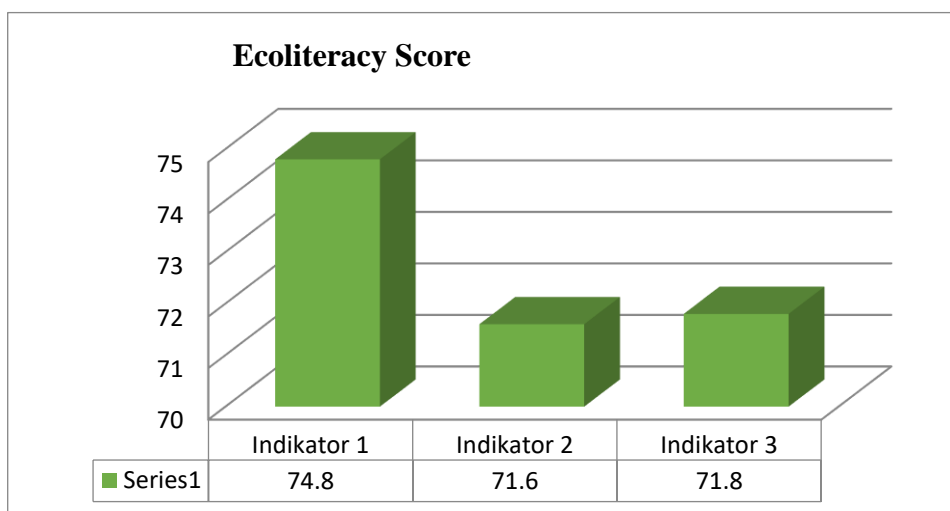
during learning, courage, and discipline. The average value of student activities can be seen in Table 2 below.

Table 2
Student Activity

Total	Student Activity
Sum	471
Mean	70
Percentage (%)	70%
Criterion	Enough

Based on Table 2, student activity scores during learning by applying the science technology society model to improve student eco-literacy in social studies learning have been increasing. This can be seen from the student activity observation sheet. The increase was obtained from the active involvement of students during the learning process. The average student score reached 70 and obtained a sufficient success category.

Figure 1. Ecoliteracy Score



The average value of the eco-literacy competency indicators in the hand/skills aspect in the graph above shows that the indicator of making and using tools, objects, and procedures needed by a sustainable society obtained an average score of 74.8, the indicator of bringing beliefs into practical and effective actions, and applying ecological knowledge to

ecological design practices obtained an average score of 71.6. In contrast, the indicator of assessing and adjusting the use of energy and resources obtained an average score of 71.8.

After completing the reflection, the research team designed the treatment for Cycle 2 by recommending the investigation method. The implementation is set for March 16, 2024, with learning activities using the investigation model. In this learning activity, the class is divided into 5 groups and given the task of investigating the school community's awareness of the environment.

Table 3. Teacher Activity

No	Aspect of Teaching	Score
1	The conveys information regarding the competencies	4
2	The delivering the material	4
3	Presenting problems regarding environmental issues	4
4	Methods regarding environmental issues	4
5	Apply environmental concepts to everyday life	4
6	Reinforcing the concepts	4
7	Conclusion	3
Total Score		27
Percentage (%)		92%
Criterion		Very Good

The percentage value of teacher activity during learning by implementing the science-technology-community learning model to improve students' eco-literacy in social studies learning shows a very good category. The researcher observed student activities. Aspects assessed from student activities include student activities during learning, student courage during learning, and student discipline. The average value of student activities can be seen in Table 4 below.

**Table 4
 Student Activity**

Total	Student Activity
Sum	490
Mean	85
Percentage (%)	90%
Criterion	Good

Table 4 shows the students' activity scores during learning by applying the models have been significantly increasing. It can be indicated from the student activity observation sheet that high scores in all aspects. The increase was obtained from the active involvement of students during the learning process. The average student score reached 85 and obtained a sufficiently good category. Based on these reasons, it is proven that the application of the Science Technology Society model can improve students' eco-literacy in social studies learning in elementary schools. Therefore, the research conducted by the researcher is said to be successful. This is evidenced by the increase in students' eco-literacy competency scores in the aspects of head/knowledge and heart/attitude.

Eco literacy is a competency that can be developed in continuous learning activities through various interesting activities. These results are by this constructivism theory, students must build knowledge based on their respective experiences (Siregar et al., 2020; Dina et al., 2024; Tianti et al., 2024). The learning process carried out in actions 1 and 2 is in line with the theory of social constructivism because it emphasizes the interaction of individuals with their environment. To gain experience, students associate new knowledge with the initial knowledge they already have (Muhammad Nur, D., & Zubair, A., 2024; Dina et al., 2024; Tianti et al., 2024). The teacher's ability to facilitate learning is the main key to developing this competency. Through the Science Technology Society, students can learn comfortably and understand the importance of protecting the environment with various important actions.

Conclusion

Overall, learning using the science technology society model in social studies learning can help teachers improve students' ecoliteracy and help students to better understand the material on social issues or problems in their environment. Based on the analysis of the data obtained, there was an increase in students' ecoliteracy by applying the science technology society model in social studies learning from pre-cycle to cycle I. The increase in ecoliteracy in the head/knowledge aspect in the pre-cycle was 60, and in cycle I it increased to 70.6. In addition, students' ecoliteracy competency in the heart/attitude aspect has begun to develop; in the pre-cycle, it was 67.2, while in cycle I it was 76.3. Based on the average value obtained in the pre-cycle and cycle I, it shows that the ecoliteracy

competency in the head/knowledge and heart/attitude aspects of students has increased well.

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