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# MULTILITERACY: ALTERNATIVE LEARNING MODELS TO IMPROVE ECOLOGICAL LITERACY OF PRIMARY SCHOOL STUDENTS

*Dede Margo Irianto [1] , Hana Yunansah[2] , Tita Mulyati [3] , Yusuf Tri Herlambang[4] , Dadan Setiawan [5]*

[1,4] Elementary School Teacher Education Study Program, Indonesian University of education, Bandung, Indonesia
[2,3] Primary School Teacher Education Study Program, Indonesian University of education, Bandung, Indonesia
[5] Basic Education Study Program, Postgraduate School, Indonesian University of education, Bandung, Indonesia

Corresponding Author: [4]yusufth@upi.edu

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**ABSTRACT:**
This study investigates the effects of multiliteracy learning models on the ecological literacy abilities of elementary school students and discovers how students describe their experiences in learning. This study uses an explanatory sequential design that is part of the mixed method. The use of explanatory sequential design allows the collection of quantitative and qualitative data that serve as corroborating evidence to answer two research questions: how are students' ecological literacy skills between students who learn to use multiliteracy learning models and students who learn to use traditional models ? How can the experience gained by students learning with multiliteracy models be useful to improve their ecological literacy skills? Quantitative results demonstrate that the use of the learning model multiliteracy significant effect on the improvement of ecological literacy skills of elementary school students. Then the qualitative findings of this elucidation are students are of the view that the learning experience experienced can strengthen and enhance their knowledge making it easier for them to solve problems encountered, students find it easy to find information because learning allows them to access information from various sources both print and media electronics, and learning experiences using multiliteracy models help students realize that humans must take good care of nature/ the environment.

## INTRODUCTION

Education is an effort to humanize humans in accordance with the nature of humanity as multidimensional beings who have a relationship with nature or the environment (Herlambang, 2018). Therefore education will always be closely related to space and time where the relationship between humans and the natural environment has a real place that implies the human obligation to always maintain harmony, harmony, and sustainability with nature (Muhaimin, 2015). This is because humans are considered part of the planet Earth (Freire, 2010; Misiaszek, 2012).

Ecological education has become one of the main focuses in the field of education. This is because of the increasing environmental challenges ranging from the problem of air pollution, garbage, water contamination, water supplies that began to decrease, and global climate change. The explanation shows that ecological education is very important to overcome these challenges. In connection with this explanation, ecological education has a very important role because it can hone ecological sensibility and foster human awareness about the existence of the environment as part of ecosystems that affect human life (Herlambang, 2018; Yunansah & Herlambang, 2017; Irianto, et al, 2020). Ecological education must begin in primary school age children. In line with this, recent research shows that environmental education can be done in early childhood by introducing nature and its relationship with humans (Elliot & Davis, 2009; Torquati, Culter, Gilkerson, & Sarver, 2013).

In line with the explanation above, environmental education is very important. Therefore, environmental education must be done properly and as well as possible so that students' environmental literacy skills are better. Environmental education must be able to develop aspects of ecological literacy including cognitive, affective, action (the ability to make tools, and spirit). One way to develop aspects of students 'ecological literacy is to apply innovative, creative, and fun learning by involving students directly involved in the learning process so that students' ecological abilities can develop.

In connection with the above, the condition is inversely proportional to the current reality. Although basically nature itself has been recognized as having value and value, in reality, nature is still considered an object of life that continues to be exploited by humans through the practice of pollution, destruction and various other bad actions. This condition is a reflection of the low ecological literacy,awareness and moral crisis of society. Environmental crises are like all crises marked by the action ns of a number of people which harm a number of others, both by negligence and intentionality (Machan, 1989). Basically, this environmental crisis is caused by a moral crisis of law.

In addition, the facts on the ground show that environmental education is carried out mostly traditionally. Students are lacking broad opportunities to explore problems and conduct investigations to solve problems related to the environment. In addition, based on the results of observations also environmental education is still focused in the classroom. Students are less given the opportunity to directly find problems, analyze problems, and create products or tools to solve existing environmental problems. Whereas learning environment that encourages students to

go directly to the field to do observation, analyze, solve problems and make work can increase students' ecological literacy. In addition, field-based learning does not only affect cognitive aspects but positively impacts attitudes and skills (Fuller, et al, 2006; Boyle et al., 2007; Elkins and Elkins 2007; Hix, 2015; Knackmuhs, Farmer, and Reynolds 2017; Noreen et al., 2019).

In this study, to overcome the problem of environmental education in elementary school students in the Indonesian context, the researcher proposes the application of field -based multiliteracy learning models to develop the ecological literacy abilities of elementary school students. The multiliteracy learning model is a learning model that can empower students to acquire new knowledge, understanding and skills based on learning activities undertaken (Allison & Allison, 2018; Harrop-allin, 2017; Silvers, Shorey, & Crafton, 2010; M Shariff et al., 2020; Muhammad et al., 2019).

The multiliteracy learning model has several advantages including the fact that in the learning process students are given the freedom to determine what problems they want to study. Learning that involves students in making decisions will encourage students to be more responsible in participating in learning and can increase student motivation (Alafouzou, Lamprinou, & Paraskeva, 2018; Munir et al., 2019).

In addition to the above advantages, multiliteracy learning also provides opportunities or students to conduct investigations, analysis, and make products or tools that serve as a means to develop aspects of knowledge, attitudes and skills to be achieved. Learning activity that gives students the widest possible to determine the problem, exploration, investigation, problem solving, and create projects to develop the ability to think a high level , and the creativity of students (alharbi et al., 2018; Alafouzou, Lamprinou, & Paraskeva , 2018 ; Allison & Allison, 2018; Harrop-allin, 2017; Shabbir et al., 2019; Silvers et al., 2010; Noorollahi et al., 2019) .

Research using the multiliteracy model has been carried out by several other researchers. The results of research using multiliteracy learning models can develop thinking skills, increase motivation, develop 21st century skills and improve student learning outcomes (Adams, 2019; Alexander, DePalma, & Ringer, 2016; Allison & Allison, 2018; Harrop-allin, 2017; Altas , 2014; Hesterman, 2011; Silvers et al., 2010; Trigos-Carrillo & Rogers, 2017 ; Setiawan, 2020; Rahman & Damaianti, 2019; Susilo & Yanto, 2018; Normalini et al., 2019; Dafit., Mustika., & Ain, 2018; Hendriyani ., Rohayati., Ernalis, 2018; Shabbir et al., 2020; Iyer & Luke, 2010; Cope & Kalantzis, 2005 ) .

With the several advantages of the multiliteracy learning model, it is expected to develop the ecological literacy abilities of elementary school students so that environmental problems and challenges can be overcome properly because they have ecological literacy abilities, environmentally responsible behavior and skills.

## CONCEPTUAL FRAMEWORK

### Ecological Literacy

Ecological literacy was first put forward by Capra (1997) who suggested that the principles of ecology could be applied to all living systems. The discourse on ecological literacy grew until many prominent thinkers emerged who supported the creation of a human community who had an understanding of natural principles

and natural systems that support life on earth (Capra, 2002; Cutter-Mackenzie & Smith, 2003; Wooltorton, 2006).

Ecological literacy can be interpreted as a comprehensive understanding of the environment (Desfandi & Maryani, 2017). In essence, ecological literacy does not only talk about aspects of knowledge, but ecological literacy is supported by social, emotional, and spiritual intelligence. The existence of these aspects is important to increase the success of ecological literacy. With this intelligence the problem of the environment can be overcome because everyone is able to live in harmony with nature (Charles, 1990; Muliana, Maryani, & Somantri, 2018).

Ecological knowledge becomes the first thing when someone will have ecological literacy (Karatekin, 2013). This means that aspects of knowledge are also an important factor in building ecological literacy of elementary school students. Knowledge aspect is not the only aspect that plays a role in developing ecological literacy of elementary school students. There are several other aspects including aspects of environmental care attitude and skills. The aspect of caring for the environment is also one of the important aspects to build the ecological competence of elementary school students. Aspects of caring for the environment can be formed through daily interactions with the surrounding environment (Mcbeth, Volk, & Mcbeth, 2010).

In connection with the explanation above, ecological awareness must also be the most important part of educational goals. Education must be able to build education people who have the character and awareness of nature / environment and are not oriented to efforts to give birth to educational beings who are pragmatic-materialist-minded, and have an impact on the development of a paradigm trapped in the jungle of development that is wrong (*maldevelopment))* who only see nature as an object, mechanistic, fragmented, separate from humans so easily dominated and exploited.

From this explanation, it can be understood that ecological awareness is not built through an educational process that is only a *transfer of knowledge,* but a learning process that places students as active subjects in learning. Education that builds awareness and ecological intelligence with the orientation *of the transfer of knowledge* will only make students limited to having knowledge about the environment, and lacking awareness and concern for the environment (Muhaimin, 2015). This has a negative impact on the character of students who in general have not been friendly and behave towards the environment.

Ecological literacy is expected to form students who have a broad understanding of how everyone can interact with natural systems and then continue to be carried out sustainably. Therefore, an understanding of nature and environmental care behavior must be a shared lifestyle that can be integrated through environmental education, but more important is the development of environmental culture (Keraf, 2014). Education is expected to build a sustainable understanding of life about ecological intelligence and emotional attachment to nature, which provides wider opportunities to make children grow into responsible citizens who care about the sustainability of life.

Efforts to support the success of ecological literacy are with ecological education. Ecological education aims to hone ecological sensibility and foster awareness of the existence of the environment as part of an ecosystem that affects human life. This means that ecological education is oriented towards a humanitarian based approach to address environmental problems (Ryan, 2012; Herlambang, 2018). Through ecological education, all humans are encouraged to always have an awareness that the behavior carried out will have an impact on nature. This has implications for the

understanding of how valuable and valuable nature is to human life, so how important it is to maintain and preserve a harmonious and balanced life.

## RESEARCH METHODS

The research method used in this study is a mixed methods research method with explanatory sequential design. Research mixed methods research is a model that applied when investigators have questions that need to be tested in terms of outcomes and processes, and involves a combination of approaches quantitative and qualitative in a study with the aim of improving the overall pattern (Creswell & Plano Clark, 2011). In a quantitative approach, the quasi-experimental method of the matching pretest-posttest control group design is used, while the qualitative approach uses case studies.

### Research Subject

The subjects of this study consisted of 5th grade elementary school students. The number of subjects of this study consisted of 76 students who were divided into experimental and control groups. There are three students who did not actively participate in the research activities so they were not involved in the research data. Students who are the subjects of this study have different academic abilities, namely (low, medium, high). This database of student characteristics is drawn from the results of student test scores on environmental themes. Based on the results of the test scores, it is known that 35% of students are in the high category, 40% of students are in the moderate category, and 25% of the students are in the low category.

### Research Instruments

This research instrument uses a test item to measure the ability of ecological literacy, assessment of rubric scoring processes, and interview guidelines. The instrument is used to determine the effect of multiliteracy learning models on the ecological literacy abilities of elementary school students and to find the experiences gained by students who learn with multiliteracy learning models can be useful to improve their ecological literacy abilities. Instruments used in this research has been validated by two experts and the instrument has been ter uj i validity and realibilitasnya so unfit for use. The ecological literacy indicators in this study refer to the indicators put forward by The Center for Ecoliteracy (2013), namely: (1) knowledge; (2) attitude; (3) action (skill in making tools to overcome the environment); and (4) spiritual.

### Data Collection and Analysis Methods.

The data in this study will be collected through several methods of data collection. Quantitative data collection was carried out through 8 question description tests that measured students' ecological literacy. Then the qualitative data collection is done through interviews to find student learning experiences that help students improve their ecological literacy.

Data analysis was performed to see whether the data showed a normal distribution. In quantitative data the data analysis uses statistical tests. Based on the results of the Kolmogorov-Smirnov test of data pre-test and post-test students who participate in this study, air- normal distribution (p>. 05). After the normality test, the

data were tested for homogeneity and the t / mann-whitney test to determine the effect of the treatment carried out. In the qualitative data, analysis of data ber form of interviews semi-structured obtained from the research carried out by content analysis. Content analysis is a systematic and reproducible system in which the desired message is identified and conclusions are reached using coding conducted according to certain rules (Büyüköztürk, Akakak, Akgün, Karadeniz & Demirel, 2009). In the content analysis approach, categories are determined qualitatively for text, and quantitatively the frequency of categories is determined (Mayring, 2014). Content analysis provides new ideas and makes it easier for researchers to understand certain events. Content analysis is used to find concepts and relationships that can explain the data collected, and the analysis is carried out in 4 steps: ( 1) Data coding; ( 2 ) Finding themes; ( 3) Manage codes and themes; ( 4) Defining and interpreting findings (Yıldırım & Şimşek, 2006) . To ensure the reliability of qualitative data in this study, two procedures were carried out. First, data that can be represented in each category is quoted directly without comment. Second, the opinion of experts sought to determine whether the statement that represents the category in question. The identification and interpretation of findings is carried out together with the results of quantitative analysis.

## RESULTS

Quantitative data analysis of this study used SPSS version 20.00. Analysis of the research data was made for the experimental and control groups and the results were formed according to the analysis. To identify how the students' ecological literacy ability is before treatment is given, an analysis of the two difference test is used to test whether there are differences in the measured characteristics between the two groups.

Normality test is carried out to determine data distribution. According to the Kolmogorov-Smirnov test results are used for groups with observations of 50 and above (Alpar, 2014). The findings indicate that the value of significance to pr e test t the experimental group were 0,0 to 9 and for the significant value of the control group was 0.132. Thus it is determined that the data are normally distributed and the subsequent analysis is the homogeneity parametric test and the t test. T tests were carried out to determine whether there were differences in pre-tests between the two groups and the results are presented in the following Table 1.

### Comparison of Pretest Results

Table 1 *Summary of the findings*

| N | Groups | The mean | Mean Difference | Std. Deviation | Normality Test | Homogeneity Test | Independent sample test |
|---|---|---|---|---|---|---|---|
| 39 | Experimental Group | 32.69 | 1.93 | 6. 7 95 | 0.09 | 0.523 | 0.235 |
| 3 7 | Control Group | 34.6 2 | | 7,305 | 0.132 | | |

Table 1 shows that there were no differences in the ecological literacy abilities of students before being given treatment between the experimental and control groups. This can be seen from the results of the t test whose significance value is 0.235 (p> 0.05). Thus it can be concluded that the ecological literacy ability of students between the experimental and control groups before being given

treatment has the same ability. To find out how the effect of the treatment that has been done then, can be seen in Table 2 below.

**Comparison of Posttest Results**

Table 2 *Summary of the findings*

| N | Groups | The mean | Mean Difference | Std. Deviation | Normality Test | Homogeneity Test | Mann-Whitney |
|---|---|---|---|---|---|---|---|
| 3 9 | Experimental Group | 87.01 | 13.54 | 7,365 | 0.11 | 0.022 | 0.00 |
| 3 7 | Control Group | 73.47 | | 10249 | 0.58 | | |

Table 2 shows that the ecological literacy abilities of students were normally distributed. H al is seen from the significance value that is p> 0,05. The significance value of the normality test in the experimental group was 0.11 and the significance value in the control group was 0.58. Because the two data are normally distributed but not homogeneous, non- parametric tests are performed for further analysis. Based on the results of the mann-whitney test shows that there are significant differences in students' ecological literacy ability between the experimental and control groups after being given treatment. This can be seen from the significance value of the mann-whitney test is 0.00 (p< 0.05).

Based on the data in table 2 above, it shows that the average value of the ecological literacy ability of students in the experimental group getting learning using the multiliteraty model is higher than the average score in the control group using the traditional model. The difference in posttest scores between the two groups is 13.5 4. To see how much impact the multiliteracy learning model has on the ecological literacy abilities of elementary school students, the researchers are presented in the following table .

**Comparison of Pre test and Post test Results**

Table 3 *Summary of the findings*

| N | Groups | The mean | Mean Difference | Std. Deviation | Normality Test | Homogeneity Test | Paired sample test |
|---|---|---|---|---|---|---|---|
| 39 | Pretest | 32.69 | 54.38 | 6. 7 95 | 0.09 | .87 | 0.00 |
| 39 | Posttest | 87.01 | | 7,365 | 0.11 | | |

Based on table 3 above, the results show that the mean pretest value in the experimental group was 32.69 with a standard deviation of 6. 7 95. After treatment, the average posttest score of students' ecological literation ability is 87.01 with a standard deviation of 7.365. From the results of the normality test show that the two data are normally distributed because p <0.05. Because both data are normally distributed, parametric tests are performed for further analysis.

Homogeneity test results indicate that the data comes from the same or homogeneous variance. This can be seen from the significance value of 0.87. Based on data analysis procedures, if you want to know the difference in the value of the pretest and posttest, paired sample test is done.

Paired sample test results indicate that there are significant differences in the ecological literacy abilities of elementary school students between before and after treatment. This can be seen in table 3 that the significance value is 0.00 (p< 0.05). Thus it can be concluded that the multiliteracy learning model is effective in increasing the ability of ecological literacy.

To complete the quantitative data presentation, the researcher presents qualitative data which contains the results of student response interviews in the experimental group on learning by using multiliteracy learning models.

Table 4. The opinions of students in the experimental group on the lessons with the multiliteracy model.

| | **Opinions** | **f** |
|---|---|---|
| Positive | Attraction | 25 |
| | Helps improve problem solving skills | 20 |
| | Helping students improve environmental care | 17 |
| | Strengthen and increase knowledge | 15 |
| | Enables students to get information from various sources in a short amount of time | 14 |
| | Helping students increase self-confidence | 11 |
| | Allow students to respect each other's opinions | 9 |
| | Enable students to collaborate with friends | 7 |
| | Provides cultural richness | 3 |
| Negative | Time problem | 14 |
| | There is no | 9 |
| | Facility problems | 8 |
| | Guidance issues | 6 |
| | Poor weather conditions | 3 |
| | Lost attention | 1 |

Based on table 4, it shows that students in the experimental group expressed their responses through the results of interviews with learning that had been conducted using a multiliteraty model. When student responses are examined, there are 121 positive opinions expressed by students and 39 negative opinions.

From the interviews, it was found that in general students' responses to learning experiences using multiliteracy learning models were very good. This can be seen in the table of positive views expressed by students after gaining learning experiences using the model. The positive outlook generally expressed by students is

that the majority of students are interested in and enjoy learning with the model, the cognitive abilities of students have increased after learning to use a multiliteracy model so that students are easy to do the tasks given by the teacher.

In addition to positive views, there are also negative views of students towards the learning experience that is done. Negative views that are commonly expressed by students are a matter of time and lack of availability of facilities.

## Disscussion

Based on the results of the study showed that the ecological literacy ability of students experienced a significant increase after learning using the multiliteracy model. This is an interesting finding that the multiliteracy learning model has a large impact on students' ecological literacy abilities. This shows that the steps of this multiliteracy learning model are effective in improving students' ecological literacy abilities.

The multiliteracy learning model can improve the ecological literacy ability of elementary school students because it uses scientific thinking stages so as to strengthen and enhance students' cognitive abilities. Evidence that the multiliteracy model can improve students' cognitive abilities is based on the results of interviews with students namely "learning experiences with multiliteracy models strengthen and enhance my knowledge making it easier for me to understand learning materials about the environment well" (A5). This is in line with previous research that multiliteracy learning can strengthen students' cognitive abilities so they can think efficiently (Allison & Allison, 2018).

Furthermore, the multiliteracy learning model also encourages students to learn to solve problems using strategies so that students are trained in solving problems encountered. This is in accordance with the positive opinion of students, namely, "the steps of learning the multiliteracy model really helped me to be able to solve environmental problems, because we were required to do analysis, investigation, solve problems, and find solutions by making tools or products. "(A12). Learning that provides an active learning environment and problem solving learning can encourage students to have high understanding and can develop students' thinking skills (Allison & Allison, 2018; Hesterman, 2011; Chen, 2007; Abidin, 2015; Concannon-Gibney & McCarthy, 2012; Cope & Kalantzis, 2005).

In connection with the explanation above, in practice multiliteracy learning modelsemphasize learning that can develop higher-order thinking skills, build experiences by actively involving students in learning , and develop students' abilities in problem solving so that students' thinking abilities including students' ecological literacy abilities develop with good (Abidin, 2015; Hesterman, 2012).

The multiliteracy learning model emphasizes students in scientific activities, such as observation, analysis, investigation, problem solving and work creation. The impact of scientific thinking activities enriched with multiliteracy will strengthen students' knowledge about the environment. Strong knowledge of the environment will influence students 'responsible behavior towards the environment so that students' ecological literacy abilities from aspects of knowledge, attitudes, and skills have improved (Zachariou, Voulgari, Tsami, & Sympathetic, 2020 ; Allison & Goldston, 2018; Iyer & Luke, 2010 ; Adams, 2019; Harrop-allin, 2017; Simon, 2011; Trigos-

Carrillo & Rogers, 2017 ; Iyer & Luke, 2010; Alexander, DePalma, & Ringer, 2016; Giampapa, 2010; Silvers et al ., 2010) .

The learning stages of the multiliteracy model give freedom to students to search for information from various sources both to make observations directly, through reading from print or electronic media so as to increase student knowledge and facilitate students in conducting investigations. Learning activities that facilitate students to gain experience through direct observation of nature to find out problems and environmental needs, and encourage students to create tools to overcome environmental problems can develop ecological literacy skills and students' ecological awareness (Goulgouti, Plakitsi, & Stylos, 2019). This is in line with students' view that "learning experiences using multiliteracy models can increase environmental awareness so that I care more about caring for and caring for nature well". (A21).

From the findings, it shows that overall the indicator of ecological literacy ability of students has increased after getting multiliteracy learning. The attitude of responsible environmental behavior increases with increasing knowledge about ecology. This shows that there is a correlation between ecological knowledge and understanding with environmental attitudes. The better knowledge and understanding of the environment, the better the attitude of caring environment (Liu et al., 2015; Pe'er, Goldman, & Yavetz, 2006; Tuncer Teksoz et al., 2014; Tuncer et al., 2009; Yavetz et al., 2009; Zachariou, Voulgari, Tsami, & Bersimis, 2020 ; Hunter & Jordan, 2019 ) . Ecological knowledge has an important role in developing students' attitudes and behaviors. Therefore to develop student 'attitudes and behaviors that are responsible for the environment it is necessary to increase students' knowledge about ecology (Nurhafni, Syahza, Auzar, & Nofrizal, 2019).

Multiliteracy learning uses learning experiences to make products or tools as a means to develop aspects of knowledge, attitudes and skills to be achieved. The product or tool made is certainly a solution to the problem solving that has been investigated (Duf & Whitty, 2014).

Based on the description above, it is evident that the ecological literacy ability of students has increased significantly after being given learning using a multiliteracy learning model. From this explanation a conclusion can be drawn that multiliteracy learning models in addition to improving learning outcomes, developing 21st century skills, and developing thinking skills can also improve students' ecological literacy abilities. The multiliteracy learning model can be used as an alternative learning model in environmental education in primary schools, especially in Indonesia.

## Conclusion

Based on the results of the study indicate that the ecological literacy ability of elementary school students has increased significantly after being given learning using multiliteracy models . Overall students' responses to the multiliteracy learning model were also very good. The majority of students are happy and interested in learning the stages of the multiliteracy model. This means that the multiliteracy learning model has a large impact on increasing students' ecological literacy abilities.

The multiliteracy learning model has implications in the learning process that canimprove student learning activities, encourage students to think scientifically, develop environmentally responsible behavior, and train students' skills.

This research has provided an understanding of the innovative and creative teaching and learning process. Things need to be underlined in this study is that all students can learn and be able to show the best ability of his when the following learning by using learning model measures multiliteracy. This study provides empirical knowledge about the effectiveness of multiliteracy learning models in developing the ecological literacy abilities of elementary school students so that they can be used as alternatives in environmental education in primary schools especially those in Indonesia.

To build students who are environmentally literate and have environmentally responsible behaviors, not only improving the learning process but also collaboration betweenthe school and family is also needed. Therefore the researcher suggests several things including: (1) In implementing multiliteracy learning , the researcher then needs to pay attention to the availability of school facilities to support the success of learning; (2) the next researcher must be able to manage the time as well as possible; (3) the government must actively socialize and provide insights on environmental preservation programs; and (3) School principals must have commitment and be able to involve all school members to actively participate in environmental management activities and preserve the environment in schools.

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