

Developing Primary School Students' Environmental Literacy by Utilizing Scraps

Uus Kuswendi¹✉ & Hana Sakura Putu Arga²

^{1,2} Primary Teacher Education Department, IKIP Siliwangi, Cimahi, Indonesia

✉ uus@ikipsiliwangi.ac.id

Abstract. One action related to environmental literacy someone's effort to reduce environmental pollution. For primary school students, this can be done by processing dry waste into useful items. Processed garbage can be processed into scraps that can be made into simple handicrafts. This research was aimed at developing environmental literacy through the use of scraps in primary schools. The research employed a quantitative approach with quasi experimental method. The samples of the research were fifth grade primary school students who were randomly selected. Then the data collection techniques were conducted with the cognitive tests, practice, and attitude questionnaires. Meanwhile, data analysis process employed the inference statistics. The results showed that the activity of utilizing scrap affected the students' environmental literacy. The aspect that experienced a quite good change was the performance aspect in the form of carrying out used scrap activities. Therefore, the use of scraps could be an effort to build the environmental literacy of primary school students.

Keywords: Environmental Care, Environmental Literacy, Primary School, Scraps.

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INTRODUCTION ~ Literacy is not only related to read and write activities but also related to other habituation, thus it becomes a culture and identity. Literacy is an important substance as an effort to foster positive character in students. This is mainly because literacy is not only cognitive-related activities, but it is correlated with actions that are later expected to be literate personal figures. One of the global issues that has not been resolved to date is the environmental problem. Current global environmental problems are in the form of climate change problems to waste problems that have not been resolved properly (McClaren, 2019). The existence of environmental problems raises a movement in the form of environmental literacy (Arnon, Orion, & Carmi. 2014). Environmental literacy is one type of literacy that is related to the attitude of loving the environment. Environmental literacy is the ability of a person to interact with their environment (Goldman, et al., 2018). Environmental literacy is related to the ability of individuals to understand and interpret environmental conditions and then the interpretation results will be decided on appropriate actions to preserve and improve environmental conditions (Saltan & Divarci, 2017). The importance of growing environmental literacy is due to the low concern level of students to the environment. In the

school environment, this can be seen from the behavior of littering, letting plants dry, piling up garbage in landfills, and dirty classrooms (Goldman, Peer, & Yavetz, 2015). Not only that, environmental literacy is also related to how individuals take care of themselves such as using clean clothes, washing their hands before eating, and eating healthy food (Frensley et al., 2020).

North American Association of Environmental Education (NAAEE) explains that environmental education is a complete and comprehensive process to help humans understand the environment and its problems. To increase students' awareness on the environment, students need to be given an interesting motivation, then guided to make observations. This is supported by Meier & Hilton (2017) stating that equipping students with knowledge about the environment from an early age is very strategic, it aims at making the students care about the environment. Some reasons that become the background of students' urgency to get environmental literacy education include the first positive interaction with the environment that is important for healthy development. Second, environmental literacy education can improve learning abilities and quality of life travel. Third, students will see nature as a source of awe, excitement, and charm. Fourth, a student's soul will be enriched by nature and he/she will find sources of human sensitivity through nature.

Environmental literacy needs to be developed from the beginning because in primary school-age, the students have a good memory, thus good habits will become habituation (Alkather & Goldman, 2017). Environmental Illiteracy is not only taught through theory but requires cooperation between school members to make it happen. That is because the best theory of habituation is the existence of an action (Madden & Liang, 2017). This is where the teacher's role as an agent of change is to facilitate students to grow environmental literacy. Schools as one of the producers of sufficiently large amounts of garbage should contribute to maintaining environmental conditions (Clayton et al., 2019). In one day, schools can produce at least 10 kg of both dry and wet garbage. The basic knowledge that needs to be taught to students is the sorting of dry and wet waste, hence schools need to provide separate bins. This is one of the actions to protect the environment. Waste segregation is a fairly simple activity but has a good impact if students are accustomed to throwing out the type of waste accordingly. Waste selection is useful so that dry rubbish can be recycled, while wet rubbish can be piled up (Namusonga & Carter, 2020).

The survey results of the Ministry of Environment and Forestry explains that in 2019, Indonesia produced 64 million tons of waste. The most dominant types of waste produced in Indonesia were organic [leftover foods and plant residues] by 50%, plastic by 15%, and paper by 10%. Then, the remaining waste was metal, rubber, cloth, glass, and others. While from the source side, the most dominant was from households (48%), traditional markets (24%), and

commercial areas (9%), while the rest were from public facilities, schools, offices, or roads. The survey results indicate that schools contributed at least 1% of landfill waste in Indonesia. Therefore, the problem of garbage is something that needs to be sought for a solution. The problem of garbage is not just throwing waste in its place, but it needs a fairly effective way to manage scraps (Baqiroh, 2019).

Waste management activities as a form of environmental literacy can be applied to primary school students (Radda, et al., 2016). Students need to learn to sort trash and dispose of rubbish according to its type so that dry rubbish is not mixed with wet rubbish. Dry trash produced by schools is usually in the form of paper, straws, ice cream sticks, or various plastic-based containers. Dry trash processing can be used by teachers and students into an activity that produces something. Waste material or scraps is not only something related to single-use goods; items that have not been used for a long time can be categorized as scraps that has a difficult decomposing rate (Passafaro, et al., 2016).

Recycling is a process to reduce the use of new raw materials, reduce energy use, reduce pollution, land damage, and greenhouse gas emissions when compared to the process of making new goods (Passafaro, et al., 2016). Currently, recycling can be carried out by using scraps. Utilizing scraps into valuable products will be able to develop students' creative thinking abilities. This becomes a choice of art and craft activity as a form of accuracy in capturing opportunities and sensitivity to the surrounding environment. Many used items can be used as products of aesthetic value by the hands of a creative person (So & Chow, 2019).

The activity of increasing environmental literacy has been conducted by several previous researchers. Iskomayanti, Suwono, & Irawati (2016) revealed the activity of increased researches that enhance environmental literacy through the Problem Based Learning model of Ibtidaiyah Madrasah students in Malang City. Activities were undertaken by MI students to improve students' environmental literacy in the form of making compost and caring for plants. Researchers provided experiences for the students to process wet waste into compost with simple tools. This activity affected the environmental literacy of students as habituation. Researchers also provided modules related to environmental literacy material so that the students understood that the small activities they conducted are beneficial for their environments. Environmental literacy has been carried out by several previous researchers (Istikomayanti, Suwono, Irawati, 2016).

Febriasari & Supriatna (2017) conducted classroom action research to improve the environmental literacy of primary school students through paper waste management. Paper waste that was previously a problem in class has been resolved by recycling paper into more

valuable and useful crafts. The students' habit of scattering paper to play around was not seen, and the students began to use both sides of the sheet of paper and old books that were still empty to be reused. The students had already the awareness to clean the classroom without being reprimanded by the teacher as well as the skills to remind and reprimand the other students for picking and maintaining class cleanliness because understanding the cleanliness of class and environment was an obligation of themselves and a form of respect for others.

Furthermore, research conducted by Siddiq, Supriatno, & Saefudin (2020) was to improve the environmental literacy of junior high school students through the Problem Based Learning model. The results showed that the Problem Based Learning model affected the environmental literacy of junior high school students, especially in the aspect of cognition. Siddiq, Supriatno, & Saefudin's (2020) research focused on aspects of cognition that are related to aspects of knowledge. Researchers provided material about the importance of protecting the environment and environmental problems that occurred as a result of environmental pollution. After the researcher explained the material, the students were given a worksheet that contained cases of environmental problems. Students read the cases and then found the cases to solve (Siddiq, Supriatno, & Saefudin, 2020).

Referring to the results of previous studies, the researchers conducted research to foster the environmental literacy of primary school students through the use of scraps. In the previous research, it focused on one aspect of the environmental literacy, while this research sought to fulfill three aspects of environmental literacy, namely the aspects of cognition, affection, and behavior (McBride, Brewer, Berkowitz, & Borrie, 2013). Researchers underwent research online, providing information about environmental knowledge, then explaining the aspects of affection from environmental literacy that is how to care of themselves, and finally the aspect related to the performance in the form of carrying out scraps. Meanwhile, research by Suryanti, Sinaga, & Surakusumah (2018) aimed at improving the environmental literacy of junior high school students through the integration of science learning. This research employed an experimental method with a pretest and posttest design. In line with this research, Suryanti, Sinaga, & Surakusumah's (2018) research employed the tests of knowledge, attitudes, and skills to improve the environmental literacy of junior high school students. The results of these research indicated that there was an increase in the environmental literacy of junior high school students through the integration of science learning. Junior high school students' environmental literacy was in the medium category, meaning that they were in the nominal category of environmental literacy. In this research, the aspects that scored quite well were the aspects of knowledge and skills, while the aspects of attitude had a low score. Therefore, this research was expected to develop students' environmental literacy, which consisted of three aspects. Based on the background

explanation of the problem, a quasi-experimental research method was conducted to grow the environmental literacy of primary school students through the use of scraps.

LITERATURE REVIEW

Literacy is student's ability to apply knowledge and skills in major areas of study and to analyze, communicate effectively, solve, and interpret problems in various situations (OECD, 2013). Meanwhile, Environmental Literacy is awareness in protecting the environment through various actions shown, such as reusing items that can be used, sorting unused items into valuable uses, and adopting healthy habits. Environmental literacy includes various aspects including aspects of knowledge, attitudes, and skills in protecting the environment. Roth cites the opinion of Hogden (2012) describing Environmental Literacy as the ability to understand the health situation of an environmental system and then take action to repair, restore, or maintain the system. Individuals who have environmental literacy are reflected in observable behavior, not just by arguing. Individuals with Environmental Literacy know that as living beings their actions greatly affect the environment, both positive and negative. Therefore, every action taken by individuals has a positive effect on their environment.

Furthermore, environmental literacy refers to knowledge of environmental concepts and issues, disposition of attitudes, motivation, cognitive abilities, and skills, and self-confidence and appropriate behavior to apply this knowledge to make effective decisions in various environmental contexts. Individuals showing a degree of environmental literacy are willing to act in an effort to improve the welfare of other individuals, society, and the global environment, and are able to participate in people's lives (Hollweg et al., 2011). Environmental care indicators are contained in environmental literacy. This is because the essential quality of environmental literacy is the ability to apply knowledge and understanding in situations involving environmental problems. Information-based and evidence-based decisions are more likely to lead to effective action. Therefore, by trying to improve students' environmental literacy, it is hoped that students' caring attitudes towards the environment can be enhanced.

METHOD

Research Design

This research employs a quasi-experimental research method. Sugiyono (2015) explained that in the quasi-experimental method there are two designs namely time-series design and nonequivalent control group design. Quasi-experimental method was used because this research provided treatments to a class, and then students' environmental literacy could be measured quantitatively. In addition, quasi-experimental research does not require random class selection because during pandemic conditions like this it was quite difficult to

randomize students. In this research, researchers used a quasi-experimental with nonequivalent control group design. Before giving treatment, the researchers first gave the test to the experimental group and the control group as a pretest, to know the initial conditions of the group. Then after being given a pre-test, both groups were given a post-test to find out the condition of the group after being given treatment. In the experimental group, learning was carried out by using scraps, whereas in the control class learning activities were carried out using direct learning models. Test results from the two groups were analyzed and described to measure the effectiveness of the use of scraps to foster the environmental literacy of primary school students. The following research designs were employed:



Figure 1. Nonequivalent Control Group Design

Information:

X = Treatment with scraps utilization activities

O₁ = Pretest in the experimental group

O₂ = Posttest in the experimental group

O₃ = Pretest in the control group

O₄ = Posttest in the control group Design

Figure 1 shows that group A is an experimental group that received treatment in the form of scraps used. Meanwhile, group B is a control group that received treatment in the form of direct learning methods. O₁ and O₃ are pre-test while O₂ and O₄ are post-test after the treatment in each group. The researcher employed an experimental type of research because it refers to the research conducted by Erdogan & Ok (2011), which used a pretest and posttest to measure students' environmental literacy.

Population, Sample, and Sampling

According to Creswell (2016) the population is a group of people or objects that have certain characteristics that will be examined. The population will be the area of the conclusion of research findings. Population is a group of subjects and objects along with their characteristics that can be used by researchers to draw generalizations and conclusions of research results. Based on this statement, it was determined the population in this research to be fifth grade students of primary schools in Cimahi District. Research on environmental literacy was integrated with social studies learning in the 2013 Curriculum. The research had been conducted for one month. Furthermore, the sample is a portion of the population. For

example, the population in an area has a sample of employees in certain organizations or teachers and students in certain schools (Sugiyono, 2015).

The sample selection in this research used a purposive sampling technique. Purposive sampling technique is deliberate sample selection through various considerations such as number of participants, student characteristics, or school setting (Creswell, 2016). The researcher chose the fifth grade students as research subjects because the characteristics of the fifth grade students that were appropriate for carrying out project-based activities. In addition, the use of purposive sampling was aimed at ensuring that student placement was not done randomly so that students did not need to adapt to the new atmosphere. The new atmosphere would impact the students feeling awkward or uncomfortable in learning.

Research Instrument

The research instrument used 3 types of tests, namely cognitive, attitudes, and skills tests. Cognitive test is to measure students' knowledge about the environmental and its problems. This test uses an objective test in the form of a description. Attitude test is to measure the student's conative aspects, namely students' attitudes about caring for themselves as a part of environmental literacy. The attitude test used a questionnaire that was filled out by each student. Meanwhile, the skills test is to measure students' skills in using used goods. Students practice managing until it becomes a valuable item. Skills tests are assessed using a skills rubric. This test instrument was validated using construct validity and content validity. The following questionnaire is students' environmental literacy attitude in table 1 (Adapted by Wijaya, 2019).

Table 1. Environmental Literacy Questionnaire

No.	Dimension	Statement	AL	US	SD	RA
1.	Initiative	I invite friends to keep the classroom environment clean				
2.		I check the desk drawer before learning began				
3.		I bring lunch from home				
4.		I bring my drinking bottle				
5.		I clean the class even though it was not a cleaning schedule				
6.	Maintain personal hygiene and health	I wear clean and neat clothes				
7.		I cut my nails and hair when it is long enough				
8.		I eat breakfast before going to school				
9.		I do not eat anything carelessly				
10.	Wise	I do not litter				
11.		I am angry to see friends littering				
12.		When there is no trash, I throw trash everywhere				
13.		I do not imitate the actions of others who litter				

14.		I feel normal to see garbage scattered
15.		I do not pay attention to the rebuke of others for littering
16.		I dispose of wet and dry rubbish according to its place
17.		I gain knowledge about recycling dry rubbish
18.	Responsible	I make useful items from recycling dry rubbish
19.		I reuse a place or container that can still be used
20.		I do not leave food that is causing a pile of wet garbage

Notes: A (Always), US (Usually), SD (Seldom), RA (Rarely)

If the statements is positive then the scores of A (Always), US (Usually), SD (Seldom), RA (Rarely) are 4, 3, 2, 1.

If the statements is positive then the scores of A (Always), US (Usually), SD (Seldom), RA (Rarely) are 1, 2, 3, 4.

Data Analysis

The data analysis in the study used descriptive statistics and inference to assess the series of tests that students had carried out. Then, inference statistics are used to test the research hypothesis. The research hypotheses are as follows.

H_0 : The use of used goods has no effect towards the environmental literacy of primary school students.

H_a : The use of used goods effects on environmental literacy of primary school students.

RESULTS

The following are the results of research after the implementation of scraps used as an effort to foster environmental literacy of primary school students.

Table 2. Student's Environmental Literacy Normality Test Results

Class	Kolmogorov-Smirnov		Conclusion	Information
	Statistics	Sig.		
Experiment	0.216	0.016	H_0 is rejected	Data not normally distributed
Control	0.225	0.009	H_0 is rejected	

The results of the environmental literacy normality test of the experimental and control class students show that the data were not normally distributed so the next statistical test employed the Mann Whitney test to answer the research hypothesis.

Table 3. Student's Mann Whitney Environmental Literacy Test Results

Mann-Whitney U	Z	Asymp. Sig. (2-tailed)	Conclusion
38,500	-4,399	0,000	H ₀ is rejected

The Mann Whitney test shows that the statistical calculation result was less than 0.05 so that the research hypothesis (H₀) was rejected. Thus, the results of the study showed that the environmental literacy of experimental class students experienced a pretty good change after the implementation of scraps. The results of statistical tests had shown that there were effects of scraps used on the environmental literacy of primary school students. Furthermore, researchers categorized students' environmental literacy. There were four categories in environmental literacy, the results of this research indicate that experimental class students were in the second category, namely nominal environmental literacy. In this category, students could already recognize simple terms about the environment and could identify environmental problems and propose solutions to overcome environmental problems in a simple manner. Furthermore, the students could be invited to work together in maintaining cleanliness, which included personal hygiene and environmental cleanliness. Meanwhile, control class students were in category one, namely environmental illiteracy. In this category, the students had already little understanding of environmental problems and had simple ideas about solutions to deal with environmental problems. However, students had not taken actions that reflected environmental literacy.

Experimental class students took environmental literacy actions in the form of scraps. The activity of utilizing scraps was carried out by students with the guidance of the teacher. The students carried out scraps at home with remote guidance. The students created handicrafts from used items in the form of straws, drinking bottles, cans, ice cream sticks, and secondhand magazines.

DISCUSSION

Environmental literacy is fundamental to be possessed by students, NAAEE explains the importance of environmental literacy that humans have a very important role and influence on earth because the number of people every year continues to increase. Therefore the need for food, clean water, fuel, and space also increases. Changes in the environment every year occurs both in local and global contexts, thus the aim of increasing environmental literacy is to prepare people who understand and can overcome environmental problems so that agents for environmental reform can be prepared who have a caring attitude and positive actions towards the environment (Meilinda, Prayitno, & Karyanto, 2017).

Based on the results of research that had been done, the action taken on research to shape students' environmental literacy was by using scraps. Before the students carried out the activities of utilizing used items, the teacher provided the material exposure and case studies related to environmental problems. This is in accordance with the opinion of Cheng & So (2015) explaining that environmental literacy will be easier to internalize to students if learning is done with practice and problem solving. Then, the teacher gives a list of activities to improve the attitude or affective aspects of students as a form of environmental literacy (Liu, et al., 2015). As for activities related to affective aspects such as washing hands before and after eating, eating nutritious foods, exercising, and turning off electricity when not in use. The results of this research were consistent with the opinions of Goldman, et al., (2018) which state that environmental literacy consists of three parts, namely student knowledge about the environment, attitudes, and behavior of students towards the environment. The purpose of increasing environmental literacy is to prepare individuals or communities who are able to understand and deal with the problem. Through environmental literacy assessment, we can find out information about one's environmental literacy level. The formation of character to the environment is very necessary for students (Innes et al., 2016).

Character building could be started from the smallest things such as throwing garbage in its place to the formulation of action plans on environmental awareness programs. Through this character building, it is hoped that a generation that has environmental concerns would be born. This showed that the school had a duty to form environmental care characters in students. Character was formed from attitudes that were carried out continuously so that schools had an obligation to instill an attitude of caring for the environment on an ongoing basis. This is in accordance with the function of national education, namely developing abilities and shaping the character of students (Collado & Corraliza, 2015).

The results of this research were in line with those of Veisi et al., (2018), which shows that environmental literacy activities in schools can improve aspects of students' knowledge about the environment. In this research, the researcher prepared a case and a video that presented environmental issues. Environmental issues were discussed, such as pollution, energy use, waste recycling, and other activities related to environmental conservation (Kahyaoglu, 2014). In this research, aspects of student knowledge were in the nominal environmental literacy category, while in the research conducted by Veisi et al., (2018), the students were in the functional environmental literacy category. The results of this research revealed that the students had enough categories of environmental knowledge, while in previous researches students were in good categories.

The indicators of each category of environmental literacy adapted to the opinion of Wijaya (2019), which is described in the following Table 4.

Table 4. Environmental Literacy Indicators

Stage	Indicator	
	Knowledge	Attitude
Environmental Illiteracy	Little understanding of environmental problems and/or ideas about environmental crises. Many misconceptions about environmental issues.	Believe that the environment is a resource for human use. Science and technology will solve environmental problems.
Nominal Environmental Literacy	Can recognize some basic terms used in communicating about the environment.	Develop awareness and sensitivity to the importance of natural systems and human impact on it. Having environmental awareness and care is needed in the community/education.
Operational Environmental Literacy	Often use environmental vocabulary with the correct definition and in the appropriate context Understand the structure and function of environmental systems and their interactions with human systems. Having knowledge and skills to act as a local problem and involved with environmental care at the educational level.	Committed personally to the quality of the environment Belief in the importance of natural nature to define and defend humanity. Committed personally to environmental education and the production of environmentally minded citizens and committed.
Highly Evolved Environment	Having understanding that people and the community are interconnected with each other. Have a thorough understanding of the dynamics of the environmental crisis by including a thorough understanding about how people (and society) have become so destructive. Having understanding that sustainability models and related environmental perspectives.	Believe in intrinsic interests and preservation to define nature and maintain humanity. Believe that humans must live simply so other people can live. Be passionate and committed Believe in the production of citizens who are environmentally friendly, committed, and active.

Apart from aspects of knowledge, aspects of student attitudes had quite good results. In this research, the students had shown the environmental literacy behaviors, such as saving energy and eating nutritious foods. The results of this research were in line with the results of

the research of Szczytko et al., (2018), which shows that the attitude of students' environmental literacy is increasing. Instruments for evaluating students' environmental literacy attitudes were collected by filling out questionnaires.

Furthermore, the aspects of the skills of this research were utilizing scraps to reduce waste. The focus was on recycling activities so that dry, non-biodegradable waste could be a more useful item. Used items that were recycled by students such as straws, ice cream sticks, bottles, cans, magazines, and calendars. The results of this research were in line with Lutfiana Baroditus & Zuhriana Aulia, (2017) who used scraps in primary school students. They conducted used items including making flowers from used bottles, making pencil cases from bottles and flannel, and making flowers from egg containers.

The relation of scraps utilization with environmental literacy is one of the activities of environmental literacy in the form of recycling. Thus the activities of utilizing scraps fall into that category. Ecological recycling could reduce the amount of waste that is harmful to human health and damages the environment (Saribas, Kucuk, & Ertepinar, 2016). The same activity is also economically useful to reduce family and community expenses to buy items that can be recycled from household waste (Kinslow et al., 2018). Children's toys that are processed from this waste are clearly economically useful. Children no longer have to buy manufactured toys that are sold quite expensive in the market. That of course saves household expenses. Basically, waste is a resource that can be used for purposes. This means that waste has economic value if humans are able to creatively reprocess it in various methods (West, 2015). This activity was useful both personally and socially because it became a forum for the formation of perspective, awareness, and character of caring for waste and the environment from an early age on students (Erhabor & Don, 2016). During a pandemic such as this, researchers encountered several obstacles in conducting research that included limited interaction between researchers and subjects. Some of the students had difficulty accessing the internet so they could not participate in online learning, and researchers were unable to monitor the process of optimally utilizing scraps.

CONCLUSION

This research found that the experimental class students were in the nominal environmental literacy category, while the control class students were in the environmental illiterate category. Experimental class students were aware of the attitudes and actions that reflected the environmental literacy quite well. Students could identify cases about environmental problems and found the solutions to the problems. Furthermore, from the aspect of attitude, the students could already show a sense of love for themselves. The students demonstrated energy-saving activities and consumed healthy food. Control class students had already an understanding of environmental issues. However, the aspects of student attitudes had not

been able to show environmental literacy attitudes, especially on the part of looking after themselves. Furthermore, in the aspect of performance, the students could not use used goods into useful items. During a pandemic such as this situation, the researchers encountered several obstacles in conducting research that included limited interaction between researchers and subjects, some of students had difficulty accessing the internet so they could not participate in online learning, and researchers were unable to monitor the process of optimally utilizing used goods. Recommendations for subsequent researchers were necessary so that they could always work around unexpected obstacles in such a research.

Based on the results of the research that has been presented, the researcher provided several suggestions for students and teachers regarding environmental literacy. After this research, the students needed to get assistance from their parents to remain consistent in protecting the environment. Behavior to protect the environment was not only done at home but was done at oneself, school, or society. The students could show self-care by cleaning themselves or by dressing neatly. In the home environment, the students could help parents to turn off unused lights, turn off water taps, use enough water, and not littering. In the school and community environment, the students could take actions that demonstrated environmental literacy by sorting waste and disposing of it according to the type of waste. The students could also make crafts without the need to be ordered by the teacher. Meanwhile, suggestions for teachers were to facilitate and monitor the students regarding the development of environmental literacy. The student environmental literacy needed to be established in a sustainable and gradual manner. The teachers could also integrate environmental literacy in various learning.

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