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Improving Critical Thinking Skills of Elementary School Students through Composter Innovation Learning

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ABSTRACT

Critical thinking is a skill that needs to be developed, practiced, and applied in the curriculum so that students are actively involved in learning. Learning activities that require students to analyze, synthesize, and evaluate information to solve problems and make decisions can sharpen critical thinking skills. The essential thinking ability of elementary school students still needs to be improved because the teacher still dominates the implementation and learning process. This study aims to improve the critical thinking skills of elementary school students through learning composter innovation. The learning was carried out during two face-to-face meetings with the learning material about composters. During the learning process, teaching and learning activities are more oriented towards student-centered learning, where students learn by observing, asking questions, and evaluating. Students also practice making composter innovations from materials obtained from the surrounding environment. Students' critical thinking is measured by using several questions posed to students. The results showed that the essential thinking ability of most of the students had increased. Learning by utilizing natural objects like this can be an alternative for teachers to improve the critical thinking skills of elementary school students

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INTRODUCTION

The development of the globalized world of the 21st century demands various changes in various fields, including education. Education tends to be required to be able to prepare and equip students with various skills. These various skills can help students become better prepared to face the times. The development of the era is also accompanied by the development of increasingly sophisticated technology. Based on Permendikbud No.103 of 2014, students are subjects who can actively seek, process, construct and use knowledge. Students must be required to be more active in learning, not only listening to explanations from the teacher (Haryanti,

2017). Active student involvement in the learning process will determine the achievement of learning outcomes and skills possessed by students.

The active learning process which is dominated by the teacher and student interactions can encourage students to actively express their opinions. Students have the opportunity to develop critical and logical thinking skills so that they can influence the way students learn. Therefore, teachers' understanding of the importance of learning affects the way teachers teach so that success in achieving educational goals can be achieved effectively (Murniati et al., 2020).

Thinking is an activity carried out by someone that involves cognitive processes to obtain various information so that they can decide the right action to take when facing a problem. Based on the level of complexity, thinking skills are divided into two areas, namely basic thinking skills and complex thinking skills (Lismaya, 2019). Basic thinking is a thinking process that involves students' ability to accept and repeat facts or memorize a formula by repeating it. Complex thinking is a thinking process that requires students to manipulate information and ideas in certain ways to give them new meanings and implications. Teachers must facilitate the learning process that can encourage students to develop thinking skills, both basic thinking skills, and complex thinking skills.

One of the complex thinking skills students and graduates need is critical thinking skills. Critical thinking skills are thinking deeply by using reasoning to acquire relevant knowledge and being able to take responsibility (Hidayat, 2019). According to Agnafia (2019), critical thinking skills are skills in reflective thinking and having reasons for something that is believed. Critical thinking is a skill that must be continuously developed, practiced, and applied in the curriculum to involve students in active learning, namely with activities that require students to analyze, synthesize and evaluate information to solve problems and make decisions to sharpen critical thinking skills (Pusparini dkk, 2018). It can be said that critical thinking skills are thinking skills using deep reasoning to obtain relevant information or knowledge and being able to make conclusions or decisions correctly and appropriately.

Humans already can think critically, but not all humans can use these skills to solve various problems they face. Critical thinking skills are very important for students to use to solve various problems that exist in everyday life (Lieung, 2019). Travis (2015) states that critical thinking ability is important to measure because it is an essential ability that can be used as an indicator of learning success in achieving competency standards. In addition, it is also in line with the concept of science learning which always prioritizes critical thinking skills to understand every lesson that is very closely related to real objects (Mukti and Istiyono, 2018).

The learning process in schools needs to be directed at the achievement of various thinking skills. The learning process can be carried out by applying various approaches and innovative learning strategies that can be a vehicle for developing critical thinking skills and conceptual understanding. Learning innovation needs to be done because it can improve learning activities that have been carried out so far. Innovative learning is learning that is used by teachers to create new understandings for students, so that they can improve learning outcomes and critical thinking skills (Laila, 2020). Rahman (2020) researched by applying the Problem Based Learning model and the results of his research showed that students' critical thinking skills had increased. Another study by Oktaferi and Desyandri (2020) also showed the results that the use of the Problem Based Learning model was able to develop students' critical thinking skills.

Several learning strategies have been applied to develop critical thinking skills, but not many studies have been based on the use of composter learning innovations. One way

to improve students' critical thinking skills is to use learning models accompanied by learning resources based on natural phenomena that are real and close to students' lives. The composter innovation can be used as a learning resource that leads to the development of thinking skills. A composter is a tool designed to make liquid or solid compost. Compost is an organic fertilizer made using organic materials, such as vegetables, fruit, and plants (Ismiyah et al, 2019). Based on this description, the researcher conducted a study to examine the critical thinking skills of elementary school students in composting learning.

METHODOLOGY

The research was carried out by applying the learning process in one class with a total of 20 students for the 2021/2022 academic year. Characteristics of elementary school students in Darsono Village, Jember, East Java, Indonesia. So far, students have focused attention on everyday life, high curiosity, and high interest in something new. Learning about composter innovation is carried out for two face-to-face learning. Before the learning was carried out, the researchers designed and assembled the composter. During the learning process, student activities are paying attention to teacher explanations, discussing material topics, and practicing composting. Students listen and observe the explanations and demonstrations made by the teacher, the teacher explains the function of the composter and invites students to discuss. Furthermore, the students were guided by the teacher to practice making composter innovations.

The research instrument used was an observation sheet for students' questioning skills and a critical thinking test. The research data were obtained from the student's ability to ask questions and answer sheets for critical thinking questions. Questioning skills measured in this study were the number of questions asked by students and the quality of questions asked by students. The quality of the questions can be seen from the types of questions asked by students based on Bloom's taxonomic classification. In addition, critical thinking skills can be seen based on the results of critical thinking test questions that have been done by students at the evaluation stage. The test questions consist of 3 questions that are adjusted to three critical thinking indicators. There are several indicators of critical thinking according to Nur (2013), shown in table 1.

Table 1. Core skills and Sub-Skills Critical Thinking

No	Skill	Sub-skills	Description
1.	Interpretation	Categorization Coding Core Clarification	Understand and express the meaning of various experiences, situations, data, events, judgments, conversions, beliefs, rules, procedures, or other criteria.
2.	Analysis	Ideas Study Argument Argument analysis	Identify inferential relationships between statements, questions, concepts, descriptions, data or other forms of representation intended to express.
3.	Evaluation	Assessing claims Judging arguments	Assess the credibility of any statement or other representation that provides an explanation or description of a person's perception, experiences, situations, judgments, beliefs or opinions and to assess the logical strength of actual or

No	Skill	Sub-skills	Description
			intended interfering relationships including statements, descriptions, questions or other forms of representation.

(Source: Facione, 2015)

The data obtained were analyzed descriptively qualitatively to describe students' critical thinking skills about learning composter innovation. How to calculate the percentage value of critical thinking questions is as follows

$$\text{Percentage value} = \frac{\text{Acquisition Score}}{\text{Maximum Score}} \times 100\%$$

The percentage value of skills obtained from calculations is categorized by table 2.

Table 2. Category of critical thinking skills percentage

Interpretation (%)	Categorized
81,25 < X 100	Very High
71,50 < X 81,25	High
62,50 < X 71,50	Medium
43,75 < X 62,50	Low
0 < X 43,75	Very Low

(Source: Karim, 2015)

RESULT AND DISCUSSION

The composter innovation was chosen as a learning material because how to make a composter and compost using this tool is quite simple, so it is easy for students to understand. In addition, the use of organic materials such as dried leaves, root residues, stems, and skins of fruit, straw, and rotten vegetables can reduce agricultural and household waste. A composter is a tool used to make compost. Making compost is an attempt to return our waste to the soil to help the soil become more fertile. Fertile soil can make the food chain continue (Wardhani, 2020).

The composter innovation is in line with science learning for fifth-grade elementary school students. The basic competence related to this material is to analyze the relationship between ecosystem components and food webs in the surrounding environment (Permendikbud Number 37 of 2018). Based on these basic competencies, the indicators of competency achievement in science learning for innovative composter learning materials are as follows:

Based on the indicators of achievement of these competencies, the learning objectives to be achieved include the following.

Table 3. Learning Objective

No.	Learning Objective
1.	Students can identify the types of organic and inorganic waste
2.	Students can analyze a composter correctly after watching a demonstration by the teacher
3.	Students can apply composting in the surrounding environment well after

No.	Learning Objective
	observing the demonstration

In the implementation of learning, the researcher applies a problem-based learning model with a demonstration method. The use of the demonstration method has the advantage of being able to give students a real picture of a concept, guiding students to gain direct experience of material in increasing student activity and being able to think critically (Nugraha, 2021). The demonstration method becomes less effective if it is not actively followed and not carefully observed by students (Wasisto, 2018). According to Roymond and Simamora (2009), the demonstration method can help students understand clearly the course of the process, the experience gained by students can be embedded in themselves and the learning process will be directed at the material. Some of the shortcomings of the demonstration method are sometimes students find it difficult to see the objects used when being demonstrated, not all of the objects used can be demonstrated, and if the teacher lacks mastery of the material, it is difficult for students to understand. Learning activities carried out by students at each stage of learning are described as follows.

The Preparation Phase

- a. The teacher prepares the composter tools and materials
- b. The teacher prepares students both physically and mentally, by assigning students to clean the room and arrange the seats.

The Opening Stage

- a. Students choose their seats



Figure 1. Student Seating Position

The teacher performs apperception by describing the phenomenon of the large amount of organic waste that has not been used optimally so that it has the potential to disrupt the environment.

- c. Students listen carefully to the teacher's explanation about the learning objectives to be achieved.
- d. Students listen carefully to the teacher's explanation about the stages of learning that will be carried out.

The Main Activities

- a. Students pay close attention to the teacher's explanation of compost and composter and the process of making it.



Figure 2. The teacher explains the composter

- b. Students are allowed to discuss and ask questions about the composter.



Figure 3. The process of discussion and the section of question and answer

The Evaluation Stage

- a. Students work on critical thinking questions related to the achievement of learning objectives
- b. Students evaluate together with teachers and students related to the learning process.



Figure 4. The evaluation stage

This research was conducted to improve learning outcomes and critical thinking skills of elementary school students in Darsono Jember Village, East Java through composter innovative learning materials. At the beginning of learning, students pay attention to the teacher when

explaining, but students do not seem to understand the material that has been delivered. The lack of students' critical thinking skills could be due to a lack of application and still dominated by teachers so that they do not train students in critical thinking. This is in line with the results of research from Nuryanti et al (2018) which states that the dominance of the teacher's role in learning causes the development of students' critical thinking skills to be less than optimal. Lack of critical thinking of students can have an unfavorable impact on further learning.

Table 4. Total of students who asking

Gender (L/P)	Number of Questionnaires	Percentage
Male	3	14,28%
Female	7	33,33%
Amount	10	47,61%
Amount of Student	21	100%

The data in Table 4 shows that the number of students' questions can be observed based on the number of questions asked. The percentage of the total number of students who asked questions was 47.61%. The questions asked by male students were 14.28% and female students were 33.33%. Most of the students' questions were still relatively low, this was due to the lack of a two-way discussion process. In addition, several factors affect the low number of students' questions including, 1) students still feel shy and awkward, 2) are constrained by the local language, and 3) students tend to have introverted characters and are not easy to get along with.

The quality of questions asked by students can be classified into two types, namely students with high and low cognitive quality, as referred to by Pratiwi et al. (2019). Students who have a high cognitive level are students who use analytical methods before solving a problem. Meanwhile, students with a low cognitive quality of questioning are students who rely on their memory skills to solve a problem.

In addition to improving thinking skills, expressing questions or statements can improve communication skills, which are classified based on cognitive domains in Bloom's Taxonomy. The domain of thought processes in Bloom's taxonomy includes remembering, understanding, applying, analyzing, evaluating, and creating. Remembering is the lowest level of thinking process while creating is the highest level of thinking.

Then a critical thinking analysis test was conducted to find out the real critical thinking skills of students. The test is carried out by giving 3 questions that have 3 aspects of critical thinking indicators, namely interpreting, analyzing, and evaluating. Based on the results of the critical thinking test analysis that has been given, the data obtained on the average critical thinking ability of students is quite high.

The results of the average analysis of each aspect of the students' critical thinking indicators are shown in the graphic below. The average result of the percentage of students' critical thinking skills is 84.16%, this shows that the critical thinking skills of students in Darsono Village are high. The percentage on the interpretation aspect is 80% which is quite high. In the analysis aspect, 90% is classified as very high and in the evaluation aspect, 82.5% is classified as high.

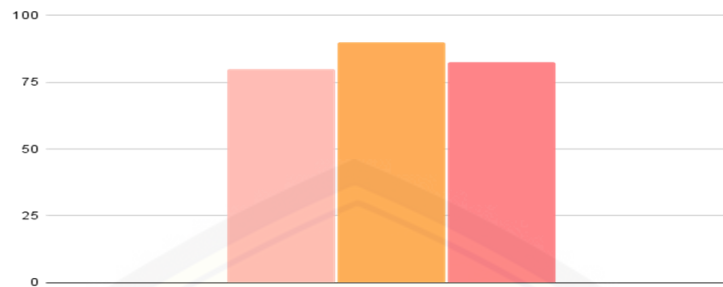


Figure 5. Critical Thinking Test Results
Critical Thinking Skill Achievement Percentage
1. Interpretation, 2. Analysis, 3. Evaluation
(Source: Author)

Here are pictures of some of the questions and answers of some students and their analysis

SOAL	JAWABAN
1. Sampah dibagi menjadi 2 jenis, yaitu sampah organik dan sampah anorganik. Apa yang kalian ketahui tentang sampah organik dan anorganik ?	- Sampah Organik yaitu Sampah yang bisa terurai - Sampah Anorganik yaitu Sampah yang tidak bisa terurai

Figure 6. Question and answer number 1 from student

In Figure 6 it can be seen that students can answer questions, can interpret the definition of the type of waste.


2. Berdasarkan gambar alat komposter dibawah ini, sebutkan masing-masing bagiannya ! 	1. Tutup Tong 2. Paralon 3. Tong 4. Saringan 5. Sampah 6. Tempat pupuk
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Figure 7. Question and answer number 2 from student

Figure 7 shows the students' answers to question number 2, that is, students can analyze the parts of the composter correctly.

SOAL	JAWABAN
Adi ingin membuat pupuk kompos. Bahan yang disediakan Adi yaitu sampah kertas, plastik, kaleng, serta sayur dan buah. Dari bahan-bahan tersebut manakah yang cocok untuk membuat pupuk kompos? Berikan alasan mengapa bahan tersebut cocok untuk digunakan!	Sampah sayur dan buah Karena bisa terurai dan membusuk

Figure 8. Question and answer number 3 from student

In Figure 8, it can be seen that students' answers to question number 2 are shown, which is intended to show that students have been able to evaluate questions related to composter material. The questions given are not difficult, but some students have difficulty in answering these questions.

Based on the results of the interviews, it was found that 15.8% had forgotten the material that they had only memorized so far. Based on the results of the analysis of critical thinking questions, students tend to find it easier to work on questions than to conduct discussions and ask questions during the learning process.

CONCLUSION

Based on the results of the study, it can be concluded that the critical thinking ability of students has changed from being in a low category to being in the high category. Learning about composting by demonstrating or showing artificial or actual goods to students and with oral explanations can motivate students to be actively involved in learning. Some students still experience problems due to lack of implementation and are still dominated by teachers, so they do not train students in critical thinking. With the composter innovation learning which emphasizes the active participation of students in learning in the learning process and students are given many opportunities to ask questions, students are accustomed to asking questions to improve their critical thinking skills. In addition, to overcome the problem of the lack of willingness of students to ask questions, a test can be carried out. Critical thinking skills can be trained and honed by reading critical questions, increasing the analytical power of a problem in question, developing observing skills, increasing curiosity, providing opportunities for asking and reflecting, and giving a question with more than one answer.

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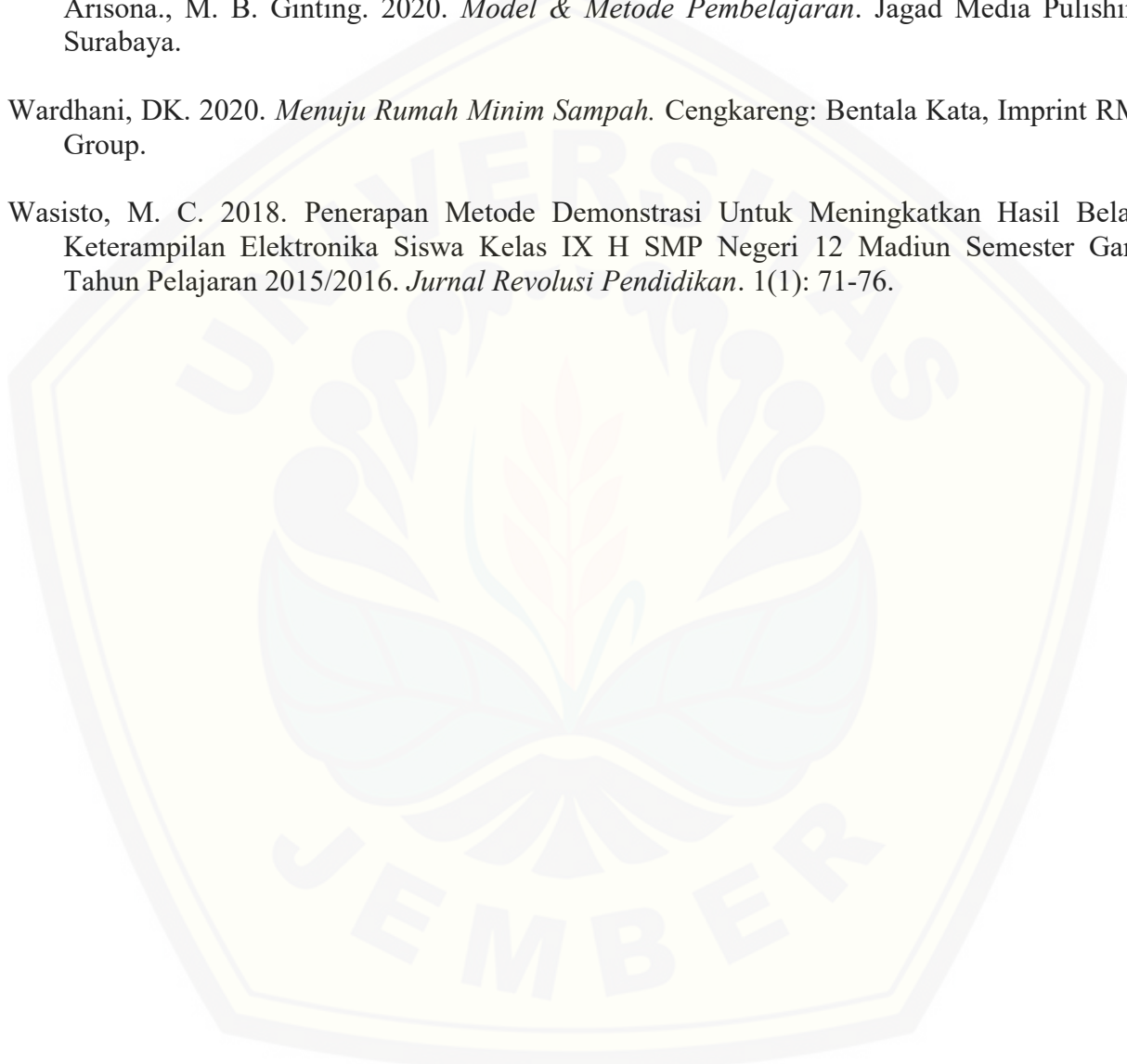
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