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Analysis of Elementary School Students' Creativity Through Project Based Learning Model in designing IPA Learning Media Based on Inorganic Waste

Rona Taula Sari[1], Festiyed Festiyed[2], Yohandri[2], Fitri Arsih[2]

[1]Primary School Teacher Education Program, Universitas Bung Hatta, Indonesia
[2]Science Education Doctoral Study Program, Universitas Negeri Padang, Indonesia

Abstract: By applying the PjBL model in processing waste into learning media, it is expected to increase the creativity of elementary school students. The purpose of this study was to analyze the creativity of elementary school students through the PjBL model in designing inorganic waste-based science learning media. This research is a pre-experimental design type The One Group Pre-test- Post-test. The population of this study were all fifth grade students of SD N 30 Aie Dingin, totaling 25 people. Data collection with tests and product assessments. Assessment of student-designed media using CPAM's creative product assessment rubric and measuring the improvement of students' cognitive learning outcomes with N-gain. From the research that has been done, the results show that the creativity of fifth grade students of SDN 30 Aie Dingin is in very creative criteria with a score of 84.7%. Meanwhile, the students' pretest score was 68.96, increasing to 86.88 in the posttest results. The project-based learning model has been proven to improve student learning outcomes in science. The PjBL model is said to be able to increase students' creativity in processing inorganic waste into learning media.

Keywords: Inorganic, Waste, PjBL, Creativity

1. INTRODUCTION

Environmental issues are one of the inevitable and never finished issues. Nowadays, garbage is becoming a very serious environmental problem for Indonesian society. The production of garbage increases every year as the population grows. In fact, according to data from the National Waste Management Information System of the Ministry of Environment and Forestry (KLHK), the amount of garbage deposits reaches 18.3 million tons per year and ranks second as the world's largest waste producer. Therefore, the government continues to work in various ways to address the problem of garbage. However, the effort has not been achieved to its fullest. This is because the amount of garbage in Indonesia is very high. So the government finds it difficult to figure out the right way to solve it (Sari, 2023).

Consciousness in environmental care is the responsibility of each individual. However, that awareness is still very low and considering environmental hygiene is not a matter of importance. Therefore, to cultivate a sense of care for a clean environment to every individual needs to be instilled from the very beginning of the family and school environment. The cultivation of environmental awareness in the educational ecosystem, is expected to be a means of socialization and understanding among school citizens about the environment and garbage. It is consistent according to Lenita (2018) that education plays an important role in raising awareness and responsibility of one to protect the environment, as well as Lianfeng (2023) shaping environmentally friendly lifestyles for environmental sustainability.

Formal education is responsible for the sustainability of the education of the living environment through the learning process (Sari, 2023). One attempt to cultivate and introduce environmental concern to students in the learning process is to introduce the benefits of garbage that is processed and used as a learning medium. Therefore, teachers should be able to use used items or garbages to be used as learning media. Denico (2020) stated that the learning media as one of the learning components is not out of the comprehensive learning system. The use of media is the part that an educator can apply in the learning process.

The use of learning media can arouse the desire and interest of students to stimulate learning activities and influence the positive psychology of students. Using organic garbage as a medium in the learning process, will have a positive impact for students in achieving learning goals, so that learning becomes more enjoyable and meaningful. So, by using learning media that has its own uniqueness can motivate students to learn. Therefore, teachers need to design learning in support of government efforts to keep the environment from garbage while increasing the creativity of students in creating learning media from the waste. One of the learning models that can enhance the creativity of students in processing garbage into learning media is the Project Based Learning model (PjBL).

PjBL is a learning model that gives teachers the opportunity to manage learning in the classroom by involving project work. The project encompasses complex tasks based on highly challenging questions and problems, and requires students to work through a series of stages of scientific methods. Sari (2018) states that PjBL requires students to think critically, analytically, use high thinking skills, require collaboration, communication, problem-solving and independent learning. Based on previous research, the PjBL model has been found to enhance student creativity in a variety of contexts. For example, a study conducted by Haryani (2023) at primary school found that the application of the PjBL model in science learning improved students' creativity and

creative thinking ability. Furthermore, Hikmawati (2022) conducted a research in vocational secondary school finding that the PJBL model assisted by science worksheets had a positive impact on student creativity, and student learning outcomes in waste management. These findings suggest that PjBL can be an effective approach to boosting student creativity, especially in the context of waste treatment. The implementation of PjBL measures in solving environmental problems associated with environmental pollution is called creative action. The conditions that allow a person to create a meaningful creative product are personal and environmental conditions where both encourage one to engage himself in the process (business, activity) of creativity.

Creativity is the ability, skill and expression that exists within a person to create something that has not been created by others. Besides, creativity is one of the skills students need to help solve problems and discover new concepts. In line with Isa (2017) student creativity is expressed through self-reflection, independent decisions, curiosity and motivation, producing something, multi-perspective, and developing new ideas that are original. Furthermore, Beetlestone (2011: 2), states that creativity can help a person in explaining and describing abstract concepts by involving his skill. Skills may include curiosity and enthusiasm, discovery and exploration. With this skill the student is expected to be able to understand abstract concepts and adapt to his ability to preserve and preserve the environment.

Based on the results of the observations of the students of V SD N 30 Aie Dingin, the students had many ideas but still had difficulty digging them. There are still many students who have not been able to channel their creativity into making products from the treatment of inorganic waste that can be used in the learning process later. Basically, they seem to have a high level of creativity and creativity, but for some students it seems very difficult to put ideas into their work. There needs to be an incentive and motivation and a challenge for them to be able to unleash their creativity. The application of the PjBL model applied by the teacher is expected to help the pupils in pouring their ideas of creativity in producing learning media based on inorganic waste. Therefore, what is the purpose of this research is to analyze the creativity analysis of elementary school students through a project-based learning model in designing anorganic waste-based IPA learning media?.

2. METHODS

This research is an experimental study with a pre-experimental design in the form of The One Group Pre-test-Post-test so that the results of the treatment can be known more accurately. The population in this study is the entire V SD N 30 Aie Dingin class of 25 people. The sampling technique used in this study is using total samplings, where the entire population is the subject of the study (Sugiyono, 2018).

The data collected is used for product testing and evaluation. According to Sari et al., (2023) the test instrument itself is a test that uses questions or other training tools used to measure the skills, knowledge, understanding, abilities or talents possessed by individuals or groups. The test instrument used is a double choice sheet of 25 items using 4 options consisting of options A, B, C, and D. The data collection is done by spreading test instruments that have been tested validity and rehabilitation according to experts to all students of class V SDN 30 Aie Dingin, in this case used twice the test pre-test and post-test .

Product assessment includes assessment of students' ability to create educational media from inorganic waste, using the CPAM (Creative Product Analysis Matrix) creative product assessment section. (Munandar, 2012). The evaluation given by the observer during the process of working the product until the product is finished. The assessed aspects are: (a) planning stages, consisting of: product design assessment, and tool and material assessment; (b) manufacturing processes, including: manufacturing techniques, work safety, timing accuracy; (c) product assessment stages: product evaluation and product benefit assessment. The data obtained was analyzed using the percentage formula found by Sari (2018). The criteria for the value of the creativity test results are shown in category Table 1.

Table 1. Creativity criteria

Score	Criteria
81 – 100	Very Creative
61 – 80	Creative
41 - 60	Quite Creative
21 – 40	Less Creative
0 – 20	Not Creative

Data obtained from the test given before learning begins (pretest) to determine the initial ability of the student, then the same test is given after learning is completed (posttest). (2012). To measure the improvement of students' cognitive learning outcomes between before and after learning, the N-gain of Hake (1999) is used.

Table 2. N-gain criteria

Coefficient Interval	Criteria
g>0.7	High
0.3<g<0.7	Medium
g<0.3	Low

3. FINDINGS AND DISCUSSION

Aie Dingin's creativity in processing inorganic waste into an IPA learning medium on environmental material through the Project Based Learning model demonstrates the expected IPA learning media. The IPA learning media produced was very diverse, adapted to the IPA materials in class V. The evaluation of the IPA learning medium created was evaluated with the CPAM (Creative Product Analysis Matrix) set by Munandar (2012). Average creativity of V-grade students of SDN 30 Aie Cold in processing inorganic wastes into IPA development media can be seen in table 3.

Table 3. Average percentage Student Creativity

Indicator	**Group**					**Score**
	1	2	3	4	5	
A. Preparation	6	7	7	6	7	82,5%
B. Technique Making	11	11	11	8	11	86,6%
C. Product Result	7	6	7	6	8	85%
Total	24	24	25	20	26	
Score	86%	86%	89%	72%	93%	84,7%
Criteria	Very Creative	Very Creative	Very Creative	Creative	Very Creative	Very Creative

From table 3, it is known that the preparatory stage with a score of 82.5% consists of the aspects of the media planner that will be made, the tools and materials used in creating the learning media IPA. Meanwhile, at the stage of manufacturing engineering obtained a score 86.6% consisting of the aspect of the level of ease and difficulty, work safety and timeliness in making the learning medium IPA. In addition, the product results obtain the score of 85% where the evaluation is made on the form of the product produced as well as the benefits of products.

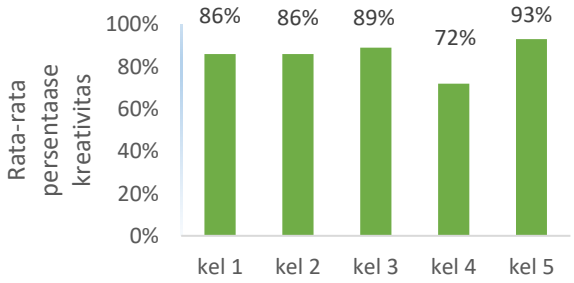
However, overall the creativity of SDN 30 Aie Dingin V-class students is on a highly creative criterion with a score of 84.7% in producing IPA learning media from inorganic waste. It can be understood that the application of the PjBL model in designing IPA learning media based on inorganic waste can enhance student creativity. According to Chintya et al., (2023) the application of the PjBL model in IPA learning can result in improved learning processes and outcomes, in improving student creativity in learning. By engaging in PjBL, students are encouraged to express their opinions and find innovative solutions, cultivating their creativity within the learning process. In addition, the Setiawan (2023) describes the learning process with the application of the PjBL model in food waste processing as more creative, innovative, and enjoyable, which leads to improved student learning outcomes. Marivane (2022) stated that the PjBL model had a significant impact on students' creativity in science learning.

PjBL has proven to be effective in enhancing students' creative thinking skills, especially in the context of waste materials. Several studies have explored the impact of PjBL on creative thinking abilities in a variety of subjects. For example, Marleny (2023) found that implementing PjBL in science education increased student creativity in terms of smoothness, flexibility, originality, and elaboration. Similarly, Safitri et al., (2018) showed that PjBL improved students' creative thinking skills in Newton's law of movement. Wibowo et al., (2021) observed that PjBL had a positive effect on the creative thinking capabilities of professional students in waste material treatment. Noor (2023) highlighted the need for PjBL to enhance student scientific creativity, in the context of vegetable waste treatment. Furthermore, Nanik et al. (2019) conducted classroom action research and found that PjBL improved students' creative thinking ability in making oil fuel from plastic waste. It shows that PjBL can effectively enhance students' creative thinking skills, especially when applied to real-world problems involving waste materials.

The level of creativity of SDN 30 students in the processing of inorganic waste into IPA learning media is very high. This can be seen in graph 1 below, where the average percentage of the highest student creativity obtained by group 1 with an average of 93% on highly creative criteria. Meanwhile, the average percent of students creativity with the creative criterion obtaining by group 4 with an average of 72%. Groups 1, 2 and 3 are in the highly creative category but with a average of approximately 86%-89%. This, showing that, the creativity of students in processing inorganic waste into IPA learning media is very high. It shows that the creativity that exists within students can be explored through the learning process. It is consistent, according to Munandar (2012) that creativity is the result of an individual's interaction with his environment, because the environment in which the individual is located can foster or even inhibit his creative process. One of the environments that can influence student creativity is the school environment.

Creativity is the ability of a person to think creatively and the ability to pour out the ideas he has. The idea is realized through the activity of creating something new or developing something already existing into something that has its own

uniqueness. According to Nurul et al., (2020) creativity is the ability to create a new idea or work that is different from the existing and is born of the individual's creative thinking ability. Students who always show their creative way of thinking will make it easier to the desired goal. A person's creative ability to generate new ideas is regarded as an independent talent factor, because creativity is seen as a readiness to produce new ideas and involves the ability to think outside the box and generate innovative solutions. Creativity is a way of finding solutions to problems. Many problems can be solved by creating a new strategy or ideas (Nuzliah, 2015).



Picture 1. Average Percentage of Student Creativity in Fifth Class

Through education in school, students creativity can be developed by teachers by paying attention to factors that support the process of creativity development and minimizing factors that hinder the occurrence of the creative thinking process in students. This is in line with according to Dung (2022) creativity in high school students include objective factors such as the educational environment provided by the school and teacher behavior, as well as subjective factors like interest, perspective, and student thinking. Another view was put forward by Ngalimun (2013) which defines creativity as a characteristic of individuals who have the ability to create or combine things so that new value, as well as creativity can be seen from the way individuals think in finding solutions to solve problems.

A creative student will always use his ability to find ideas so that the problems he faces in his learning activities can be solved. Even if the ideas he has not been able to solve the problems faced, then the student will look for alternatives. The creative personality that one possesses will send it to a consciousness to see the problem from different perspectives. A person who has a high creativity, it can be said that the person has a creative personality. According to Munandar (2012): Xiaojing (2021) characteristic of creative personality is characterized by a child's high curiosity for something, children show interest and love activities that stimulate their creativity, and have a high sense of self-confidence. Students who have a high level of creativity, thus tend to be more critical in learning activities.

The accumulation of data from the students' pretest and posttest results in this study is continued with data analysis to see a picture of students' critical thinking skills and student availability on before and after learning is carried out. The results of the data analysis are presented in Table 4.

Table 4. Recapitulation of the average pretest posttest

	pre-test	**post-test**	**N-gain**	**Criteria**
Amount	1724	2172	14,2	Sedang
Avarage	68,96	86,88	0,56	

Based on table 4 above it is known that the average pre-test student of class V SD N 30 Aie Dingin is below the KKM that has been determined by the school is 75. This is because students do not know and understand the material that will be implemented in the learning process during research using the PjBL model that will produce the learning media from the waste that has been collected. There was an improvement in learning outcomes after learning with the PjBL model. The student's pre-test values before learning using the PJBL model 68.96, increased to 86.88 on the post-test results. It can be stated that using the model can improve student learning outcome. This is in line with research carried out by Mohsin et al., (2023) found that the application of the PjBL model significantly improved cognitive learning outcomes in students. Similarly, Puja et al. (2023), found that implementation of project-based learning leads to better learning outputs and increased student creativity. Research Sidik (2023) also showed that project based learning significantly increased learning output in social studies. Furthermore, Agung (2023) suggested that the PJBL model improved student learning independence.

Project-based learning models have been shown to improve student learning outcomes in science. Studies conducted at various levels of education, namely a study conducted in primary school conducted by Ali et al., (2023) the application of project-based Learning models resulted in increased creativity and creative thinking among students, which led to increased learning outcome in the science. The PjBL model is said to be able to enhance the creativity of the pupils in carrying out the treatment of inorganic waste into the learning media. The application of the PjBL model has a positive impact on the learning process in which class conditions free students to create. Anila et al., (2015) Through this PjBL model build students to learn independently in solving problems, especially what happens in everyday life.

4. CONCLUSION

From the research that has been carried out obtained results that the creativity of students of class V SDN 30 Aie Dingin is on the criterion very creative with a score of 84.7%. Besides, the learning results after learning with the model PjBL. The student's pretest value before learning using the model 68.96, increased to 86.88 on the results of the posttest. A project-based learning model has been shown to improve students' learning outcomes in science. The application of a project based learning model results in increased creativity and creative thinking among students, which leads to improved learning outputs in sciences. The PjBL model is said to be capable of improving the creativity of students in conducting the treatment of inorganic waste into learning media.

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