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Ipas Learning Based On Project-Based Learning With Ethnoscience Content On Waste Management To Improve Creative Thinking Skills

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Abstract
This study aims to develop a science learning design based on project based learning (PjBL) containing ethnoscience of waste processing and determine its effectiveness as an impact in improving students' creative thinking skills. The research method used is Research and Development (R&D), with a model (bord & gall) consisting of five stages, namely: needs analysis, learning design, learning development, field testing, and expert validation. Data collection techniques use observation, questionnaires and documentation. The sample of data sources is 15 fifth grade students of SDN 38 Mataram. Indicators of research success are seen from the results of validation by linguists, material experts, and media experts, while the effectiveness of learning is determined based on the results of the N-gain Test. The results of the study showed that validation carried out by linguists was 65% (good category), material experts 62% (good category), and media experts 63% (good category). Meanwhile, the results of the N-gain Test of students' creative thinking skills based on the fluent thinking indicator obtained an average of 56.55% (quite effective category), flexible thinking of 81.13% (effective category), original thinking of 65.21% (quite effective category), while the average value of the detailed thinking indicator was 57.62% (quite effective category), and the evaluating thinking indicator was 58.33% (quite effective category). Based on the results of theoretical and empirical studies, it was found that PjBL-based science learning containing ethnoscience of waste processing improves creative thinking skills.

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1. INTRODUCTION

Natural and social science (IPAS) education plays a crucial role in equipping elementary school students with a fundamental understanding of nature and social interactions around them (Hasanah et al., 2023). The independent curriculum, as the foundation of current education, emphasizes contextual, relevant, and student-centered learning. This aims to develop various skills in the 21st century, with students having the ability to think creatively in facing challenges. (Dewi et al., 2024). Developing creative thinking skills in student learning is able to create or develop new things in the form of ideas or works that can be utilized by the students themselves. (Fadilah et al., 2025). Science learning in elementary schools aims to equip students with knowledge, ideas, or concepts gained through experience and scientific processes. Santrock (2019) emphasized the importance of a constructivist approach to science learning, where students can construct their own knowledge and creativity through teacher guidance (Yulia et al., 2025).

Various learning models can be used to improve creative thinking skills and develop students' scientific thinking, one of which is the project-based *learning* (PjBL) model (Prameisthi et al., 2025). PjBL originated in the progressive education movement, which prioritizes a more learner-centered and experiential approach to education that supports "deeper learning" through active exploration of real-world problems and challenges. PjBL is defined as a learning model that has five central criteria, namely: project-focused, guiding questions, inquiry construction, autonomous projects, and realistic projects (Anggraini et al., 2024). The PjBL Model is a learning approach that involves students in studying ideas or digging up student information, and being directly involved in understanding natural phenomena, which has the main goal of enabling students to collaborate in finding solutions to problems that can attract interest and create a real product. (Mabruroh, 2019). In applying the PJBL model, learning activities become enjoyable if the context of the teaching material involves an ethnoscience context, as stated by Anwar et al., (2025), related to the PjBL model, as an approach that can integrate scientific investigations in the field, and PjBL is a constructivist approach that encourages students to develop questions, design learning, collect data. And students can increase creativity in designing and solving problems in everyday life (Suriya Ningsyih et al., 2024). The PJBL model is based on problems that require authentic investigation, namely investigations that require real-world solutions (Anwar et al., 2024). Students' problem-solving abilities are developed through experimental stages, thus requiring higher-order thinking skills. Therefore, implementing the PjBL model can be applied to develop students' higher-order thinking skills (Anwar et al., 2020).

Ethnoscience comes from the word ethnos from Greek, meaning 'nation', and the word knowledge from Latin, meaning knowledge (Widyaningrum et al., 2021). Ethnoscience can be said to be knowledge possessed by a nation or, more precisely, by an ethnic group or social group, and as a form of local wisdom (Rahmawati et al., 2023). Ethnoscience is a strategy for creating a learning environment that integrates culture into the science learning process, making it useful for social life (Mukti et al., 2022). According to Sudarmin (2015), various types of ethnoscience studies that anthropologists and other scientific fields have successfully researched have given rise to the essence of ethnoscience, namely a culture as a knowledge system, which consists of (a) classification through local language or local terms and local cultural categories, (b) rules or moral values based on local cultural categories, (c) depictions of indigenous knowledge systems found in the culture of a particular community or community group. (July 2024).

Based on the results of observations and interviews conducted at SDN 38 Mataram, several obstacles were found, namely: science materials containing abstract principles, concepts, and theories were difficult to understand, aspects of creative thinking skills were not optimal, students used textbooks more and had less creative-centered learning, the use of culture as a learning resource in schools was not optimal, and students lacked knowledge regarding the relationship between science concepts and everyday life events. These factual data show that students' creative thinking skills are still not optimal (Susanto, 2022). The 2013 Regulation of the Minister of Education and Culture concerning the standards of elementary and secondary education processes emphasizes that to develop thinking skills, the ability to construct one's own knowledge, and problem-solving skills, it is recommended to use a learning approach that produces problem-solving-based work, namely through the PjBL model (Badriah et al., 2023).

Indonesia is the fourth most populous country in the world, and therefore produces the fourth largest amount of waste, both organic and inorganic (Adzim et al., 2023). Organic waste is usually processed into compost and biogas, although at the national level, there is still little practice in organic waste processing (Utami et al., 2021). In the Indonesian context, more than 65% of urban waste is organic, primarily food scraps (Sutisna, 2024). To reduce its impact, waste management is not limited to just collecting, transporting, and storing it in a final disposal site (TPA). Waste can also be processed into useful products, such as through recycling projects. (Zulfar et al., 2024). Waste management is divided into three categories: organic waste, inorganic waste, and toxic/B3 waste (Nurhanifah et al., 2025). Organic waste is waste that is easily decomposed and rots from living things, such as humans, animals, and plants (Simatupang et al., 2024). Wet organic waste includes waste with a high-water content, such as fruit peels and vegetable scraps (Trosobo et al., 2023). Dry organic waste includes waste with little water content, such as wood, tree branches, and dry leaves (Hutagalung et al., 2023). Organic waste, which does not come from living things, can be recycled and reused (Syaria et al., 2023). Plastic and metal materials are included as sources of inorganic waste. (Sulistiyani, 2022).

In the local context, Mataram City, as a center of rapid economic growth in West Nusa Tenggara (NTB), faces challenges related to complex waste management. Waste management in Mataram City, particularly in the Selaparang sub-district, is currently not optimal. Residents simply dump waste in their neighborhoods and rivers, causing environmental damage and water pollution due to the accumulation of waste and flooding. Various types of waste require special handling because they tend to decompose and create negative environmental impacts if not managed properly. Based on observations, the Mataram city community has a very high impact due to the waste problem in the surrounding environment. Plastic waste disposal is a crucial issue in efforts to prevent environmental degradation. Waste is often misinterpreted as something worthless, as stated by Ega Dwi Putri Rahayu et al. (2024) regarding plastic bottle waste, so the waste is immediately thrown away, even though plastic waste is difficult to decompose, causing environmental problems. Limited student knowledge and skills in processing waste into creative products also pose a challenge for students (Khoiriyah, 2021).

Based on the above conditions, innovative efforts are needed to develop effective learning models that integrate ethnoscience, as well as implement context-based problems. This research is intended to collaborate on a plastic waste processing system in accordance with the principles of local ethnoscience, with science learning based on the PjBL model, to improve students' creative thinking skills at SDN 38 Mataram. The aim is to test the feasibility of the developed learning design, as well as to improve students' creative thinking skills.

2. RESEARCH METHODS

This research is a Research *and Development* (R&D) with a development model of *Borg & Gall*, to design a learning system, which consists of five stages, namely: Needs analysis, learning design, learning development, field testing, and expert validation. The type of data used in the research is quantitative data obtained based on the responses/assessments of validators, namely, material experts, media experts, and language experts, as well as data on students' creative thinking skills obtained through test questions. Data analysis was carried out using statistical *descriptive methods* to describe the feasibility of learning designs and classify students' creativity levels based on indicators of creative thinking skills. This analysis process involves collecting data based on predetermined criteria and then interpreting the results into categories. The research subjects were 15 fifth-grade students at SDN 38 Mataram. Conversion of values into scores and the criteria refer to Table 3.

Table 1 Data Collection Techniques

Observation:	Interview:	Questionnaire:	Test Questions:
Observation and Observations in this study were conducted during the teaching and learning process in grade 5. Researchers collected data by conducting direct observations of the objects studied. Students' activities and attention were observed to obtain qualitative data, namely, analyzing the process of science learning activities in the classroom.	Conducted with teachers at the school regarding activities during the learning process at school. After interviews with teachers, the next step is to collect data and develop a product that will be developed through science learning. In the context of this research, researchers obtained initial information about various issues or waste problems in the surrounding environment. This became the object of research. Researchers actively participated in dialogue with informants to gain an in-depth understanding of the process of developing science teaching materials at SDN 38 Mataram.	Used for expert testing, compiled based on the framework of the science learning research instrument. The questionnaire was given to material experts, media experts, and language experts to obtain assessments and suggestions as a basis for revising the science learning so that researchers can determine the feasibility of the learning design that has been created.	Questions were given to fifth-grade students in the form of descriptive question grids, which aimed to determine the improvement in students' creative thinking skills.

Table 2. Types of Data and Research Instruments

Data types	Research instruments
The type of data used in the research was quantitative data obtained based on criticism, responses, and suggestions provided by validator experts, material experts, media experts, and language experts. After going through a trial learning phase, the students were then given a creative thinking skills test.	- Interview: The researcher conducted an interview with the homeroom teacher regarding the teaching and learning process in class 5. Interviews were conducted with teachers at the school regarding the approach and objectives of developing science teaching materials. After conducting interviews with teachers in the classroom, the researchers practiced using a science learning approach based on the PJBL model with the theme of waste management in the environment, which was applied to students at SDN 38 Mataram. - Observation: Researchers can design science learning designs to gather more in-depth information about developments and activities in school learning. In this activity, researchers use a model-based science learning design. Project Baset Learning is based on ethnoscience. - Questionnaire: The questionnaire used for expert testing is compiled based on the research instrument grid regarding science learning. The questionnaire is given to material experts, media experts, and language experts to fill out the science learning instrument sheet and obtain assessments and suggestions as a basis for revising the science learning design. - Test questions: questions were given to fifth-grade students to determine students' creative thinking skills. After the questions had been collected, the researcher calculated the scores based on each indicator (KBK) using the test (*N gain)* to see the improvement of students' creative thinking skills.

Table 3. Material Expert and Media Expert Value Score Conversion

Mark	Conversion Score	Interval Shoes	Criteria	Information
Very less	1	81-100	Very Valid	No Revision
Not enough	2	61-80	Valid	No Revision
Enough	3	41-60	Quite Valid	Needs Revision
Good	4	21-40	Less Valid	Revision
Very good	5	0-20	Very Little Valid	Revision

Based on Table 3, a learning design is declared valid if it meets the criteria for achieving an average score of more than 60 for all assessment elements contained in the assessment questionnaire by material experts and media experts. The assessment must meet valid criteria to be applied in the trial. If the assessment indicates otherwise, revisions must be made until it meets valid criteria.

The analysis of data on the level of creative thinking ability aims to understand and classify the level of student creativity based on the specified indicator questions, such as fluency, *flexibility*, *originality*, and *elaboration*. This analysis process includes collecting data through creative tasks, assessing based on established criteria, and then interpreting the results into value categories. *N-gain*, as developed by Siswono (2016).

The data analysis technique in this study used the results of the students' creative thinking ability instrument. Data collection was carried out by providing descriptive questions. The data analysis technique used was the data analysis of *descriptive* technique. The data collected from the research were processed using analytical *descriptive* techniques by calculating scores based on data obtained from student test results, which were then calculated using the following formula:

$$\text{Value} = \frac{\text{score obtained x100\%}}{\text{maximum score}}$$

From the percentage data, you can use descriptive statistics and comparisons to determine the improvement of students' creative thinking skills. The value of student learning outcomes before and after using PJBL-based science learning models was assessed using problem-solving *descriptive* analysis.

Mark's *normalized gain* (*N-Gain*) was analyzed to determine the increase in students' creative thinking skills through comparative analysis. The increase between the scores of the pretest and *posttest will* be calculated through the equation N-gain below:

$$\textit{N-Gain} \; \frac{\text{Value of } \textit{Posttest- Pretest}}{\text{Maximum value – value pre-test}}$$

The best method to determine the level of efficacy of a given treatment is to analyze the results of *pre-test* and *post-test* using the scores *Gain*, which is normalized and known as N-gain. Value category N-Gain scores can be determined based on the value of N-Gain in the form (%). Below is the division of the categories of value obtained *N-Gain*.

Table 4. Category Criteria (*N-gain*)

Presentation	Category
N-gain ≥ 0,70	Effective
0,30 ≤ N-gain ≤ 0,70	Quite effective
N-gain < 0,30	Less effective

The results of successful learning designs developed based on the model of *Borg & Gall are shown* in the following stages:

1. Needs analysis

Observation: Observations can be made based on field activities by designing learning activities using plastic bottle waste products that have been developed to be used as plant pots in the environment. Each student is divided into 5 groups. In each group, students collect plastic waste that will be poured into beverage bottles. After that, students and their groupmates think of ideas to match the waste that can be poured into bottles that can be designed through decorative plant creations that can be applied in the school yard.

Interview: Interviews with fifth-grade homeroom teachers at SDN 38 Mataram showed that IPAS learning was still predominantly expository and did not provide enough space for students to explore their creative thinking skills. Teachers tend to only deliver material according to the textbook without involving students in the process of scientific inquiry or reasoning. In addition, there is no integration between the learning content and ethnoscience, such as the processing of waste that can be recycled into Eco bricks, which can go through the stages of collecting, sorting, and processing plastic waste to be used as plant pot material.

2. Learning Design

The learning design in this study used plastic bottle waste products, namely making eco bricks, which were developed to be used as plant pots in the environment. The learning design was tested on 15 fifth-grade students divided into five groups. Each group collected plastic waste to be poured into beverage bottles. After that, the students and their groupmates brainstormed ideas for matching the waste that could be poured into the bottles with decorative plants that could be placed in the school yard.

3.Learning Development

Learning concept development: Students are introduced to the concept of Eco bricks and their benefits in reducing plastic waste in the environment.
Group discussion: Students are divided into 5 small groups to discuss Eco bricks and how to use them in everyday life.
Idea development: Students can develop ideas on how to make useful eco brick products.
Production: Students can make Eco bricks from plastic bottle waste with the help of teachers.
Presentation: Students present the eco brick products they have made and explain the manufacturing process.
Conclusion: Students summarize the results of the learning activities that have been carried out during the activity.

4. Field Test

Field tests were conducted on 15 fifth-grade students at SDN 38 Mataram. The learning design to be tested in this study was plastic bottle waste products that were recycled (eco bricks). Before the trial was conducted, the researchers distributed materials about the types of waste in the environment and how to process them properly. The field test was conducted with the students for approximately 2x30 minutes to learn IPAS learning materials about waste in the environment and how to manage it properly.

5. Expert Validation

The validation results conducted by linguists were 65% (good category), while subject matter experts obtained 62% (good category). Meanwhile, media experts obtained 63% (good category). This shows that the results of research on learning design activities can be categorized as good and meet the requirements for maximum learning achievement.

Figure 5. Learning design results-based on the model (*Bord & Gall*)

3. RESULTS AND DISCUSSION

The results of the observations can be carried out with detailed aspects of activities in the field, which can be explained in Figure 6 below.

Figure 6. Science Learning Activities (processing plastic waste)

Based on Figure 6 above, students can design a science learning design by making Eco bricks (plastic bottle waste), which are developed to be used as plant pots. in the environment. Each student is divided into 5 groups. In one group, students collect plastic waste that will be poured into drink bottles. After that, students with their group friends think of ideas to be able to match the waste that can be poured into bottles that can be designed through ornamental plant creations that can be applied in the school yard.

The purpose of the above activity is to develop students' abilities in using products made from plastic waste. By developing Eco brick product designs, students can learn how to reduce plastic waste and recycle it into useful products. Eco brick product designs allow students to develop their creativity and imagination in making unique and interesting products. The process of making Eco bricks and product design allows students to develop skills such as problem-solving, creative thinking, and teamwork. By making Eco bricks, students can learn about the importance of protecting the environment and reducing the negative impacts of using plastic waste.

a. Benefits of Eco bricks (Plastic bottle waste):

1. Eco bricks can help reduce the amount of plastic waste in schools by collecting and reusing them as decorative plant pots.
2. Increasing environmental awareness: making Eco bricks can increase students' awareness of the importance of managing plastic waste and preserving the environment.
3. Developing student skills: making Eco bricks can help develop students' skills in managing waste, through group work and creative thinking.
4. Making the school environment more beautiful: Eco bricks are used as building materials to make plant pots, walls, or other structures that can make the school environment more beautiful and comfortable.

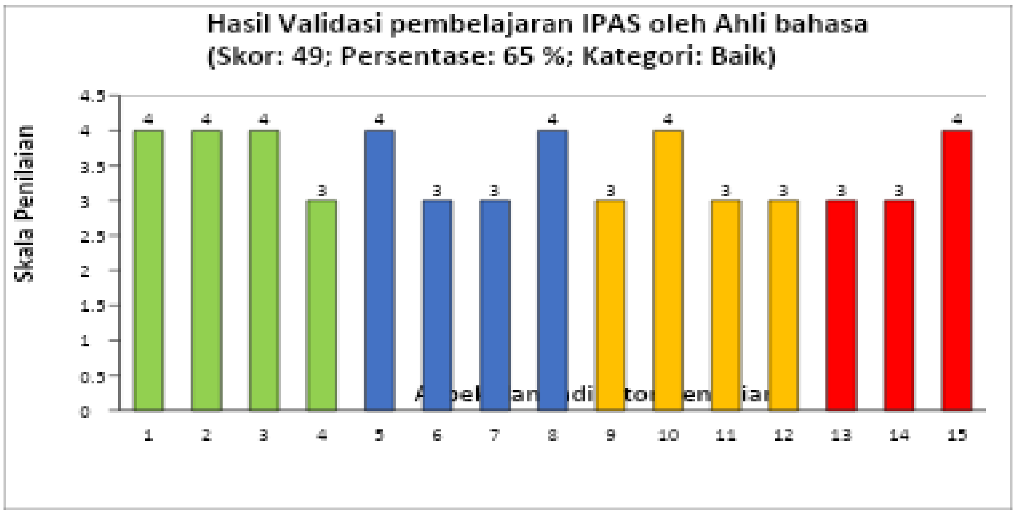
b. Steps to make Eco bricks (plastic bottle waste):

1. Sort and clean plastic waste
   The main ingredient needed to make Eco bricks is plastic waste. The types of plastic waste referred to here can vary, from detergent packaging, beverage packaging, single-use plastic bags, to food wrappers. Once all the plastic waste has been collected, wash it thoroughly with soap—either detergent or dish soap. Afterward, dry the washed plastic waste in the sun.
2. Prepare a used bottle of mineral water.
   In addition to plastic waste, you'll also need to prepare used 600ml mineral water bottles. These bottles will become the "bricks" in making eco bricks. Try to collect as many of these used mineral water bottles as possible.
3. Use a stick to insert the plastic.
   Before you start putting plastic waste into the bottle, first prepare a stick that is twice the length of the mineral water bottle.

4. Weigh each eco brick
   Eco brick waste is arranged neatly and formed like bricks, and each bottle filled with plastic waste is weighed.
5. Stacking eco bricks
   Once all the Eco bricks are complete, it's time to assemble them into an object or structure. Eco bricks can be used to make flower pots and even to form walls in the schoolyard.

Based on the results of the validation assessment by linguists, the quality and feasibility of the developed science and science learning were determined. The quality of the learning was determined by the percentage results, divided into five categories. The resulting data are shown in Figure 7 below.

Figure 7. Results of the validation of IPAS learning by language experts



Of the 15 questions answered by language experts, the researcher concluded based on Figure 7. Using the formula stated by Nurgiyantoro (2016; 219) to find out the average validation results by language experts, 65% was obtained, which was categorized as good based on the interpretation in Figure 7.

× = *jlah Score obtained*49%

Average value = 65%

Figure 8. Results of the validation of science learning by material experts

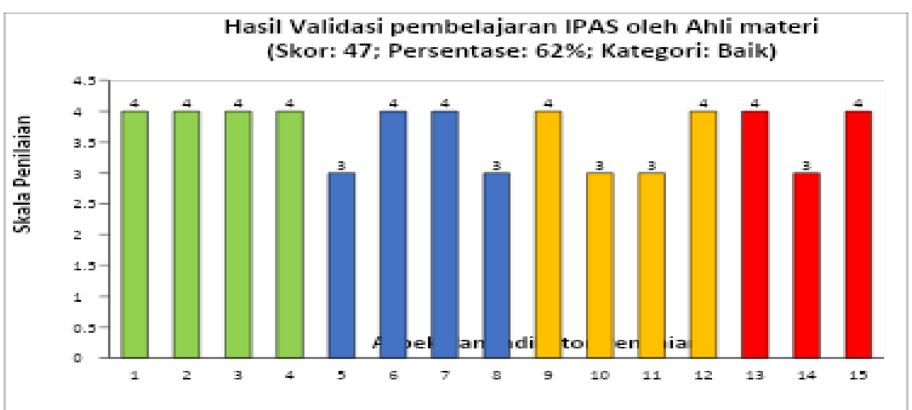
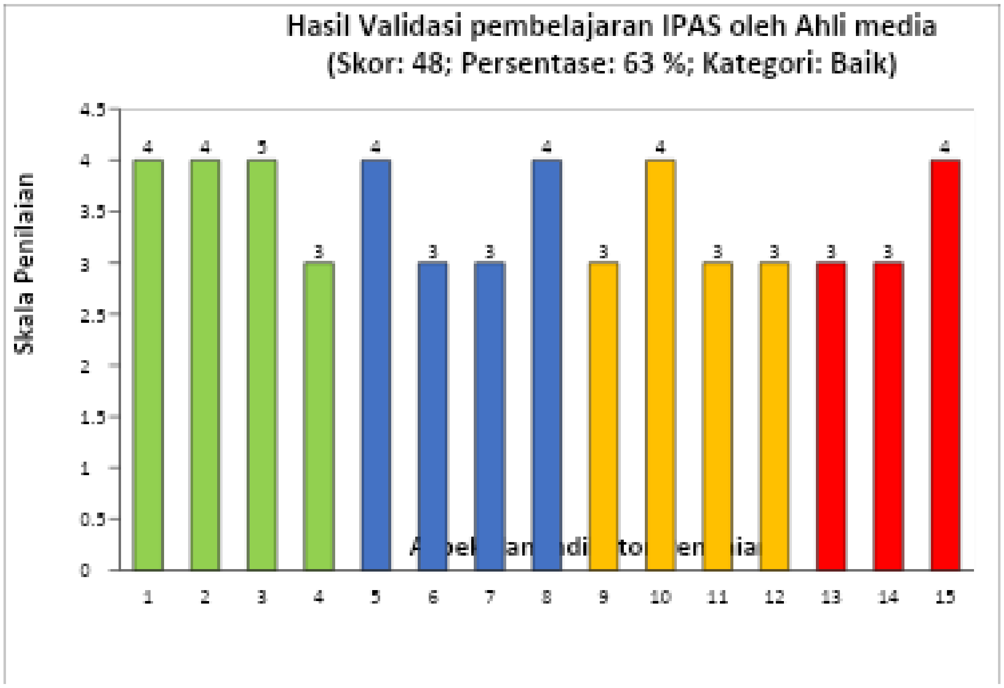


Figure 9. Results of the validation of IPAS learning by media experts



The validation results by the material experts above obtained a percentage score of 62% in the good category, while the validation results by the media experts obtained a percentage score of 63% in the good category. This indicates that the validation results provided by the material expert and media expert validators are practically used in the developed science and science learning design. The total percentage scores for the material experts, media experts, and language experts are shown in Table 10 below:

Number and percentage score		Criteria
Subject matter expert	47-62%	Good
Media member	48-63%	Good
Linguist	49-65%	Good

Table 10. Validation results of material experts, media experts, and language experts

Based on Table 10, it can be seen that the validation by the material expert obtained a percentage score of 62% (good criteria), the media expert obtained a percentage score of 63% (good category), and the language expert obtained a percentage score of 65% (good category). This indicates that the assessment results carried out by the validator expert showed good criteria.

After the science and education learning was declared valid by several validators, with several revisions made, the science and education learning was ready for a trial. The trial used a plastic waste product design, which was conducted at SDN 38 Mataram, with 15 fifth-grade students as research subjects. The trial was conducted to assess the effectiveness of several indicators of creative thinking. To determine the average value of each indicator, a test was used.*: N-gain*. Test results of *N-gain* Creative thinking skills are seen in Figure 11 below.

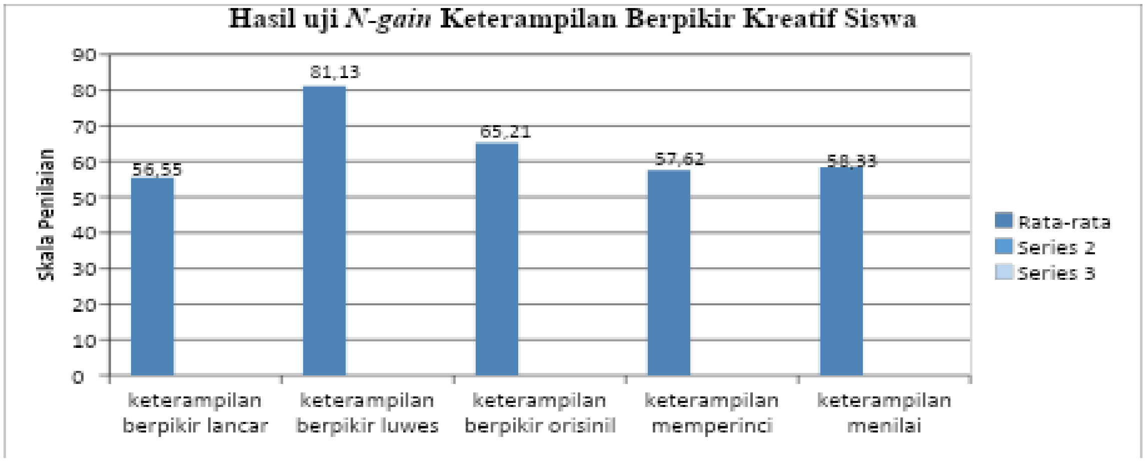


Figure 11.**Test results of *N-Gain* creative thinking skills**

Based on Table 11 above, it can be described that students' creative thinking skills on the fluent thinking indicator with an average value of 56.55% (quite effective category), the average value of the flexible thinking indicator is 81.13% (effective category), the average value of the original thinking indicator is 65.21% (quite effective category), the average value of the detailed thinking indicator is 57.62% (quite effective category), the average value of the assessing thinking indicator is 58.33% (quite effective category). This shows that students of SDN 38 Mataram can produce various answers from various aspects, and the creative thinking indicator can be categorized as quite effective.

- Validity of the science learning design

  Obtained from the validation results by several experts, namely: material experts, media experts, and language experts. The validity level of material experts with a percentage of 62%, with the criteria (valid). The validity level of media experts with a percentage of 63% with the criteria (valid). The validity level of language experts with a percentage of 65% with the criteria (valid). The validation results are in the form of comments and suggestions for the developed science learning and along with the instruments that will be used in the research.

- Effectiveness of science learning design

  Effectiveness can be seen from the test results of *N-gain* students' creative thinking skills in developing science and science learning designs. Results of the test*N-gain*The average value of the fluent thinking indicator is 56.55% in the fairly effective category, the average value of the flexible thinking indicator is 81.13% in the effective category, the average value of the original thinking indicator is 65.21% in the fairly effective category, and the average value of the detailed thinking indicator is 57.62% in the fairly effective category. Meanwhile, the average value of the thinking indicator is 58.33% in the fairly effective category.

  Based on the test results, N-gain from several indicators of students' creative thinking skills, it shows that science learning based on the PJBL model containing ethnoscience of waste processing for fifth-grade students of SDN 38 Mataram can be declared quite effective. From the results of the trial of science learning based on the PJBL model, it can be said that the ethnoscience of waste processing for fifth-grade students of SDN 38 Mataram can be declared quite effective. *PJBL Several* things can be found, namely that science learning integrated with ethnoscience of waste processing makes it easy for students to learn individually (independently) and easily understand the material in the learning. This is in line with the opinion of Prastowo Andi (2015:105,) who said that science learning is the smallest learning program unit that will be studied by students individually (*self-instructional*) or in groups. After participants complete the unit in the next lesson, participants can move on and study the social studies learning unit. (2) In using social studies learning in the context of waste processing, students can understand the elements of waste in the environment and can process it well.

From the explanation above, it can be concluded that science learning is based on a model-based *learning* (PJBL) that contains ethnoscience of waste processing based on assessments and suggestions by material experts, media experts, and language experts, as well as the results of the Test*N-gain* can improve students' creative thinking skills.

3.1. Discussion

The results of this study indicate that the implementation of PJBL-based science learning design containing ethnoscience of waste processing can be demonstrated by validation carried out by linguists as much as 65% (good category), and material experts as much as 62% (good category). While media experts are 63% (good category). And the results of the N-gain Test of creative thinking skills based on the fluent thinking indicator with a value of 56.55% (quite effective category), the average value of the flexible thinking indicator is 81.13% (effective category), the average value of the original thinking indicator is 65.21% (quite effective category), the average value of the detailing skill indicator is 57.62% (quite effective category), while the average indicator of assessing skills is 58.33% (quite effective category).

Empirical evidence suggests that PjBL-based science learning with an ethnoscience focus on waste management can improve creative thinking skills, with moderate effectiveness. This finding aligns with several relevant studies, including:

Research by Aidoo et al. (2022) found that implementing the PJBL model of science learning is effective in developing students' creative thinking skills because it places them at the center of classroom learning activities. Students not only memorize information but also construct knowledge from contextually relevant, hands-on experiences. Implementing this in an environment that promotes ethnoscience by processing waste can make learning more meaningful, concrete, and relevant to students' lives.

Research by Darn et al. (2025) supports this finding, where the integration of ethnoscience and PjBL has certain characteristics in the learning process. PjBL emphasizes learning through challenging and relevant real projects, where students work collaboratively to solve problems or create a product from the plastic waste that is developed.

Research by Nurhayati et al. (2021) found that students learning using an ethnoscience approach with a PJBL model demonstrated better logical reasoning skills compared to those learning using conventional methods. This confirms that an ethnoscience approach, incorporating products made from plastic waste into learning, can foster students' creativity in using the products they develop for the environment.

The results of observations conducted by researchers by interviewing teachers at SDN 38 Mataram show that science learning is still predominantly expository and does not provide space for exploration of students' creative thinking abilities. Teachers tend to only deliver material according to textbooks without involving students in the process of investigation or scientific reasoning. In addition, there is no integration between learning content and ethnoscience, such as processing recyclable waste into Eco bricks that can go through the process of collecting, sorting, and processing plastic waste into building materials and environmentally friendly plant pots. Processing plastic waste into Eco bricks can help students develop skills such as design, construction, and problem-solving. Plastic waste processing can be an effective tool in science learning by developing students' creative thinking.

This situation indicates a gap in the use of ethnoscience as a lever for meaningful learning and improving students' creative thinking skills. As a solution to this problem, the ethnoscience-based project-based learning (PJBL) model is proposed as an approach capable of integrating waste management into the environment. The PJBL model is a learning model that allows students to work on projects relevant to their real lives to develop products, collect data, and draw conclusions (Pedaste et al., 2020). By linking PJBL to an ethnoscience context such as waste management, students not only learn ethnoscience procedurally but also learn socially and community-based meanings in waste management. The PJBL model allows students to actively develop creative thinking skills through the process of formulating plans through product development, interpreting results, and relating findings to students' real lives. The integration of the PJBL and ethnoscience models has the advantage of simultaneously fostering students' creative thinking skills. In the context of waste processing, students can develop creativity in transforming plastic waste into useful and aesthetic products. Students are invited to analyze the principles of reducing and managing waste in the environment by reducing the use of unused plastic and reusing plastic bottles as containers for making eco bricks. Integration of ethnoscience and PjBL has certain characteristics in the learning process. PjBL emphasizes learning through challenging and relevant real projects, where students work collaboratively to solve problems or create real products.

The novelty of this research lies in the application of the Project-Based Learning model that is directly contextualized with ethnoscience, namely waste processing, to shape and train students' creative thinking skills in using products. Different from previous studies that only used the PJBL approach in general, this study integrates the ethnoscience context of waste processing in contextual learning, making it a bridge between science and learning (Anwar et al., 2025). This research also presents a new dimension in the ethnoscience context, which not only functions as a medium for preserving school culture but also as a strategic means for improving the quality of students' creative thinking from an early age. With the ethnoscience approach and the PJBL model, learning becomes more adaptive, inclusive, and contextual. This research is based on Vygotsky's constructivist theory, which emphasizes the importance of scaffolding and the ethnoscience-cultural context in learning. Project-based learning with an ethnoscience context is in line with the principle of the zone of proximal development (ZPD), where the role of the teacher as a facilitator is very important in encouraging the development of students' logic in creative thinking. Furthermore, the use of ethnoscience in learning serves as a concrete and meaningful learning tool for students. This research is interdisciplinary, connecting natural sciences with students' social lives. This research has not been widely explored by previous researchers at the elementary school level.

These findings also demonstrate strong relevance to the policy direction of the Independent Curriculum, which emphasizes project-based learning, strengthening ethnoscience, and developing character and higher-order thinking skills. This research contributes not only to theory and learning models, but also to educational practices in the context of ethnoscience. By managing plastic waste as an authentic learning resource, students understand science not only in the context of textbooks but also as part of their lived reality. This research is expected to serve as a reference in the development of PJBL-based science learning with ethnoscience-based waste processing content to improve creative thinking skills (Asriyadin et al., 2025).

The implications of this research are significant for teachers, curriculum designers, and educational policymakers. PJBL-based science learning combined with the ethnoscience of waste processing can open up opportunities for students to develop products from plastic waste. In practice, teachers not only act as instructors but also as facilitators capable of managing the ethnoscience-based project-based learning process. This requires special training so that teachers have the capacity to design activities that promote knowledge while creating products from the collected waste. This research also provides a strong foundation for the development of PJBL-based science learning in the context of the ethnoscience of plastic waste. Similar models can be replicated in other ethnoscience learning contexts with their own unique characteristics, to encourage education that is not only academically superior but also rooted in student creativity in connecting ethnoscience. Thus, the PJBL model containing ethnoscience of waste processing is not only cognitively effective but also strategic in building student identity through education that is relevant to social reality and everyday life.

4. CONCLUSION

The aim of this research is to develop a science-based learning design. Project-based *learning* (PjBL) involves ethnoscience of waste processing and knowing its effectiveness as an impact on improving students' creative thinking skills. The purpose of developing this plastic waste product is for students to learn how to reduce plastic waste in schools and reprocess it into useful products. The design of eco brick products from plastic waste can develop students' creativity and imagination in making interesting and creative products. Thus, the purpose of this research is to develop a learning design using products from plastic waste, which can increase students' awareness in protecting the environment, as well as develop students' skills and creativity.

Based on the research results, the suggestions given are as follows:

- For school principals, in order to improve the standards of student learning creativity in science learning, science learning needs to be developed using a model. *Project-based learning* (Pjbl) integrates ethnoscience by increasing waste processing in the environment.
- For teachers at school, to encourage students' creative thinking skills by inviting other teachers to use science teaching materials with the model-based *learning* (PJBL), which is combined with the relevant learning strategies.
- Researchers who conduct research can correct the shortcomings in this research to improve the results of further research.

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6. LITERATURE

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