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IMPLEMENTATION OF PROJECT-BASED LEARNING ON SCIENCE MATERIALS TO INCREASE STUDENT CREATIVITY

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Abstract

This research aims to uncover the integration of science concepts, especially style and motion, in local cultural practices in the form of the process of weaving ketak carried out by the community in Janggo Village, Janapria District, Central Lombok Regency. Weaving not only serves as a handicraft product of high economic and aesthetic value, but also reflects complex and repetitive motor skills, which indirectly contain the basic principles in Natural Sciences (IPA) learning. This study uses a descriptive qualitative approach with a data collection method through direct observation of the weaving manufacturing process, in-depth interviews with local artisans, and documentation of weaving activities as primary data sources. The results of the study show that in the weaving process, there is the application of forces such as pull, pressure, and thrust which have an impact on the shape, sturdiness, and beauty of the weaving. In addition, the craftsmen's regular, precise, repetitive hand movements are concrete representations of the concept of motion in physics. This activity indirectly shows that local traditional skills can be used as a source of contextual learning in science education, especially to explain the concepts of style and movement in an applicative and meaningful way. Therefore, this study recommends the development of local culture-based teaching materials such as weaving as an effective strategy to improve students' science literacy, while supporting the preservation of regional cultural heritage.

Keywords: Project-Based Learning, Creativity, Science, Junior High School Students

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INTRODUCTION

The paradigm shift in learning in the 21st century requires schools to focus not only on achieving cognitive learning outcomes, but also on developing 21st century skills such as creativity, critical thinking, communication, and collaboration (Trilling & Fadel, 2019). In the context of Natural Sciences (IPA) learning, creativity is an important skill that students must have because the scientific process is closely related to divergent thinking skills and produces innovative solutions to real problems (Susanti et al., 2021). Unfortunately, science learning at the junior high school (SMP) level is still mostly oriented towards mastering concepts through lecture methods, practice questions, and memorization. This kind of learning model does not provide enough space for students to develop their creativity (Yuliana & Afandi, 2020). This has an impact on students' low ability to relate science concepts to daily life, as well as their lack of initiative in exploring new and original ideas.

In order to overcome these problems, a more active, contextual learning approach is needed, and provides freedom of thought to students. One model that fits these characteristics is project-based learning (PjBL). This model encourages students to construct knowledge through the exploration and completion of real projects collaboratively. In addition, PjBL also provides opportunities for students to design a final product that reflects their understanding of science concepts while developing creative thinking skills Rahmawati & Astuti, (2022). The application of PjBL has been proven to increase student creativity because it provides freedom in choosing how to complete projects, product forms, and allows for the emergence of original ideas. In a study by Istiqomah et al. (2020), the implementation of PjBL in science subjects in grade VII of junior high school showed a significant increase in students' creative thinking skills and independent learning. Similar findings were also put forward by Nursidah & Hidayatullah (2021) who found that students became more active and creative in designing solutions to environmental problems through simple scientific projects.

In addition, PjBL is also able to increase student learning motivation. According to Sulisworo et al. (2022), active involvement in real projects can increase students' sense of responsibility for their learning outcomes, so they are more motivated to dig up information, think more openly, and look for innovative solutions. This is in line with the ideal characteristics of science learning, namely inquiry-based and problem-based learning. However, the implementation of PjBL cannot be done carelessly. Careful planning, preparation of appropriate assessment rubrics, and teacher training are needed to facilitate students' creative thinking processes. Research by Wulandari et al. (2023) emphasizes the importance of teacher support in providing feedback during the project process so that students' creativity can be optimally stimulated. Seeing the importance of developing student creativity in science learning and the potential of PjBL as an effective learning model, this study was conducted to determine the influence of project-based learning implementation on increasing student creativity in environmental pollution materials. This research also aims to provide empirical evidence that can be a reference for teachers in choosing the right learning approach to improve the quality of science learning in junior high schools.

METHODS

This study uses a quantitative approach with quasi-experimental methods and nonequivalent control group design. The research subjects consisted of two classes VIII in one of the State Junior High Schools in Mataram City which were selected purposively. Class VIII-A is designated as an experimental class that accepts project-based learning, while class VIII-B is a control class that accepts conventional learning. This research was carried out for four weeks with four meetings on the material "Environmental Pollution". The instruments used include a rubric for assessing student creativity developed based on Torrance's theory and has been adapted to the context of science (Putri & Fauzan, 2021). This rubric covers four aspects of creativity, namely: (1) fluency of ideas, (2) flexibility of thinking, (3) originality, and (4) elaboration. The validity of the instrument was tested by three science education experts and obtained an average validity value of 0.84 which indicates a very valid category.

Data analysis was carried out using an independent t-test (Independent Samples t-Test) to determine the difference in average creativity score between the experimental class and the control class. The test of normality and homogeneity assumptions was first carried out to ensure that the data met the requirements of parametric analysis (Hartati et al., 2020).

RESULT AND DISCUSSION

Student creativity data was collected from project assessment sheets covering all four aspects of creativity. Here are the average creativity scores in each class:

Creativity Aspect	Experimental Classes	Control Class
Eloquence	85.2	72.5
Flexibility	82.4	69.7
Originality	84.1	68.3
Elaboration	83.5	70.2
Average	**83.8**	**70.2**

Analysis of Research Results and Their Implications on Student Creativity in Learning to determine the influence of the project-based learning model (PjBL) on increasing student creativity in Natural Science (IPA) learning. Data analysis was carried out inferentially using an independent t-test to test the hypothesis of a difference in creativity level between students in the experimental class using the PjBL model and students in the control class using conventional learning methods. The results of the analysis showed that there was a statistically significant difference between the two groups, with a significance value (p) = 0.001. Since the p< value is 0.05, it can be concluded that the difference between the students' creativity scores in the experimental class and the control class is statistically significant.

These findings clearly show that the application of a project-based learning model has a positive impact on increasing student creativity in science learning. This model provides ample space for students to be actively involved in the learning process, not only as recipients of information, but also as subjects who actively design and realize their own learning activities. In this context, the results of the research are in line with what has been stated by Novita and Yulianti (2020), who stated that the project-based learning model provides greater opportunities for students to express their ideas freely and creatively, because of its open, flexible, and problem-based nature.

In this study, the topic raised in the learning project was "environmental pollution," which was chosen because of its proximity to students' daily lives. This topic challenges students to recognize different forms of pollution in their surrounding environment, analyze their causes and impacts, and design solutions that are scientific, innovative, and applicative. Through these activities, students not only learn science concepts theoretically, but also practice them in real-life situations, which require them to think critically and creatively.

In measuring creativity, four main indicators are used, namely: originality, flexibility, fluency, and elaboration. The results of the analysis showed that of the four indicators, originality was the most prominent aspect in the experimental class, with an average score of 84.1. This means that students show a high ability to generate ideas that are unique and different from the usual, a sign of strong divergent thinking abilities. This is especially important in the context of science education, because scientific thinking requires the ability to look at problems from various perspectives and come up with solutions that are not yet common or conventional. Maryani and Hartono (2022) stated that originality is a key component in assessing scientific creativity, as it shows students' courage in exploring new ideas and not being afraid to be different from their peers.

The success in developing this aspect of originality is inseparable from the design of the project-based learning model itself. In the PjBL model, students are given full freedom to design and choose the final form of their project. The teacher does not limit the form of the solution or the final result of the project, but rather provides guidance and support throughout the process. This freedom motivates students to explore ideas more deeply and develop solutions that match their understanding and interests. In other words, students become the main actors in the learning process, and this is what triggers the emergence of creative thinking naturally. In contrast, students who were in the control class and followed conventional learning tended to show uniform responses. Their work shows that understanding is still limited to mastering basic concepts and has not reached a higher level of application. The ideas they convey are general, repetitive, and do not show depth of thinking. This is evident in the elaboration aspect, which shows the lowest score compared to the experimental class. Elaboration requires students to develop the initial idea into a more complex and detailed form, but in the control class, the tendency of the student is to stop at the initial idea without developing further. Mustaqimah et al. (2021) noted that conventional learning approaches do not provide enough stimulus to stimulate students' exploration and freedom of thought, so their creative potential tends to be hampered.

Another important aspect that contributes to increasing creativity in the experimental classroom is the active involvement of students during the learning process. In PjBL, students are required to work in teams, discuss, agree on the division of tasks, design and run projects, and present the final result. This collaborative process gives rise to a lot of interaction between students, exchange of ideas, and joint decision-making. Through these activities, students not only learn science concepts, but also learn to work together, think critically, solve problems, and express opinions effectively. Sari and Nurdin (2023) stated that the learning process that involves collaborative work in a meaningful context can encourage the growth of creativity, a sense of responsibility, and learning independence.

In addition, experience in managing projects also helps students to understand the importance of the stages of scientific thinking in a practical way. They learn to identify real problems, design solutions based on data, and evaluate the effectiveness of the solutions they create. This process hones high-order thinking skills that are needed in 21st century science learning. In projects on environmental pollution, for example, students conduct field observations, document forms of pollution, conduct interviews with residents, and design solutions in the form of environmental campaigns, waste recycling, or small-scale waste management systems. All of this is done with a creative and contextual scientific approach.

Overall, based on the quantitative data of the results of the t-test and field findings obtained through observation and documentation of activities, it can be concluded that the application of the project-based learning model has a significant impact on increasing student creativity. This can be seen from the increase in scores on all creativity indicators, especially originality and elaboration. This approach has also been proven to increase students' active participation, foster a sense of responsibility, and train them to think scientifically and creatively at the same time. Therefore, a project-based learning approach is very worthy of being considered as an alternative in the development of science learning that is not only oriented towards academic achievement, but also on the development of 21st-century skills such as creative thinking, collaboration, and problem-solving. In the context of the implementation of the Independent Curriculum that encourages student-centered learning and based on real experience, the PjBL model can be a relevant and effective strategy. By providing students with space to learn from the real world through contextual projects, the school not only educates students to understand science, but also prepares them to become critical, creative, and solutive thinkers in the future.

CONCLUSION

The results of this study show that the implementation of project-based learning significantly increases students' creativity in science learning. The four aspects of creativity—fluency, flexibility, originality, and elaboration—showed significant improvements in classes taught using the PjBL model compared to conventional learning. Contextual, engaging, and challenging projects have proven to be able to stimulate students to think out-of-the-box and come up with innovative scientific solutions. These findings provide important implications for science teachers at the junior high school level to apply more project-based learning models in order to develop students' creative thinking potential. However, the implementation of this model needs to be designed systematically, including the selection of relevant topics, the preparation of appropriate assessment rubrics, and the provision of feedback during the project work process. Thus, the goal of learning science that not only understands concepts but also develops 21st century skills can be optimally achieved.

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