

The Influence of Problem-Based Learning Method on the Characteristics of Archipelagic Students

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Abstract

Understanding student characteristics is vital for lecturers to recognize each student's unique traits, allowing them to collect valuable data about students. Therefore, This quasi-experimental study with a nonequivalent control group design aimed at understanding the characteristics of island-based students and examining the impact of the Problem-Based Learning (PBL) method on these characteristics. The characteristics of island-based students in this study are analyzed from cultural, social status, interest, motivation, and cognitive development aspects. The sample consists of 14 students, with 8 students in the experimental class and 6 students in the control class. The sampling technique used is purposive sampling based on specific characteristics deemed relevant to the study. The research findings indicate that during the learning process, students from Karampuang Island were highly enthusiastic and actively participated in lectures. The analysis of the average N-Gain score shows that the experimental class (Problem-Based Learning method) achieved 85.3%, categorized as effective. Since this value is ≥ 0.70 , it falls within the high category, meaning that the effectiveness of using the Problem-Based Learning method for island-based students is high. Meanwhile, the average N-Gain score for the control class (conventional learning method) was 38.7%, categorized as ineffective. Therefore, it is recommended that future researchers explore alternative teaching methods that align with the subject matter and student characteristics to enhance learning outcomes and create a more active, effective, and efficient classroom learning environment.

Keywords: Learning Methods, Problem Based Learning, Student Characteristics, Karampuang Island

Abstrak

Memahami karakteristik siswa sangat penting bagi dosen untuk mengenali ciri khas setiap siswa, sehingga mereka dapat mengumpulkan data berharga tentang siswa. Penelitian quasi eksperimen dengan desain *nonequivalent control group desain yang* tujuan untuk mengetahui gambaran karakteristik mahasiswa kepulauan, dan mengetahui pengaruh metode pembelajaran *Problem Based Learning* terhadap karakteristik mahasiswa kepulauan. Adapun karakteristik mahasiswa kepulauan dalam penelitian ini dapat ditinjau dari kultural, status sosial, minat, motivasi, dan perkembangan kognitif. Sampel dalam penelitian ini berjumlah 14 mahasiswa, 8 mahasiswa kelas eksperimen, dan 6 mahasiswa kelas kontrol. Adapun teknik pengambilan sampel yang digunakan adalah *purposive sampling* dengan berdasarkan karakteristik tertentu yang dianggap relevan dengan penelitian. Berdasarkan hasil penelitian diperoleh bahwa selama pelaksanaan proses pembelajaran, peneliti melihat mahasiswa yang berasal dari Pulau Karampuang sangat antusias dan berpartisipasi mengikuti perkuliahan dan analisis nilai rata-rata N-Gain diperoleh bahwa untuk kelas eksperimen (metode pembelajaran *Problem Based Learning*) adalah sebesar 85.3% termasuk dalam kategori efektif. Nilai ini $\geq 0,70$ maka kategori yang diperoleh yaitu tinggi. Artinya, efektifitas penggunaan suatu metode pembelajaran *Problem Based Learning* terhadap karakteristik mahasiswa kepulauan, tinggi. Sedangkan untuk rata-rata N-Gain skor kelas kontrol (metode pembelajaran konvensional) adalah sebesar 38.7% termasuk dalam kategori tidak efektif. Dengan demikian, peneliti selanjutnya diharapkan mampu memberikan alternatif metode yang sesuai dengan materi dan karakteristik mahasiswa agar dapat meningkatkan hasil belajar serta membuat proses pembelajaran di kelas menjadi lebih aktif, efektif serta efisien.

Kata kunci: Metode Pembelajaran, *Problem Based Learning*, Karakteristik Mahasiswa, Pulau Karampuang

INTRODUCTION

As the times continue to evolve, every aspect of life has also developed rapidly. Nowadays, people prioritize material gains over self-improvement (Wariani & Hayon, 2023). They believe that success in life is only measured by what is visible to the eye. Despite the temptation to focus solely on acquiring wealth, we must not forget the importance of education. Education is a fundamental human need that must be fulfilled, playing the most crucial role beyond mere survival. It grants

individuals greater dignity and a higher social standing than those without education (Pandang & Anas, 2018). Education is an inseparable element of human life. From the womb to adulthood and into old age, people undergo an educational process, whether from parents, society, or their surroundings. Education is regarded as the light of life, guiding individuals in determining their direction, goals, and the true meaning of life (Zainal et al., 2025).

Law No. 20 of 2003 on the National Education System states that education is a conscious and planned effort to create a learning environment and learning process so that students can actively develop their potential. This enables them to possess religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed for themselves, society, the nation, and the state (Irfan & Rahman, 2024). National education serves to develop abilities and shape the character and civilization of a dignified nation to enhance national intelligence (Rizaldy, 2024). Its goal is to develop students' potential so that they become individuals who believe in and are devoted to God Almighty, have noble character, are healthy, knowledgeable, capable, and skilled. Education is generally conducted democratically, fairly, and without discrimination, upholding human rights, religious values, cultural values, and national diversity. Thus, every citizen has the same right to receive quality education (Ramli & Jafar, 2023).

Putra et al. (2023) state that education is highly beneficial for human life. Without education, it would be nearly impossible for a community to thrive and progress toward prosperity. The government has made efforts to improve education quality by implementing nine years of basic education, secondary education, and higher education. Higher education plays a crucial role in preparing individuals with professional academic abilities so that they can apply, develop, and create knowledge, technology, and art. However, in reality, not all high school graduates wish to continue to higher education. Some families prefer to send their children to work or migrate in pursuit of material wealth.

Sihombing et al. (2021) state that, in principle, humans need education, whether through formal teaching methods or other socially recognized means. The progress or decline of a society is determined by the quality of education and the quality of its generations. The decision to pursue higher education is influenced by personal interest and the need for self-development. Internal motivation drives individuals to take action and participate in educational activities (Rahayu, Firman, & Yunus, 2023). Therefore, understanding students' characteristics is essential for lecturers, serving as a reference for developing appropriate teaching strategies and methods. Lecturers must be able to recognize and adapt to students' diverse characteristics at different academic levels.

According to Harahap et al. (2024), human nature consists of inherent traits (heredity) and characteristics shaped by environmental influences. A person's characteristics are significantly affected by their personal development. Students have emotions, thoughts, and aspirations for recognition and self-actualization based on their potential. Meanwhile, Bawamenewi (2024) defines student characteristics as aspects that form an individual's personal qualities. Understanding these characteristics enables lecturers to classify students and select the most suitable teaching methods to achieve optimal learning outcomes. Generally, students' characteristics encompass basic demographic factors such as age, academic level, occupation, and gender. These fundamental aspects should be considered alongside more individualized traits.

The purpose of understanding student characteristics is to help lecturers recognize each student's

unique traits, allowing them to collect valuable data about students. This information serves as a guide in selecting optimal teaching methods to ensure successful learning. The effectiveness of the teaching-learning process is significantly influenced by how well lecturers understand students' characteristics. An initial survey conducted on July 15, 2024, at the Informatics Engineering Program, Faculty of Computer Science, at a university in West Sulawesi revealed that most students in the program come from Karampuang Island. The island is located approximately 3 km from Mamuju City, accessible only by boat. The local community refers to it as "Crocodile Island" due to its shape when viewed from above. It covers an area of 6.37 km² and is home to 855 households, with a total population of 3,163 people. The local government has given special attention to children's education, as evidenced by the presence of PAUD (early childhood education), elementary, junior high (SMP/MTs), and senior high schools (SMA/MA) on the island. Despite the limited internet access, the community enjoys abundant marine resources, with most residents working as fishermen. From an early age, children are encouraged to fish and support their family's economy. However, the community strongly supports higher education, particularly at Tomakaka University.

During the teaching process, the researcher observed that students from Karampuang Island were highly enthusiastic and participative compared to those from highland areas. Many island students mentioned that their parents fully support their education, hoping they can develop marine-related skills and improve technological competencies in island-based aquaculture. Although financial constraints exist, the community collectively supports the younger generation in pursuing education. In this study, the characteristics of island students are examined from cultural, social status, interest, motivation, and cognitive development perspectives, using the Problem-Based Learning (PBL) teaching method. According to Marlis et al. (2024), PBL encourages students to construct knowledge by reasoning from prior and newly acquired information. This student-centered learning approach actively engages students in problem-solving, making them responsible for addressing challenges independently. In practice, students conduct their own investigations, identify problems, and find solutions under the lecturer's guidance. This teaching method is expected to enhance active learning, promote positive interactions with peers and lecturers, and improve students' ability to complete tasks individually or in groups.

Several studies have investigated student characteristics. Tjhin & Istriana (2024), in their research titled "The Relationship Between Student Characteristics and Academic Burnout in Medical Students," found that 62.5% of students experienced mild burnout, while only 4.8% had no burnout. Meanwhile, 32.7% of students suffered from moderate to severe burnout. There was no significant relationship between age, gender, and academic achievement with academic burnout. Sesilia et al. (2024), in their study titled "The Role of Pancasila Education in the Era of Globalization in Shaping Student Character," found that globalization can erode national identity, highlighting the growing importance of integrating Civic Education into curricula to strengthen and maintain national character.

Similar findings were reported by Sihombing et al. (2024) in their study titled "The Effect of Affective Learning Strategies on Student Character." Their research confirmed that the affective learning strategy variable (X) significantly influenced student character (Y), proving the hypothesis that affective learning strategies impact student character development at the Indonesian Tabernacle School of Theology. Another study by Harahap et al. (2024), titled "Between Tradition and

Transformation: Exploring the Role of Personality Courses in Shaping Student Character in the Era of Globalization," concluded that a holistic character education approach, incorporating moral values into academic curricula, is essential for addressing these challenges. The study emphasized the need for collaborative efforts from educational institutions, lecturers, and students to improve this situation and foster a more ethical campus environment.

Additionally, Marlis et al. (2024), in their research titled "The Effect of the Problem-Based Learning (PBL) Model in Civics Education on the Discipline Character of Elementary School Students in Kampung Parang, Bajeng Barat District, Gowa Regency," demonstrated the impact of the PBL model on improving student discipline.

Based on the above discussion, the present research is titled "The Effect of Problem-Based Learning on the Characteristics of Island Students." This study differs from previous research by focusing on island students and exploring the effects of PBL while adopting a quantitative research approach. Its novelty lies in modifying various student characteristics to tailor content, process, and educational outcomes according to student needs. This research is relevant to the development of the Merdeka Curriculum and the improvement of education quality. It has the potential to provide practical guidance for lecturers in designing teaching methods that align with instructional materials and student characteristics.

METHOD

Research Design

This study employs a quasi-experimental design with a non-equivalent control group design. The research process begins with data collection, followed by data interpretation, and concludes with final results. The study consists of one independent variable (X), which is the effect of the Problem-Based Learning (PBL) method, and one dependent variable (Y), which refers to the characteristics of students from Karampuang Island. The research design is structured as follows:

Table 1. Pre-test and post-test

| Group | Pre-test | Treatment | Post-test |
|-----------------|----------------|-----------|----------------|
| Experiment (EG) | O ₁ | X | O ₂ |
| Control (CK) | O ₁ | - | O ₂ |

Description :

- EG : Experiment group with Problem Based Learning method
- CG : Control group with conventional method
- X : Treatment with Problem Based Learning method for experiment group
- : No treatment but applying conventional method
- O₁ : Pre-test
- O₂ : Post-test

Research subject

The subjects in this study are the characteristics of island students in the fourth semester from Pulau Karampuang, enrolled in the Informatics Engineering Program at a University in West Sulawesi Province, totaling 14 students—8 in the experimental class and 6 in the control class. This is due to the fact that, based on student data from the Informatics Engineering Program, out of 36 students, only 14 students from Pulau Karampuang enrolled in the program. According to Alpansyah

and Abdul Talib Hashim (2021), in quasi-experimental research, subjects can be selected using a matching sampling technique, applied to subjects in both the control and experimental groups.

Procedure

The research procedure to be carried out includes preparing the lesson plan and question materials to be used during the teaching and learning process. The learning process is then conducted according to the prepared lesson plan, with lessons delivered using videos or simulations that support PBL learning. A non-test instrument in the form of a questionnaire is administered, tailored to the teaching materials and student characteristics. Finally, the researcher analyzes the questionnaire and compiles the student report.

Data Collection

The data collection technique in this study is divided into three stages: before the lesson, during the lesson, and after the lesson. Data is gathered through questionnaires and tests, serving as tools to collect information related to the characteristics of the students sampled in the study. The questionnaire is administered by providing a set of statements to respondents based on the research variables. Meanwhile, the test used meets the requirements of a good instrument, including validity, reliability, discrimination index, and difficulty level tests.

Data Analysis

The data analysis techniques used are as follows: 1) Scoring the pre-test and post-test to measure students' abilities. 2) Calculating the normalized N-Gain score. The test data obtained before and after learning is analyzed by comparing the pre-test and post-test scores. According to Alamsyahbana et al. (2023), the improvement before and after learning is calculated using the N-Gain formula:

$$N - Gain = \frac{X_{post-test} - X_{pre-test}}{X_{maximum} - X_{pre-test}}$$

Description:

Xpre-test : Pre test score

Xpost-test : Post test score

Xmaksimal : Maximum test score

Table 2. N-Gain Criteria

| No. | N-Gain Score | Criteria |
|-----|----------------------|----------|
| 1. | $G \geq 0,70$ | High |
| 2. | $0,30 \leq G < 0,70$ | Moderate |
| 3. | $G < 0,30$ | Low |

Based on Sugiyono (2022) The percentage of N-Gain is as follows.

Table 3. Criteria for N-Gain percentage interpretation

| No. | Percentage (%) | Criteria |
|-----|------------------|-----------------|
| 1. | $x \leq 40$ | Less effective |
| 2. | $40 > x \leq 75$ | Quite effective |
| 3. | $x > 75$ | Effective |

RESULT AND DISCUSSION

The N-Gain score distribution obtained to determine the effectiveness of the Problem-Based Learning method on the characteristics of island students, calculated using the SPSS application, can be seen as follows:

Tabel 4. Descriptives Statistics

| | | Class | Statistic | Std. Error | |
|-------------|----------------------------------|----------------------------------|------------------|-------------------|---------|
| Experiment | | Mean | 85.3486 | 4.24079 | |
| | 95% Confidence Interval for Mean | Lower Bound | 75.3208 | | |
| | | Upper Bound | 95.3765 | | |
| | | 5% Trimmed Mean | 85.5726 | | |
| | | Median | 87.4224 | | |
| | | Variance | 143.874 | | |
| | | Std. Deviation | 11.99476 | | |
| | | Minimum | 66.67 | | |
| | | Maximum | 100.00 | | |
| | | Range | 33.33 | | |
| | | Interquartile Range | 21.93 | | |
| | | Skewness | -.416 | .752 | |
| | | Kurtosis | -1.253 | 1.481 | |
| | Control | | Mean | 38.7484 | 3.82730 |
| | | 95% Confidence Interval for Mean | Lower Bound | 28.9100 | |
| Upper Bound | | | 48.5868 | | |
| | | 5% Trimmed Mean | 38.8140 | | |
| | | Median | 38.8095 | | |
| | | Variance | 87.889 | | |
| | | Std. Deviation | 9.37493 | | |
| | | Minimum | 26.32 | | |
| | | Maximum | 50.00 | | |
| | | Range | 23.68 | | |
| | | Interquartile Range | 19.00 | | |
| | | Skewness | -.093 | .845 | |
| | | Kurtosis | -1.559 | 1.741 | |

Based on the N-Gain Score test calculations, the results indicate that the average N-Gain score for the experimental class (using the Problem-Based Learning method) is 85.3486 or 85.3%, which falls into the effective category. Since this value is ≥ 0.70 , it is classified as high. The N-Gain score in the control class is lower than that in the experimental class. The difference in N-Gain scores between the control and experimental classes demonstrates a positive change in the experimental class compared to the control class when using the Problem-Based Learning method. The learning process in each class, which employs different teaching methods, significantly influences student characteristics. The teaching method used in the experimental class makes a substantial contribution to increasing students' interest, motivation, and learning outcomes.

This can be seen in Table 4, where the standard deviation in the experimental class is 11.99476 with an interquartile range of 21.93. Meanwhile, in the control class, the standard deviation is around 9.37493 with an interquartile range of 19. This indicates that the effectiveness of the Problem-Based

Learning method in relation to the characteristics of island students is high. In contrast, the average N-Gain score for the control class is 38.7484 or 38.7%, which falls into the ineffective category. Therefore, it can be concluded that the use of the Problem-Based Learning method is highly effective for island students' characteristics, whereas conventional methods are ineffective for the same group.

The implementation of learning activities is expected to produce good learning outcomes. Achieving good learning outcomes depends on selecting appropriate methods tailored to the subject matter and the diverse characteristics of students. One such method is Problem-Based Learning. The application of this method aims to train students in teamwork. According to most students, during the learning process using the Problem-Based Learning method, they are confronted with real-life problems, allowing them to construct and develop their own knowledge, cultivate higher-order thinking skills, become independent in solving problems, and boost their self-confidence. Students learn to solve problems by applying their existing knowledge or seeking out the necessary knowledge.

Throughout the learning activities, students are grouped into small teams, fostering motivation to develop teamwork skills. This method requires students to be actively engaged. They integrate knowledge and skills simultaneously and apply them in relevant contexts. Everything students do aligns with real-world situations in their environment, enabling them to encounter and address conceptual and theoretical challenges during the learning process. This result is also shown in the following figure:

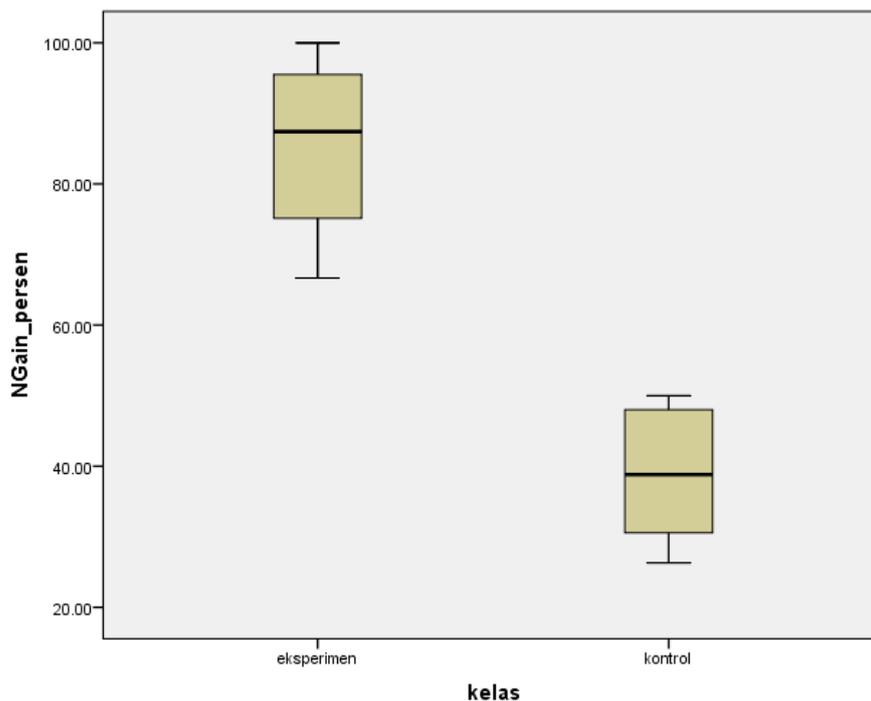


Figure 1. Experiment and Control Group

This study indicates that the Problem-Based Learning (PBL) method has an impact on the characteristics of island students. The research findings show that implementing the PBL method is more effective than conventional methods. This method utilizes relevant problems in the learning process, requiring students to identify problems, collect and analyze data, solve the issues they face, and think independently.

According to Riyanto et al. (2023), the Problem-Based Learning method is specifically designed to help students develop critical thinking and problem-solving skills, stimulating their active engagement in the learning process. PBL enables students to better understand the subject matter, as it consistently motivates them to read and explore materials, thereby enhancing their knowledge. Additionally, it serves as a tool for self-assessment and learning evaluation. This method is also relevant to various student characteristics, as the learning approach must be adapted to the subject matter and student background, particularly in this case, students from Karampuang Island.

According to Adawiyah et al. (2023), four factors must be considered in analyzing student characteristics: general characteristics, initial competencies and abilities, learning styles, and motivation. Therefore, the key indicators of student characteristics in this study are examined from cultural aspects, social status, interests, motivation, and cognitive development. Based on the test results, the effectiveness of the Problem-Based Learning method in relation to the characteristics of island students is evident.

These findings also align with the study conducted by Marcinauskas et al. (2024), titled "*Problem-Based Learning versus Traditional Learning in Physics Education for Engineering Program Students.*" The study found that implementing the PBL method enhances teamwork, presentation, and critical thinking skills in physics. However, the Traditional Learning (TL) method improves individual learning skills and provides a broader theoretical understanding of physics, making it more suitable when exams consist only of closed-ended questions. The study presents data from 460 first-year engineering students enrolled in a physics course at Kaunas University of Technology. The information presented in this research is based on insights, observations, and the individual experiences of the authors as teaching staff.

This study has several limitations that should be acknowledged. First, the small sample size of only 14 students limits the generalizability of the findings to a broader population of island-based students. Future studies should consider larger sample sizes to enhance the reliability of the results. Additionally, the use of purposive sampling restricts the ability to generalize findings beyond the specific characteristics of the selected students. A randomized sampling method could provide more representative data. Furthermore, this study only measured the immediate impact of the Problem-Based Learning (PBL) method on student characteristics, without assessing its long-term effects. Longitudinal studies are needed to determine whether the observed improvements persist over time. Moreover, the study focused primarily on student characteristics and learning outcomes using the N-Gain score, without considering other important factors such as collaboration skills, problem-solving abilities, and long-term retention. Lastly, the effectiveness of the PBL method may have been influenced by the instructor's delivery and experience, introducing potential bias. Future research should control for teacher-related variables to ensure consistent implementation of the method. Addressing these limitations in future studies can provide a more comprehensive understanding of PBL's impact on island-based students.

CONCLUSION

This study found that the Problem-Based Learning (PBL) method significantly influences the characteristics of island-based students. This is evidenced by the average N-Gain score for the experimental class (using the Problem-Based Learning method), which reached 85.3%, categorized

as effective. Since this value is ≥ 0.70 , it falls within the high category. This indicates that the effectiveness of using the Problem-Based Learning method on the characteristics of island-based students is high. In contrast, the average N-Gain score for the control class was 38.7%, which is categorized as ineffective. Conventional teaching methods are therefore not recommended for use.

The findings of this study highlight the importance of tailoring teaching methods to student characteristics, particularly for island-based students. The high effectiveness of the Problem-Based Learning (PBL) method suggests that active, student-centered learning approaches significantly enhance student engagement, motivation, and cognitive development. Given the unique cultural and social background of island students, educators should consider integrating PBL or similar interactive strategies to foster a more effective learning environment. Additionally, the significant difference in learning outcomes between the experimental and control groups underscores the need for a shift from conventional teaching methods to more engaging pedagogical approaches. Institutions should provide training and resources for lecturers to implement PBL effectively, ensuring that students receive an education aligned with their needs. Future research should explore the long-term impact of PBL on island students' academic performance and skill development, as well as investigate other innovative teaching methods suited to diverse learning environments. By doing so, educators can create more inclusive and effective learning experiences, ultimately improving educational quality for underrepresented student populations.

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