E-ISSN: 2798-0472 DOI: 10.52562/biochephy.v5i1.1635

BIOCHEPHY: Journal of Science Education

http://journal.moripublishing.com/index.php/biochephy

CORRELATION BETWEEN PROJECT-BASED LEARNING ACTIVITIES AND STUDENTS' ATTITUDES TOWARDS THE SUBJECT OF MATTER AND ENERGY

Rifda Nur Hikmahwati Arif
Universitas Negeri Makassar, Indonesia
*Corresponding author: rifdanha@unm.ac.id

Abstract: This study aims to determine the correlation between project-based learning activities and students' attitudes in the subject of matter and energy. This study is a descriptive correlative study with a quantitative approach. The population of the study was all students of the subject of matter and energy in the even semester of the 2024/2025 academic year in the Science Education Study Program, FMIPA UNM. The sampling technique used was saturated sampling. The data collection technique was carried out using an observation sheet of project-based learning activities and student attitudes that had been tested for validity and reliability. The data analysis technique used descriptive statistics and inferential statistics to determine the correlation between student activities and attitudes in the subject of matter and energy. The results of the study showed that: 1) The level of project-based learning activities of Regular A class students was 78.04 in the high category, Regular B class was 75.05 in the high category, and ICP class was 78.13 in the high category. 2) The attitude level of Regular A class students is 73.28 in the high category, Regular B class is 75.14 in the high category, and ICP class is 75.00 in the high category. 3) There is a very strong and significant correlation between project-based learning activities and student attitudes in the three classes studied (correlation coefficient > 0.81). This study confirms that increasing activity in project-based learning has a positive effect on the formation of student attitudes that support the learning process.

Keywords: PjBL Activities, Student Attitudes, Substances and Energy.

***Abstrak**: Penelitian ini bertujuan untuk mengetahui hubungan antara aktivitas pembelajaran berbasis proyek dengan sikap siswa pada pokok bahasan materi dan energi. Penelitian ini merupakan penelitian deskriptif korelatif dengan pendekatan kuantitatif. Populasi penelitian adalah seluruh siswa mata pelajaran materi dan energi semester genap tahun ajaran 2024/2025 pada Program Studi Pendidikan IPA FMIPA UNM. Teknik pengambilan sampel yang digunakan adalah sampling jenuh. Teknik pengumpulan data dilakukan dengan menggunakan lembar observasi aktivitas pembelajaran berbasis proyek dan sikap siswa yang telah diuji validitas dan reliabilitasnya. Teknik analisis data menggunakan statistik deskriptif dan statistik inferensial untuk mengetahui hubungan antara aktivitas dan sikap siswa pada pokok bahasan materi dan energi. Hasil penelitian menunjukkan bahwa: 1) Tingkat aktivitas pembelajaran berbasis proyek siswa kelas Reguler A sebesar 78,04 dengan kategori tinggi, kelas Reguler B sebesar 75,05 dengan kategori tinggi, dan kelas ICP sebesar 78,13 dengan kategori tinggi. 2) Tingkat sikap siswa kelas Reguler A sebesar 73,28 termasuk dalam kategori tinggi, kelas Reguler B sebesar 75,14 termasuk dalam kategori tinggi, dan kelas ICP sebesar 75,00 termasuk dalam kategori tinggi. 3) Terdapat korelasi yang sangat kuat dan signifikan antara aktivitas pembelajaran berbasis proyek dengan sikap siswa di ketiga kelas yang diteliti (koefisien korelasi > 0,81). Penelitian ini menegaskan bahwa peningkatan aktivitas dalam pembelajaran berbasis proyek berpengaruh positif terhadap pembentukan sikap siswa yang mendukung proses pembelajaran.*

***Kata Kunci**: Aktifitas PjBL, sikap siswa, materi dan energi*

INTRODUCTION

The project-based learning approach has become a relevant strategy in science education, especially to increase student engagement in the learning process. Through applicative activities, students are not only required to understand the theory, but also to apply it in real situations that are close to conditions in the world of work. This model is designed to foster critical thinking skills, teamwork, and student creativity (Fatmala & Atmojo, 2024).

In the Matter and Energy course, the implementation of real projects allows students to bridge conceptual understanding with directly observable practices, thus creating a meaningful learning experience. In addition to cognitive aspects, affective dimensions such as students' learning attitudes also play a major role in the success of lectures. Attitudes reflect interests, motivations, and tendencies to act that can affect academic achievement (Manurung, 2017).

Several previous studies have highlighted that activities in project learning can foster positive attitudes, such as a sense of responsibility, self-confidence, and interest in the material (Ismail & Muis, 2019). However, studies that explicitly analyze the relationship between the intensity of involvement in projects and learning attitudes are still limited, especially in the context of the topic of Matter and Energy. Therefore, this study seeks to explore the extent to which project-based activities correlate with student attitudes, which can ultimately form the basis for developing more adaptive and long-term impactful learning strategies.

RESEARCH METHODS

This study uses a quantitative approach with a correlational design to determine the relationship between project-based learning activities and students' attitudes in the subject of matter and energy. The population in this study were all students taking the subject of matter and energy in the even semester of the 2024/2025 academic year in the Science Education study program, FMIPA UNM. The sample was taken using a saturated sampling technique.

Data on project-based learning activities and attitudes were collected through assessment sheets designed to measure student activities during learning. The assessment sheet instrument was first tested for validity and reliability to ensure the accuracy of the data obtained. Data analysis was carried out using descriptive statistics to describe the profile of student activities and learning outcomes. Furthermore, a correlation test was carried out using the Pearson coefficient to determine the level of relationship between project-based learning activities and student learning outcomes. This analysis is also complemented by a significance test to ensure whether the correlation found has a statistically significant value. All data analysis processes were carried out using the latest version of SPSS statistical software.

1) Learning Activities and Student Attitudes

The categories of project-based learning activities and student attitudes can be seen in the table below.

Category	Score Range
Very High	85 - 100
High	70 - 84
Moderate	55 - 69
Low	40 - 54
Very Low	0 - 39

2) Pearson Correlation

The Pearson correlation categories can be seen in the following table.

Pearson Correlation	Category
0,00 – 0,19	Very Weak
0,20 – 0,39	Weak
0,40 – 0,59	Moderate
0,60 – 0,79	Strong
0,80 – 1,00	Very Strong

RESULT AND DISCUSSION

1) Project-based Learning Activities

Table 1. Project-Based Learning Activities

Class	Number of Samples	Minimum	Maximum	Mean	Standard Deviation
Regular A	34	60.00	83.33	78.04	5.35
Regular B	30	56.67	80.00	75.05	3.97
ICP	34	60.00	81.67	78.13	3.84

Based on data on student project activities in the subject of matter and energy in three classes, the average score of student project activities in Regular A class is 78.04, Regular B class is 75.05, and ICP class is 78.13. Referring to the applicable value range category, the average value of the three classes is in the high category, which is between 70 and 84. The minimum value of project activities in Regular A and ICP classes is 60.00, while in Regular B class it is 56.67, which is included in the sufficient category (55–69). The maximum value of project activities for each class is in the range of 80 to 83.33, which is also included in the high category. The lowest standard deviation of project activity values is in the ICP class at 3.84, while Regular A class has the highest standard deviation at 5.35, indicating variations in project activities between students in each class.

Student project activity data in the subject of matter and energy shows that the average project activity score is in the range of 75 to 78, which is included in the high category. This indicates that students are generally quite active and participate optimally in carrying out project activities. The highest average score is in the ICP class with a score of 78.13, followed by Regular A class (78.04), and Regular B class which is slightly lower (75.05). The relatively small standard deviation in each class, which is between 3.84 and 5.35, indicates good consistency in student involvement in the project activity.

This high project activity is very important in the context of project-based learning (PjBL) because active student involvement in the project can improve conceptual understanding, critical thinking skills, and collaboration skills. PjBL provides opportunities for students to learn directly through practical experiences, thus encouraging them to take an active role in the learning process (Bell, 2010). This is in line with the research results of Fatmala and Atmojo (2024) which show that the implementation of the PjBL model can significantly increase student activity and activeness.

The difference in minimum scores between classes, namely 56.67 in Regular B class and 60.00 in Regular A and ICP classes, still shows that some students have sufficient involvement, but not optimally. Factors such as learning motivation, time management, and learning environment support can affect the level of student activity in projects (Ryan and Deci, 2017). Therefore, it is important for lecturers to provide adequate guidance, motivation, and facilitation so that all students can increase their participation and consistency in project activities.

Overall, these results confirm that project-based learning is an effective strategy to increase student involvement in academic activities, especially in the subject of matter and energy. With high activity, it is hoped that students will not only gain theoretical knowledge, but also develop practical skills and positive attitudes that support the lifelong learning process (Ismail & Muis, 2019).

2) Student Attitude

Table 2. Student Attitude

Class	Number of Samples	Minimum	Maximum	Mean	Standard Deviation
Regular A	34	0	83.33	73.28	18.94
Regular B	30	0	83.33	75.14	14.45
ICP	34	0	83.33	75.00	13.72

Data on students' attitude scores in the subject of matter and energy in three classes show that the average attitude score in Regular class A is 73.28, Regular class B is 75.14, and ICP class is 75.00. The minimum project activity score in all classes is recorded as 0, while the maximum score

is the same at 83.33. The largest standard deviation is in Regular class A, which is 18.94, followed by Regular class B 14.45, and ICP class 13.72. This shows that there is quite a wide variation in the level of student involvement in project activities in the three classes. The data shows that the average attitude scores of students in the three classes, namely Regular A, Regular B, and ICP, are 73.28; 75.14; and 75.00, respectively. This range of scores shows that students' attitudes are generally in the high category, indicating that the majority of students have a positive attitude towards the subject of matter and energy. This positive attitude is very important because it plays a role in supporting the success of the learning process and improving learning outcomes (Marissa, 2022).

However, a minimum value of 0 in all classes indicates that there are students who have very low or less positive attitudes towards learning. This is an important concern because negative or low attitudes towards learning can affect student motivation and participation in academic activities (Willingham, 2016). Therefore, special efforts are needed to facilitate these students so that they can develop better attitudes through a more personal and interactive learning approach.

The fairly high standard deviation, especially in Regular A class with a value of 18.94, indicates that there is quite a large variation in student attitudes in that class. This variation shows that although most students have positive attitudes, there are groups of students with attitudes that vary from very positive to less good. Better attitude consistency is seen in ICP and Regular B classes with lower standard deviations, namely 13.72 and 14.45, which indicate that student attitudes in that class are relatively more homogeneous.

Students' positive attitudes towards learning not only affect the affective aspect, but are also closely related to the cognitive and conative aspects that support active involvement in project-based learning (Fredricks, Blumenfeld, & Paris, 2004). Research by Fatmala and Atmojo (2024) and Ismail and Muis (2019) also emphasized that project-based learning can form positive attitudes and characters that support the learning process as a whole. Thus, lecturers and education managers need to continue to evaluate and provide guidance to maintain and improve positive attitudes of students, especially those who currently still show less than optimal attitudes. Strengthening motivation and increasing interaction in learning can be important strategies to improve and enhance the quality of student attitudes as a whole.

3) Correlation between Project-based Learning Activities and Student Attitudes

Table 3. Correlation between Project-based Learning Activities and Student Attitudes

Class	Pearson Correlation	Category
Regular A	0.818	Very Strong
Regular B	0.837	Very Strong
ICP	0.814	Very Strong

Based on the Pearson correlation analysis between project-based learning activities and students' attitudes in the subject of matter and energy, a very strong correlation value was obtained in the three classes studied. The correlation value in Regular class A was 0.818, Regular class B was 0.837, and ICP class was 0.814. All three values are in the very strong category, indicating a very significant positive relationship between students' project activities and their attitudes in participating in learning.

A very strong correlation value indicates that the higher the students' activity in carrying out projects in the subject of matter and energy, the more positive the attitudes they show towards the learning. These results are in accordance with the theory stating that active involvement in learning activities can form positive attitudes that support the learning process (Ryan and Deci, 2017). Intensive activities in learning projects not only deepen cognitive understanding, but also affect students' affective and conative aspects, such as a sense of responsibility, motivation, and enthusiasm for learning (Fredricks, Blumenfeld, & Paris, 2004).

Previous research also supports these findings. For example, Fatmala and Atmojo (2024) found that the implementation of project-based learning can increase student engagement and

positive attitudes. In addition, Ismail and Muis (2019) stated that project-based learning is effective in developing student character which has an impact on increasing motivation and learning attitudes. With this very strong correlation, it can be concluded that project activities are not only complementary aspects, but also the main component that contributes greatly to the formation of positive student attitudes. Therefore, lecturers and study program managers are advised to continue to optimize project-based learning methods in order to simultaneously increase student engagement and attitudes.

CONCLUSION

Based on result and discussions, the level of project-based learning activities of Regular A class students is 78.04 in the high category, Regular B class is 75.05 in the high category, and ICP class is 78.13 in the high category. The level of attitude of Regular A class students is 73.28 in the high category, Regular B class is 75.14 in the high category, and ICP class is 75.00 in the high category. There is a very significant and very strong correlation between project-based learning activities and student learning outcomes in the subject of matter and energy. The Pearson correlation coefficient obtained above 0.81 in all three classes shows a close positive relationship between student project activities and learning outcomes. This confirms that increasing activity in project-based learning has a significant effect on improving student learning outcomes.

REFERENCES

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83(2), 39–43.

Fatmala, A. D. E., & Atmojo, S. E. (2024). Efektivitas penggunaan model project based learning (PjBL) dalam meningkatkan pemahaman materi IPAS kelas IV SD Kraptak Wetan. *Elementary Pedagogia, 1*(3), 27–35.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109.

Ismail, & Muis, A. (2019). Pembelajaran berbasis proyek untuk mengembangkan karakter mahasiswa. *Prosiding Seminar Nasional LP2M UNM 2019*, "Peran Penelitian dalam Menunjang Percepatan Pembangunan Berkelanjutan di Indonesia." ISBN 978-623-7496-14-4.

Manurung, T. M. S. (2017). Pengaruh motivasi dan perilaku belajar terhadap prestasi akademik mahasiswa. *Jurnal Analisis Sistem Pendidikan Tinggi*, 1(1), 17–26.

Marissa, N. (2022). Pengaruh sikap belajar siswa terhadap prestasi belajar geografi siswa. *Meretas: Jurnal Ilmu Pendidikan, 9*(1), 32–45.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* The Guilford Press.

Schunk, D. H. (2012). *Learning theories: An educational perspective* (6th ed.). Pearson.

Willingham, D. T. (2016). *Why don't students like school? A cognitive scientist answers questions about how the mind works and what it means for the classroom*. Jossey-Bass.