

## **EFFECT OF PROJECT BASED LEARNING MODEL (PjBL) ON STUDENT LEARNING RESULTS ON THE MATTER OF DIVERSITY OF HABITATIVES**

**Nirmala Hasty<sup>1\*</sup>, Amrizal<sup>2</sup>**

<sup>1,2</sup> *Biology Education (Biology, Faculty of Mathematics and Natural Sciences, Medan State University, Indonesia)*

\*Corresponding Author: [nirmalahasty100@gmail.com](mailto:nirmalahasty100@gmail.com)

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### **ABSTRACT**

This study aims to determine the effect of the Project Based Learning Model on student learning outcomes in ecosystem material in class X IPA SMA Negeri 2 Percut Sei Tuan in the academic year of 2024/2025. The population in this study were all students of class X IPA SMA Negeri 2 Percut Sei Tuan consisting of 9 classes. The sample in this study was 2 classes which were categorized as experimental classes and control classes. The type of research used was Quasi Experiment, the method used in this study was Pre-Experiment, with a Non-equivalent Control Group Design design. The sample used consisted of two classes totaling 60 students who were taken by purposive sampling. The data collection technique used pretest and posttest questions. Based on the data obtained and the data analysis that had been carried out, the value of students' cognitive learning outcomes was obtained. The average pre-test value for the experimental class was 49.167 and the average pre-test value for the control class was 46.833. Furthermore, after being given model treatment in each class, a post-test was given again with the same questions as the pre-test questions, so that the average post-test score for the experimental class was 86.667 and the average score for the control class was 79.5. The data obtained showed that the average score of the experimental class learning outcome test was higher than that of the control class. Then the homogeneity test was conducted and obtained for the Fcount value for the pre-test value is 1.408 and for the Fcount value of the post-test value is 1.520 with the Ftable value of 1.860 with a significance level of 0.05. This shows that Fcount < Ftable, so that the pre-test and post-test data for both classes are said to be homogeneous. Furthermore, for the results of the hypothesis test, the tcount value is 6.2890 and for the ttable value with a significance level of 0.05 is 2.0017. Where tcount is greater than the ttable value ( $tcount > ttable$ ) which is  $6.2890 > 2.0017$ , this shows that  $H_0$  is rejected and  $H_a$  is accepted, which means that there is an influence of the project based learning model on student learning outcomes in ecosystem material.

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## INTRODUCTION

Education is one form of manifestation of dynamic human culture. In Indonesia, education aims to convey knowledge to students and improve the quality of students to become creative, skilled and professional human beings. According to Wahyudin (2023), education is a conscious effort to create a learning atmosphere and a continuous learning process to have personality and self-control. In addition, Salsabilah (2021) said that education functions to develop the potential of students to become human beings who believe in God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent and become democratic and responsible citizens. In the world of education there are terms learning and learning that cannot be separated. Learning refers to what the subject must do in learning, while learning refers to the teacher who will guide the subject (Susanti, 2020).

In learning and learning there is interaction between teachers and students (Taufik, 2020). According to Elvira (2021), learning and studying are the main activities in education that are carried out consciously and in a planned manner to create a learning atmosphere so that students can actively develop their abilities, are able to have self-control and have good skills for the students themselves. The problem in learning is that students are unable to manage their cognitive abilities and skills. This can happen because classroom conditions cannot encourage students to improve their cognitive abilities and skills. In the teaching and learning process, teachers must adjust the learning model that will be used with the conditions of the classroom and the students in the room. use of a one-way learning model.

Based on initial observations conducted by interviewing one of the teachers at SMA Negeri 2 Percut Sei Tuan, it is known that the learning model used in the classroom is the lecture learning model. This model is considered less effective by teachers because the implementation of this learning model makes students less active and creative so that learning becomes teacher-centered. Usually in class the teacher provides the material to be studied,

students are assigned to take notes and then there will be a simple discussion such as questions and answers. In addition, it is known that teachers have never used the project based learning model. In addition, it is also known that the minimum completeness in class X IPA is 73, and the student achievement value is still relatively low with a percentage of 47% of students achieving KKM, 13 students achieving KKM and 16 students not achieving KKM. Although the lecture learning model is easy to do and not too bad to use in the learning process in the classroom. However, this learning model does not involve participants actively, where students only play a monotonous role and complete tasks without being given the opportunity to complete or solve problems in scientific learning and this causes students to be less interested or less enthusiastic in participating in learning (Latifah et al., 2023).

This makes student learning outcomes less than satisfactory, especially in ecosystem material. Ecosystem material is part of biology material that is closely related and can be directly connected to everyday life. Problems in learning outcomes in class X IPA SMA Negeri 2 Percut need improvements that can improve learning outcomes by using innovative learning models. One learning model that involves students can play an active role so that a good classroom atmosphere is created by using a learning model. Project-based learning is an innovative learning model or approach, which emphasizes contextual learning through complex activities (Mukhsinah, 2023). This encourages students to work together cooperatively in solving problems that are not well structured (Rineksiane, 2022).

## METHODS

This study employed a quantitative method with a quasi-experimental design, specifically the non-equivalent control group design. The research subjects were 10th-grade science students of SMA Negeri 2 Percut Sei Tuan in the 2024/2025 academic year. The sample was selected using purposive sampling, consisting of class X IPA B (experimental group, 28 students) and class X IPA A (control group, 29 students).

The research instrument was a multiple-choice test administered as both a pretest and posttest. The experimental group received treatment using the Project Based Learning model, while the control group received conventional instruction without specific treatment. Data were analyzed using an independent sample t-test to determine the effect of the learning model on student achievement.

## RESULTS AND DISCUSSION

This research was conducted at SMA Negeri 2 Percut Sei Tuan during the 2024/2025 academic year, involving two classes: one experimental and one control class. Class X IPA-1, taught using the project-based learning model, served as the experimental class, while X IPA-2, taught using the direct learning model, served as the control class. Both classes studied the same material, which was the ecosystem topic.

### Student Learning Outcomes

The students' cognitive learning outcomes were measured using multiple-choice tests. Of the 50 items developed and tested, 20 valid items were used as instruments. The results showed that before treatment (pre-test), both classes had similar average scores (experimental: 49.17, control: 46.83), indicating no significant difference. After treatment (post-test), the experimental class scored an average of 86.67, while the control class scored 79.67, indicating a higher improvement in the experimental class.

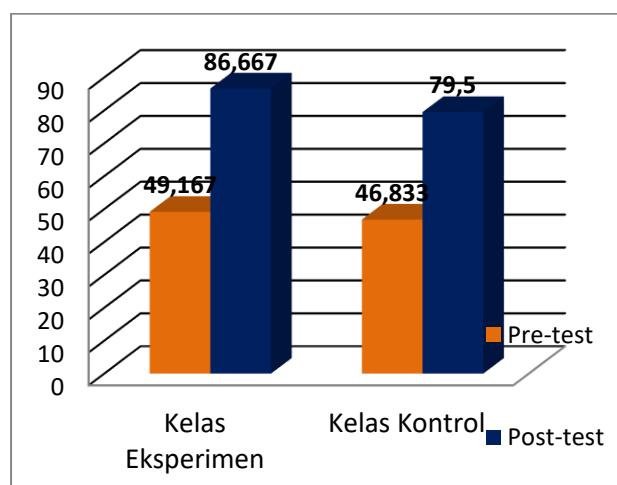


Figure 1. Diagram of Pre-test and Post-test Average Values

### Data Analysis

Normality testing using the Liliefors method confirmed that both pre-test and post-test scores were normally distributed. Homogeneity testing also showed that the data had equal variance. Hypothesis testing using t-tests revealed no significant difference in pre-test scores between groups, but a significant difference in post-test scores ( $t_{count} = 3.807 > t_{table} = 2.007$ ), indicating that project-based learning had a significant positive effect on student learning outcomes.

### Discussion

The results confirm that students taught using project-based learning showed higher improvement in understanding ecosystems than those taught using direct learning. The significant increase in the experimental group's post-test scores supports the effectiveness of project-based learning in enhancing cognitive performance.

The findings of this study demonstrate that the project-based learning (PjBL) model has a significant effect on students' cognitive learning outcomes, especially in the topic of ecosystems. Students in the experimental class who were taught using the PjBL model showed higher average post-test scores compared to those in the control class who were taught using the direct instruction model. This suggests that learning through projects helps students understand and retain concepts more effectively.

One reason for the better performance of the experimental class is that project-based learning encourages students to be more active in the learning process. Instead of just receiving information, students are required to explore, investigate, and apply knowledge through hands-on projects. This learning process builds critical thinking skills, fosters collaboration, and enhances creativity—all of which contribute to better comprehension and memory retention.

In contrast, students in the control class followed a direct learning approach, where information is mainly delivered through lectures. Although this method can be effective in delivering content quickly, it tends to make students more passive. As a result, their level of engagement and deep understanding may be

lower than those who participate in project-based tasks. This could explain the lower improvement in their post-test scores.

The results of the normality and homogeneity tests further strengthen the validity of the findings. Both groups started from relatively equal conditions, as indicated by their similar pre-test scores and the results of the normality and homogeneity tests. This supports the conclusion that the observed differences in learning outcomes were due to the treatment, not to chance or pre-existing differences between the groups.

Hypothesis testing also confirms the significant impact of the PjBL model. The post-test score analysis revealed a t-count higher than the t-table, which statistically proves that the learning model significantly affected the outcome. This aligns with previous research showing that PjBL improves student motivation and performance by involving them in meaningful and contextual tasks.

Moreover, project-based learning allows students to develop soft skills such as communication, collaboration, and problem-solving. In this study, the students in the experimental class worked together in groups to complete their projects. This not only enhanced their understanding of the material but also trained them to work as a team and express their ideas clearly. These skills are essential for their future education and career.

In conclusion, the project-based learning model provides a more student-centered and interactive learning environment, which positively influences students' cognitive outcomes. By giving students the opportunity to engage in real-life projects, they are more likely to internalize the knowledge and develop a deeper understanding. Therefore, the implementation of PjBL, particularly in biology subjects like ecosystems, is highly recommended to improve both academic achievement and student engagement.

## CONCLUSION

Based on the results of the research and the data obtained, the following conclusions can be drawn: Students' cognitive biology learning outcomes using the project-based learning

model on the ecosystem topic at SMA Negeri 2 Percut Sei Tuan in the academic year 2024/2025 obtained an average post-test score of 86.667.

Students' cognitive biology learning outcomes using the direct instruction model on the ecosystem topic at SMA Negeri 2 Percut Sei Tuan in the academic year 2024/2025 obtained an average post-test score of 79.667.

There is an effect of the project-based learning model on students' biology learning outcomes in the ecosystem topic at SMA Negeri 2 Percut Sei Tuan in the academic year 2024/2025. This is shown by the results of the hypothesis test, where the calculated t-value ( $t_{\text{count}} = 6.2890$ ) is greater than the critical t-value ( $t_{\text{table}} = 2.0017$ ), which means that the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_1$ ) is accepted.

## REFERENCES

Al-Tabany, T. I. B. (2017). *Mendesain Model Pembelajaran Inovatif, Progresif, Dan Kontekstual*. Prenada Media.

Amatulloh, F. W., & Kanda, A. S. (2024). Pengaruh El Nino terhadap Ekosistem dan Ketahanan Pangan Masyarakat Sekitar,(Studi Kasus Wilayah Margacinta Kec. Cijaura Bandung Jawa Barat). *Neraca: Jurnal Ekonomi, Manajemen dan Akuntansi*, 2(2), 386-401.

Amrizal. (2021). Meningkatkan Hasil Belajar IPA materi Lingkungan Hidup Melalui Metode *Examples Non Examples* Pada Siswa Kelas X IPA 1 SMA Negeri 9 Pekanbaru Tahun Ajaran 2018. *Jurnal Guru Kita*. Vol5(3).

Anggraini, P. D., & Wulandari, S. S. (2021). Analisis penggunaan model pembelajaran project based learning dalam peningkatan keaktifan siswa. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, 9 (2), 292-299.

Arikunto, S. (2014). *Prosedur Penelitian*. Jakarta : Rineka Cipta.

Batubara, K. A. (2012). Membangun Kreativitas Pustakawan di Perpustakaan. *Jurnal Iqra'*, 6 (2).

Elvira, E. (2021). Faktor penyebab rendahnya kualitas pendidikan dan cara mengatasinya (studi pada: sekolah dasar di Desa Tonggolobibi). *Iqra: Jurnal Ilmu Kependidikan Dan Keislaman*, 16(2), 93-98.

Faizzah, F. (2023). Penerapan Pembelajaran Model Group Investigation Untuk Meningkatkan Hasil Belajar Siswa Mata Pelajaran Ilmu Pengetahuan Alam (Ipa) Materi Ekosistem Kelas VII. 2 Di Smp Negeri 8 Pekanbaru. *Diklat Review: Jurnal manajemen pendidikan dan pelatihan*, 7(2), 449-457.

Faizah, H., dan Kamal, R. (2024). Belajar Dan Pembelajaran. *Jurnal Basicedu*. Vol 8(1).

Farijan, A. (2019). Penerapan Model Pembelajaran Kooperatif Untuk Meningkatkan Keterampilan Proses Merencanakan Eksperimen Dan Hasil Belajar PKN Di SMK Negeri 1 Sakra. *Jurnal Pendidikan Dasar*. 3(1).

Harizah, D. T. D., Sumarmi, S., & Bachri, S. (2022). Pengaruh Model Pembelajaran Project Based Learning Terhadap Hasil Belajar Geografi Siswa SMAN 5 Pamekasan. *J- Pips (Jurnal Pendidikan Ilmu Pengetahuan Sosial)*, 8(2), 104–113.

Hamdayama, J. (2016). *Metodologi Penelitian*. Lampung Selatan: CV. Hira Tech.

Hartono, D. P., & Asiyah, S. (2019). PjBL untuk meningkatkan kreativitas mahasiswa: sebuah kajian deskriptif tentang peran model pembelajaran PjBL dalam meningkatkan kreativitas mahasiswa. *Jurnal Dosen Universitas PGRI Palembang*.

Hariyani, S., Masfufah., Wijayati, N. & Kurniawan. C. (2018). Improvement of metacognitive skills and students' reasoning ability through problem-based learning. *Journal of Physics: Conference Series*, 983(01): 1-5.

Hapudin, H. M. S. (2021). *Teori belajar dan pembelajaran: menciptakan pembelajaran yang kreatif dan efektif*. Prenada Media.

Huda, Khairol. (2020). *Modul Biologi*. Kementerian Dan Kebudayaan Direktorat Jendral Pendidikan Anak Usia Dini, Pendidikan Dasar dan Pendidikan Menengah Atas.

Jagantara, I. M. W., Adnyana, P. B., & Widiyanti, N. L. P. M. (2014). Pengaruh model pembelajaran berbasis proyek (Project Based Learning) terhadap hasil belajar biologi ditinjau dari gaya belajar siswa SMA. *Jurnal Pendidikan dan Pembelajaran IPA Indonesia*, 4(1).

Kemendikbud. (2014). *Materi Pelatihan Guru Implementasi Kurikulum 2013*. Jakarta: Kementerian Pendidikan dan Kebudayaan.

Kristanti, D. Y., Subiki., & Rif'ati, D. H. (2016). Model Pembelajaran Berbasis Proyek (Project Based Learning Model) Pada Pembelajaran Fisika Disma. *Jurnal Pembelajaran Fisika*. 5(2) : 112-128.

Latifah, N., Munandar, K., & Prasetyo, W. G. (2023). Peningkatan Minat Belajar Melalui Metode Role Playing berbasis PBL pada Kurikulum Merdeka. *Jurnal Bioshell*, 12(2), 91-102.

Mahmudi, I., Athoillah, M. Z., Wicaksono, E. B., & Kusuma, A. R. (2022). Taksonomi Hasil Belajar Menurut Benyamin S. Bloom. *Jurnal Multidisiplin Madani*, 2(9), 3507-3514.

Mayuni, K. R., Rati, N. W., & Mahadewi, L. P. P. (2019). Pengaruh Model Pembelajaran Project Based Learning (PjBL) Terhadap Hasil Belajar IPA. *Jurnal Ilmiah Pendidikan Profesi Guru*, 2(2), 183-193.

Mukhsinah, M., Akib, E., & Akhir, M. (2023). Pengaruh Model Pembelajaran Projek Based Learning Terhadap Kemampuan Dan Minat Menulis Bahasa Indonesia Kelas Iv. *Jurnal Pendidikan Glasser*, 7(1), 16-27.

Nababan, D., Marpaung, A. K., & Koresy, A. (2023). Strategi Pembelajaran Project Based Learning (PjBL). *Jurnal Pendidikan Sosial dan Humaniora*, 2(2), 706-719.

Nugraha, I. R. R., Supriadi, U., & Firmansyah, M. I. (2023). Efektivitas Strategi Pembelajaran Project Based Learning dalam Meningkatkan Kreativitas Siswa. *Jurnal Penelitian Dan Pendidikan IPS*, 17(1), 39-47.

Nuryadi, N., Astuti, T. D., Sri Utami, E., & Budiantara, M .(2017). Dasar-Dasar Statistik Penelitian. Yogyakarta: Sibuku Media.

Pane, A., & Muhammad, D. D. (2017). Belajar dan Pembelajaran. *Jurnal Kajian Ilmu-Ilmu Keislaman*. 3(2) :333-353.

Rineksiane, N, P. (2022). Penerapan Metode Pembelajaran Project Based Learning untuk Membantu Siswa dalam Berpikir Kritis. *Jurnal Pendidikan Manajemen Perkantoran*. Vol 7(1).