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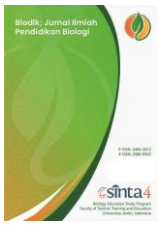

*Research Article*

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# Pembelajaran Berbasis Proyek Berbentuk Terarium Dalam Botani Tingkat Rendah: Persepsi Mahasiswa Pendidikan Biologi

## *(Project-Based Learning in the Form of a Terrarium in Lower Botany: Perceptions of Biology Education Students)*

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**ABSTRACT**

*Lower-level botany learning has been carried out using conventional lecture methods. Learning becomes less meaningful for students because students tend to be passive. The purpose of this study was to see how students perceive the application of the project-based learning (PjBL) model in lower-level botany courses. This research was conducted using a quantitative research model with a survey method. Data collection was carried out by giving questionnaires to students. As many as 85.7% of students stated that they felt that their understanding of lower-level botany had improved and 80% expressed interest in lower-level botany learning with PjBl. As many as 82.9% stated that they were able to design a terrarium well and 85.7% were able to state that PjBl helped them identify the morphology of cryptogamae. As many as 74.3% of students stated that they were motivated by group cooperation and 71.4% of them were able to link theory and practice. The final result was that 88.6% of students felt that this learning method improved their understanding of cryptogamae. Overall, low-level botany learning with PjBL for biology education students at Mulawarman University can improve students' understanding and interest in low-level botany courses.*

***Key words: Project-Based Learning (PjBL), Lower-Level Botany, Terrarium, Student Perception***

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**ABSTRAK**

Pembelajaran botani tingkat rendah selama ini dilakukan dengan metode ceramah konvensional. Pembelajaran menjadi kurang bermakna pada mahasiswa karena mahasiswa cenderung pasif. Tujuan penelitian ini adalah untuk melihat bagaimana persepsi mahasiswa terhadap penerapan model project-based learning (PjBL) pada mata kuliah botani tingkat rendah. Penelitian ini dilakukan dengan model penelitian kuantitatif dengan metode survei. Pengumpulan data dilakukan dengan pemberian angket kepada mahasiswa. Sebanyak 85,7% mahasiswa menyatakan bahwa mereka merasa bahwa pemahaman mereka tentang botani tingkat rendah semakin membaik dan 80% menyatakan minat terhadap pembelajaran botani tingkat rendah dengan PjBl.

Sebanyak 82,9% menyatakan mampu merancang terarium dengan baik dan 85,7% mampu menyatakan PjBl membantu mereka mengidentifikasi morfologi cryptogamae. Sebanyak 74,3% mahasiswa menyatakan termotovasi kerjasama kelompok dan 71,4% dari mereka mampu mengaitkan teori dan praktik. Hasil terakhir yaitu 88,6% mahasiswa merasa metode pembelajaran ini meningkatkan pemahaman mereka dalam cryptogamae. Secara keseluruhan, pembelajaran botani tingkat rendah dengan PjBL pada mahasiswa pendidikan biologi Universitas Mulawarman dapat meningkatkan pemahaman dan minat mahasiswa terhadap mata kuliah botani tingkat rendah.

**Kata kunci: Project-Based Learning (PjBL), Botani Tingkat Rendah, Terarium, Persepsi Mahasiswa**

## INTRODUCTION

Effective learning strategies undoubtedly enhance students' comprehension, driven by the achievement of learning objectives in each session. The traditional teacher-centered approach is increasingly being replaced by a student-centered approach to meet these objectives. This shift aligns with the mandate of SN-DIKTI, which emphasizes education that fosters creativity, capacity, personality, and students' needs while promoting independence in seeking and acquiring knowledge (Nizam & Partiwi, 2023).

Lecturing, as one of the commonly used teaching methods in Indonesia, is favored by educators for its practicality and efficiency, particularly when dealing with large groups of students and extensive material. However, despite the use of audiovisual aids, this method often results in passive student engagement during the learning process. Consequently, the knowledge acquired by students tends to be short-lived and less meaningful (Prabowo et al., 2021).

Project-Based Learning (PjBL) is an instructional approach that involves students in projects aligned with the learning theme. This method is designed to enhance students' creativity by encouraging active participation in problem-solving and applying critical thinking to produce solutions or products that address specific issues (Kurniawati et al., 2022).

One subject particularly suitable for PjBL implementation is the lower-level botany course, which covers ferns (*Pteridophyta*) and mosses (*Bryophyta*). Appropriate projects for this course include the creation of herbaria and terraria. A terrarium is a model for planting in transparent containers, arranged aesthetically to resemble ornamental plants. In this context, ferns and mosses are placed in clear glass or plastic containers for educational, research, or decorative purposes (Yusniwati & Warnita, 2023).

As learners, students' perspectives on this approach are valuable. They can provide evaluations of the implementation of PjBL in the learning process. The purpose of this study is to investigate students' perceptions of the application of PjBL in lower-level botany courses. Data collection aims to serve as a basis for evaluating the implementation of PjBL in future botany courses.

## RESEARCH METHOD

This study was conducted using a quantitative research model with a survey method (Tanzeh & Arikunto, 2020). The data collection technique employed was purposive sampling, with the participants consisting of all 35 students from Class B of the Undergraduate Biology Education Program at Mulawarman University, cohort of 2023. The research was carried out over one week to prepare the materials and resources to be used during the terrarium-making activity. Observation was conducted within a single day, focusing on the group-based terrarium-making process, as well as the cohesion and discussions among participants during the activity. The activity began with the preparation of tools and materials, such as glass containers for the terrarium and tweezers for placing components like stones and plants. The teaching team proactively provided guidance and monitored the activity concurrently. Data collection was performed by administering a self-developed questionnaire to the students. The questionnaire included items addressing students' opinions on the learning process and the project undertaken. The questionnaire utilized a five-point Likert scale, which was subsequently analyzed using descriptive statistics. The Likert scale used in this study ranged from 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, to 5 = Strongly Agree.

## RESULT AND DISCUSSION

### Result

The learning activities went very well. Students are very enthusiastic about the process of making this terrarium. Some important incidents during the terrarium making process include participants bringing the wrong tools and materials and misrecognizing which plants are *cryptogamae* and which are not. The obstacles experienced can be solved immediately with the help of a team of lecturers as companions to ensure that the preparation before the activity is in optimal condition. The learning process of making terrarium is documented in Figure 1.

The survey was conducted with a student perception questionnaire after the learning process took place. This survey contains several important characteristics of students, namely deep understanding of concepts, high motivation and enthusiasm, observation and data analysis skills, collaboration and communication skills, reflective and critical attitudes, and student satisfaction and sense of success. The frequency and percentage data of each question are processed and presented in Table 1.

**Table 1.** Survey Results of the Implementation of PjBL for Making Terrarium in Students

| No. | Questionnaire Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | I understand the basic concepts of low-level botany better through the creation of a terrarium | 2,9 | 2,9 | 8,6 | 45,6 | 40,1 |
| 2 | Terrarium building project-based learning increased my interest in *cryptogamae* material | 2,9 | 5,7 | 11,4 | 51,3 | 28,7 |

| No. | Questionnaire Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 3 | I am able to plan and design a terrarium according to the correct ecosystem principles | 0 | 2,9 | 14,3 | 54,2 | 28,7 |
| 4 | Observations of *cryptogamae* in terrarium helped me identify the parts of the plant | 0 | 5,7 | 8,6 | 60,1 | 25,6 |
| 5 | I feel motivated to work with my group mates in the creation and maintenance of the terrarium | 2,9 | 5,7 | 17,1 | 48,7 | 25,6 |
| 6 | I can relate the low-level botanical theories learned in class to hands-on practice in terrarium making | 2,9 | 5,7 | 20 | 54,2 | 17,2 |
| 7 | Overall, I am satisfied with the terrarium project-based learning method in improving my understanding of botany | 0 | 2,9 | 8,6 | 40,1 | 48,5 |

**Figure 1.** Terrarium Making Process

## Discussion

An increase in understanding of learning concepts can occur when students are given PjBL learning. As many as 85.7% of students stated that they felt that their understanding of low-level botany was improved through the creation of terrariums. This is in accordance with research by Indah Yulaikah (2022) who stated that the value of understanding learning concepts carried out with PjBL will be higher than conventional learning with the lecture method. This increase is due to more meaningful learning for students so that the basic concepts provided tend to be easier to understand (Indah Yulaikah et al., 2022).

PjBL learning also increases motivation and interest in the material *Cryptogamae*. As many as 80% of students stated that this terrarium project increased their interest in the material *Cryptogamae*. This increase was triggered by how the terrarium was something new and exciting for them to create. In addition, the aesthetic value of the terrarium can also provide positive value both in motivation and in students' interest in learning (Wijaya et al., 2022).

Student skills are another aspect that can be seen after the terrarium making process is successful. As many as 82% of students stated that they were able to design a terrarium ecosystem according to scientific

principles. This data explains that students not only understand theory but can also realize it in the design of the terrace appearance. This positive influence will be obtained directly when students are faced with meaningful learning in the form of PjBL (Azzahra et al., 2023).

As a meaningful learning, PjBL can also increase cooperation, reflective attitudes, and criticism in students. It was recorded that 74.3% of students were motivated to cooperate in making and caring for terrariums. PjBL as one of the learning models applied in Indonesia provides opportunities for students to work together in a team to achieve common goals and higher work productivity (Pratiwi et al., 2018). This high productivity makes students more active, creative and innovative (Retno, 2022). A reflective and critical attitude is embodied in their way of relating the theoretical and practical concepts of terrarium-making. This method is able to awaken the ability of students to further analyze the research object (Awal et al., 2023).

At the end of the lesson, students expressed satisfaction with the overall application of PjBL in the process of making terrariums. As many as 88.6% of students expressed satisfaction with the learning process. This satisfaction is based on the attractiveness of the learning process based on the PjBL syntax (As'ari, 2023). The role of the lecturer team as a facilitator also increases student satisfaction. A teacher must be able to encourage intrinsic motivation of students in the form of attention, connectedness, confidence, and satisfaction for students through engaging and meaningful learning (Ainiyah et al., 2023).

## CONCLUSION

Overall, low-level botany learning for Biology Education students at Mulawarman University is effective in improving understanding of low-level botanical concepts, arousing interest in this material and training skills in the process of making terrarium media. These findings imply that the learning process using the PjBL learning model is a strategic step that can be applied in this course to improve learning outcomes and the quality of graduates. Based on this, the PjBL model is recommended to be used in similar courses in the Biology Education study program of Mulawarman University which has a practical component so that students get a similar experience and can increase student output.

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