ANP JOURNAL OF SOCIAL SCIENCES AND HUMANITIES VOL. 4 NO. 1 (2023) 75-80

ANP-JSSH
ISSN 2773-482X eISSN 2785-8863
DOI: https://doi.org/10.53797/anp.jssh.v4i1.10.2023

The Problem Based Learning Demonstration Model on Learning Outcomes in Class Iv Science Learning in School Negeri 3 Balong Jepara

Yudhistira, Axl

Faculty of Teacher Training and Education, Universitas Muria Kudus, Central Java, INDONESIA

*Corresponding Author Email: 202133054@std.umk.ac.id

Received: 16 April 2023; Revised: 7 May 2023; Accepted: 9 June 2023; Available Online: 30 June 2023

Abstract: Study This aim for know influence use of *the Problem Based Learning* model to results learning on learning student material photosynthesis in class IV SDN 3 Balong Jepara. Study This use type study quantitative. Research methods used in the research This is *Pre- Experimental Design* and with design *One Group Pretest-Posttest Design.* Research sites This will carried out in class IV of SDN 3 Balong Jepara. Population in study This is all over participant educate class IV SDN 3 Balong. Deep sample study This use One class that is participant educate class IV, totaling 18 participants educate. Deep data collection techniques study This that is form test. Data analysis carried out with using statistical tests parametric namely the Paired Sample T-test. Research result show that mark significance 0.061 < 0.05, which means H_o rejected. So that can conclude that There is influence use *Problem Based Learning* model to results learning on learning student material photosynthesis in class IV SDN 3 Balong Jepara.

Keywords: Problem Based Learning, Science, Photosynthesis

1. Introduction

Education is a deliberate and structured effort aimed at guiding individuals in developing their physical and spiritual potential through the care and support of adults. This guidance enables learners to become independent individuals capable of managing their lives effectively (Abdillah, 2019). Education is essential for human development and is a fundamental component in building quality human capital. According to the National Education System Law of Indonesia (Law No. 20 of 2003, Chapter 3), the primary goal of education is to cultivate learners into individuals who are faithful, devout to God Almighty, knowledgeable, independent, creative, capable, and responsible citizens.

Education is a universal human activity that cannot be separated from the processes of teaching and learning (Burgstahler et al., 2010). Learning can occur independently through students' initiatives, while teaching involves the systematic facilitation of learning by educators (Zainuddin et al., 2019). Learning itself is a cognitive and experiential process involving structured thinking, practice, and repetition with the goal of acquiring new knowledge, skills, attitudes, values, and behaviors (Sagor, 2010; Ahsanti et al., 2018). It is a conscious and purposeful activity that supports lifelong personal and academic development (Pane & Dasopang, 2017).

To optimize learning outcomes, educators must create learning environments that are conducive, engaging, and stimulating. A dynamic and well-managed classroom can motivate students and minimize boredom, thereby promoting deeper learning (Dörnyei et al., 2019). Learning, therefore, is not merely the transmission of content, but a professional and intentional process wherein teachers utilize pedagogical knowledge and strategies to achieve curriculum goals (Suardi, 2018). When students exhibit a lack of interest or disengagement during lessons, it often reflects ineffective instructional strategies and signals the need for innovative approaches to teaching and learning.

One key strategy to address such challenges is through the use of varied and suitable learning models. A learning model provides a conceptual and procedural framework for teachers to organize and deliver instruction effectively. It includes defined steps, structures, and culturally responsive methods that align with the learning objectives and student needs (Kolb et al., 2014). A well-designed learning model helps students understand subject matter more easily and prevents the learning process from becoming monotonous.

Learning models are essential in the teaching process for several reasons. They facilitate the achievement of intended learning outcomes, guide students through structured learning activities, encourage motivation and interest,

*Corresponding author: 202133054@std.umk.ac.id

prevent boredom, and allow students to experience diverse ways of learning (Asyafah, 2019). One such effective model is Problem-Based Learning (PBL), which fosters the development of critical thinking, collaboration, and problem-solving skills. PBL encourages students to explore real-world problems in small groups, promoting autonomy and meaningful engagement with content (Nisa & Rhosalina, 2020; Westberg et al., 2004).

To enhance the effectiveness of PBL, it can be integrated with the demonstration method, which involvesvisually presenting processes, phenomena, or skills using real or simulated objects. Demonstration allows students to observe and understand abstract concepts through concrete representation (Arubayi, 2015; Siregar, 2012; Kochhar, 1992). The integration of PBL with demonstration supports student engagement, increases analytical thinking, and provides hands-on learning opportunities, particularly in science education (Riswari et al., 2018).

Given that PBL is rooted in problem-solving, it encourages students to think critically and collaboratively. Suardana (2019) emphasizes that problem-solving not only enhances comprehension but also transforms the learning process into a meaningful experience. Educators who implement such innovative and student-centered models often report improvements in classroom dynamics and student performance.

Preliminary observations and interviews conducted at SD Negeri 3 Balong revealed several learning challenges in a Grade IV science class, particularly during the topic of photosynthesis. Students were often passive, disinterested, and disengaged, with many showing signs of boredom such as sleepiness, restlessness, and inattentiveness. Conversations often strayed from the lesson, and attention to instructional materials was minimal. Furthermore, many students scored below the Minimum Competency Criteria (KKM), indicating a need for pedagogical improvement (Münkel-Jiménez et al., 2020; Arçay & Akçay, 2016).

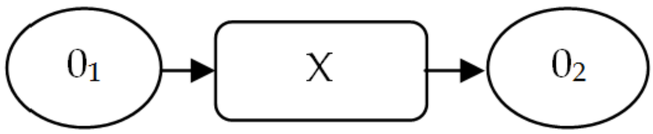
These conditions suggest the necessity of adopting a more interactive and student-friendly learning approach. The integration of the Problem-Based Learning model with the demonstration method is proposed as a viable solution to support students in better understanding scientific concepts, such as photosynthesis, in an engaging and effective manner. Based on these considerations, this study seeks to explore the impact of using the Problem-Based Learning model combined with the demonstration method on science learning outcomes among Grade IV students at SDN 3 Balong Jepara.

2. Research Methods

This study employed a quantitative research approach using a pre-experimental design, specifically the one-group pretest-posttest design. Experimental research is considered exploratory in nature, as it examines the causal relationship between independent and dependent variables through intentional manipulation of the independent variable (Harel et al., 1998).

The research design involved two stages of treatment: a pretest and a posttest. The population and sample of this study consisted of Grade IV students at SDN 3 Balong. Data collection techniques included interviews, tests, and classroom observations.

For data analysis, the study applied both descriptive and inferential statistical techniques, including pretest-posttest condition analysis and hypothesis testing. To ensure the validity of the data, a normality test was conducted using the Kolmogorov-Smirnov test, with the assistance of SPSS software.



Information:
O_1 = *Pretest before treatment*
O_2 = *Posttest after treatment*
X = *Problem Based Learning* (PBL) *treatment demonstration*

3. Results and Discussions

The purpose of this study is to determine the influence of the Problem-Based Learning (PBL) model combined with the demonstration method on the learning outcomes of Grade IV students in the subject of science, specifically on the topic of photosynthesis at SDN 3 Balong Jepara. Table 1 presents the results, indicating an increase in the class average score from 79 (pretest) to 81 (posttest). The data were then subjected to a normality test to determine the distribution of scores, followed by a paired sample t-test to evaluate the research hypothesis. The analysis was conducted based on the pretest and posttest scores obtained by the students, as presented in Table 1.

Table 1: Learning Results Student

Pretest value	56
Pretest value	100
Pretest average	79
Min posttest value	60
Posttest value	100
Posttest average	81

3.1. Normality test

Based on the calculations using SPSS version 26.0, the results are as follows:
The Shapiro-Wilk Normality Test was used to determine whether the data were normally distributed, particularly suitable for small sample sizes (n < 50). This test was introduced in two seminal papers by Shapiro and Wilk (1958) and Shapiro, Wilk, and Chen (1968), which emphasized its effectiveness for sample sizes fewer than 50. According to this test, data are considered normally distributed if the significance value (p-value) is greater than 0.05 (p > 0.05). Based on the normality test results obtained from SPSS version 26.0, the pretest scores showed a significance value of 0.640, and the posttest scores showed a value of 0.130, both of which are greater than 0.05. Therefore, it can be concluded that the data are normally distributed, and the assumption of normality is met.

Table 2: SPSS Normality Test Output Results

	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	Df	Sig.
Pretest	.139	17	.200*	.898	17	.064
Posttest	.142	17	.200*	.917	17	.130

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

3.2. Paired Sample T-test

Paired Samples T-Test was used For know hypothesis A test or treatment. Basis for taking hypothesis testing decisions is :

H_O = None influence application of *the Problem Based Learning* Demonstration model to results studying in class IV science and science learning at SDN 3 Balong Jepara.
H_a = Yes influence application of *the Problem Based Learning* Demonstration model to results studying in class IV science and science learning at SDN 3 Balong Jepara
Significant level α= 0.05

Criteria :
If significant > 0.05, so $H_O$accepted
If significant < 0.05, so $H_O$rejected

The criteria used for hypothesis testing are as follows: if the significance value (p-value) is greater than 0.05 (p > 0.05), then the null hypothesis (H_0) is accepted, indicating that the implementation of the Problem-Based Learning Demonstration model has no significant effect on the science learning outcomes of Grade IV students at SDN 3 Balong Jepara. Conversely, if the significance value is less than 0.05 (p < 0.05), then H_0 is rejected, which implies that the application of the Problem-Based Learning Demonstration model does have a significant effect on students' learning outcomes in science. Based on the SPSS test results, the obtained significance value is 0.016, which is less than 0.05. Therefore, H_0 is rejected. It can be concluded that there is a significant influence of applying the Problem-Based Learning Demonstration model on the science learning outcomes of Grade IV students at SDN 3 Balong Jepara.

Table 3: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-1.882	3.855	.935	-3.864	100	-2.013	16	.061

4. Discussion

The findings of this study indicate that the application of the Problem-Based Learning (PBL) model combined with the demonstration method had a positive impact on students' science learning outcomes, particularly in the topic of photosynthesis. The increase in average scores from pretest to posttest suggests that students were better able to comprehend and apply scientific concepts after receiving instruction through this model.

This result is consistent with the findings of Nisa and Rhosalina (2020), who highlighted that PBL encourages students to engage in active problem-solving, thereby enhancing their critical thinking and conceptual understanding. By integrating real-world problems into the learning process, students are more motivated to participate actively, which in turn improves their academic performance. In the context of this study, the demonstration of photosynthesis processes likely helped students grasp complex biological concepts that would otherwise be difficult to understand through traditional lecture-based instruction alone.

The study also aligns with Suardana (2019), who emphasized that PBL is rooted in a problem-solving approach that fosters collaboration, communication, and deeper inquiry. In this study, the PBL framework encouraged students to work in groups, discuss ideas, and support one another—particularly beneficial in a classroom where low achievement and passive learning were previously observed.

Prior to the intervention, the pretest scores reflected students' limited mastery of the material, with some scoring as low as 56. This finding is indicative of a learning gap, which may have been caused by a lack of engagement, insufficient instructional strategies, or the abstract nature of the content. The post-intervention improvements suggest that PBL with demonstration is effective in addressing such gaps by making learning more student-centered, contextual, and interactive.

The effectiveness of this combined model is also supported by Dörnyei et al. (2019), who argue that engaging and enjoyable learning environments increase student motivation and concentration. The students in this study responded positively to the PBL-Demonstration method, showing increased interest, reduced off-task behavior, and greater retention of knowledge—evidence of meaningful learning taking place.

Moreover, the improvement in learning outcomes supports Asyafah's (2019) assertion that varied learning models not only prevent monotony but also accommodate diverse student learning styles, ultimately fostering a more inclusive learning environment. The positive outcomes in this research reinforce the idea that learning models must be adapted to both the content and the learner, and that interactive, visual, and collaborative approaches are particularly effective in science education.

The findings of this study contribute to the growing body of research that supports the integration of Problem-Based Learning and demonstration methods as a powerful pedagogical strategy. It not only enhances academic achievement but also fosters important skills such as problem-solving, critical thinking, and cooperative learning—skills that are essential in 21st-century education.

5. Conclusions

The implementation of the PBL-Demonstration model made science learning more engaging, meaningful, and enjoyable, allowing students to take on active roles in the learning process. This model enabled students to explore and construct new concepts in science. Through active participation, students experienced deeper learning, which made scientific concepts easier to understand and remember.

Furthermore, the use of the PBL-Demonstration model in science learning proved effective in helping students grasp the content of IPAS (Ilmu Pengetahuan Alam dan Sosial), particularly the topic of photosynthesis. The integration of this approach, supported by appropriate learning media, succeeded in capturing students' attention and increasing their interest in science. As such, the application of this model is expected to enhance students' mastery and understanding of the photosynthesis topic in a more effective and lasting manner.

Acknowledgement

The authors would like to thank fellow authors and organizations whose intellectual properties were utilized for this study.

Conflict of Interest

The authors declare no conflicts of interest

References

Ahsanti, N. (2018). Students' Attitude towards English for Business. Unpublished Thesis Semarang: Walisongo State Islamic University Semarang.

Arçay, Ş., & Akçay, S. (2016). Prospective elementary science teachers' understanding of photosynthesis and cellular respiration as nested systems. *Journal of Biological Education, 51*(1), 52–65. https://doi.org/10.1080/00219266.2016.1170067.

Arubayi, O. A. (2015). The demonstration method of teaching: A practical method bridging theory and practice. *Journal of Education and Practice, 6*(3), 34–40. https://doi.org/10.2991/icss-18.2018.70.

Asyafah, A. (2019). Consider the learning model (study theoretical-critical on the learning model in education Islam). TARBAWY: Indonesian Journal of Islamic Education, 6 (1), 19-32. http://dx.doi.org/10.17509/t.v6i1.20569.

Burgstahler, S. E., & Cory, R. C. (Eds.). (2010). Universal design in higher education: From principles to practice. Harvard Education Press.

Dörnyei, Z., & Muir, C. (2019). Creating a motivating classroom environment. Second handbook of English language teaching, 719-736. http://dx.doi.org/10.1007/978-3-030-02899-2_36.

Gulo, A. (2022). Application of the Discovery Learning Model to Learning Outcomes Students on Ecosystem Material. Educativo: Journal of Education, 1 (1), 307-313. https://doi.org/10.56248/educativo.v1i1.54

Harel, G., & Sowder, L. (1998). Students' proof schemes: Results from exploratory studies. American Mathematical Society, 7, 234-283.

Hidayat, Rahmat, and Abdillah Abdillah. " Knowledge education : concepts, theories and applications." (2019).

Jarboe, S. (1988). A comparison of input-output, process-output, and input-process-output models of small group problem-solving effectiveness. Communications Monographs, 55(2), 121-142.

Kochhar, S. K. (1992). Methods and techniques of teaching. Sterling Publishers Pvt. Ltd.

Kolb, D. A. (2014). Experiential learning: Experience as the source of learning and development. FT press.

Makki, MI, & Aflahah, A. (2019). Basic Concepts of Study and Learning.

Mantiri, J. (2019). The Role of Education in Create Human Resources Quality in North Sulawesi Province. Journal of Civic Education: Media for the Study of Pancasila and Citizenship, 3 (1), 20-26. https://doi.org/10.36412/ce.v3i1.904.

Münkel-Jiménez, M., Bonilla-Araya, M., Grey-Pérez, A. D., & Herrera-Sancho, O. A. (2020). Awaking interest in science learning: Hands-on photosynthesis demonstrations using Elodea canadensis and Spinacia oleracea. *Journal of Chemical Education, 97*(2), 457–461. https://doi.org/10.1021/acs.jchemed.9b00216.

Nisa, F., & Rhosaliana, I. A. (2020). Application of the Problem Based Learning Model Ability Think Critical Students in Learning Mathematics. RANGE: Journal of Mathematics Education, 1 (2), 152-156.

Pane, A., & Dasopang, MD (2017). Learning and learning. Fitrah: Journal of Science Studies Islam, 3 (2), 333-352.

Riswari, L. A., Yanto, H., & Sunarso, A. (2018). The effect of problem-based learning by using demonstration method on the ability of problem solving. Journal of Primary Education, 7(3), 356-362. https://doi.org/10.15294/jpe.v7i3.24519.

Sagor, R. (2010). The action research guidebook: A four-stage process for educators and school teams. Corwin Press.

Siregar, M. (2012). The effect of using the demonstration method on students' achievement in writing procedure text. *REGISTER: Journal of English Language Teaching of FBS-Unimed, 1*(1), 14–24. https://doi.org/10.24114/reg.v1i1.342.

Suardana, P. (2019). *Application of learning models problem-based learning (PBL) with method demonstration For increase results Study game reject bullet. Journal of Educational Action Research, 3* (3), 270-277. https://doi.org/10.23887/jear.v3i3.17974.

Suardi, M. (2018). Learning & learning. Deepublish.

Westberg, J., & Jason, H. (2004). Fostering learning in small groups: A practical guide. Springer Publishing Company.

Zainuddin, Z., Muluk, S., & Keumala, C. M. (2019). How do students become self-directed learners in the EFL flipped-class pedagogy? A study in higher education. Indonesian Journal of Applied Linguistics, 8(3), 678-690. https://doi.org/10.17509/ijal.v8i3.15270.