



Multimodel-Based Learning Strategy And Wetland Environment-Based Learning Approach: Alternative Solution to train Higher Order Thinking Skills

Abdul Salam*, Sarah Miriam, Muhammad Andrean Lazuardi, Norhalimah, and Syah Warunadwipa Andiantosa

Program Studi Pendidikan Fisika, Universitas Lambung Mangkurat
Banjarmasin, Indonesia

*salam@ulm.ac.id

DOI:10.20527/bipf.v10i2.12373

Received: 31 December 2021

Accepted: 30 June 2022

Published: 30 September 2022

A number of studies on multimodel-based learning strategy and environment-based learning approaches have been proven effective in improving learning outcomes. This study seeks to combine the strategy and the approach to train higher-order thinking skills as one of the 21st Century skills. This quasi-experiment study used one group pretest and post-test design. Data was collected using essay tests. The results showed that multimodel and wetland environment-based learning effectively improves students' higher-order thinking skills with a gain score of 0.63 (medium category). This study indicates the importance of integrating practicum activities and theory in learning in the classroom so that students' learning motivation is maintained and higher-order thinking skills are continuously trained.

Keywords: Higher Order Thinking Skills; Multimodel; Wetland Environment

© 2022 Berkala Ilmiah Pendidikan Fisika

How to cite: Salam, A., Miriam, S., Lazuardi, M. A., Norhalimah, N., & Andiantosa, S. W. (2022). Multimodel-based learning strategy and wetland environment-based learning approach: alternative solution to train higher order thinking skills. *Berkala Ilmiah Pendidikan Fisika*, 10(2), 171-178.

INTRODUCTION

Living in the 21st century, which is full of challenges and dynamic changes, requires people to think intelligently and collaborate to solve every problem. In this case, everyone must have high-order thinking skills (Erfan & Ratu, 2018; Zubaidah, 2016). One of the well-known lessons in improving students' learning competencies is multimodel learning. This learning is based on the consideration that no single learning model can dominate the learning outcomes for each learning topic. Each particular learning model has advantages

for specific learning situations and student characteristics (Arends, 2012). No one learning model is effective among the others. This is returned to the characteristics of the teaching materials, the characteristics of students, the learning environment, and the goals to be achieved (Asyafah, 2019). Therefore, selecting a learning model in completing a learning cycle (e.g. one basic competency) does not require using one learning model but several learning models (multimodel).

Learning that relies on the telling and drill exercises has led to the



underdevelopment of students' higher thinking skills (Kurniasari, Koeshandyanto, & Akbar, 2020). Conventional learning makes learning dull and less attractive to students (Latief, Rohmat, & Ningrum, 2014). This learning causes students to do the repetition and less able to be associated only with material with real-world situations (Nuraisah, Irawati, & Hanifah, 2016), let alone efforts to solve real problems.

On the other hand, environment-based learning has also improved student learning outcomes. Environmental-based learning is more contextual so that students feel closer to the object of study being discussed. Students' initial knowledge/understanding of something that exists in nature is used as a learning approach to lead students to a new physics topic. Learning close to the student's environment makes students more confident in learning (Suparman et al., 2016). It has its mental impression and causes students to be motivated to learn (Nurhasanah & Sobandi, 2016).

The results showed that environment-based learning improved student learning outcomes with 80% completeness (Suparman et al., 2016). The results of other studies also state that environmental-based learning can improve student learning outcomes with a gain score of 0.66, which is included in the medium category (Arifuddin et al., 2017).

Environment-based learning (Suparman et al., 2016) and multi-model learning (Salam & Miriam, 2016; Salam et al., 2017; Salam & Arifuddin, 2018) have been proven to be effective in improving student learning outcomes, so what will maximize the combination of the two. In addition, to build the advantages of Universitas Lambung Mangkurat, which is concerned with the study of wetlands, the researchers adopted a wetland environment-based approach based on the

results of previous research that has been proven to be able to improve student learning outcomes.

Through a multimodel-based learning set based on the characteristics of the teaching material, the characteristics of students, and the students' learning environment in the wetland, it is believed that it will be more leverage in improving student learning outcomes. This study aims to describe the effectiveness of combining the two (multimodel-based learning and wetland environment) to improve student learning outcomes, especially higher-order thinking skills.

METHOD

This pre-experimental research aims to test the effectiveness of multimodel-based learning and a wetland environment to train students' higher-order thinking skills. The research subjects were 26 entry-level students in the Physics Education Study Program, Lambung Mangkurat University. The research design used is one group pretest and post-test design.

Data collection was carried out through a written test, with the level of HOTS (Higher Order Thinking Skills) questions. The description test starts from the cognitive level of analyzing, evaluating, and creating. The research design carried out the tests before and after the treatment.

The learning outcomes in higher-order thinking skills were analyzed and presented using simple descriptive statistics in the form of maximum scores, minimum scores, averages, and standard deviations. Learning outcomes are also expressed in the form of achieving a gain score using the formulation (Hake, 1998):

$$\langle g \rangle = \left(\frac{\% \langle S_f \rangle - \% \langle S_i \rangle}{100\% - \% \langle S_i \rangle} \right)$$

Where $\langle g \rangle$ is the normalized gain, $\langle S_f \rangle$ is the posttest value, and $\langle S_i \rangle$ is the pretest value. The increase in learning outcomes is

categorized into three groups: high achievement if the gain score is greater than or equal to 0.7, the medium achievement for a gain score between 0.3 to 0.7, and low achievement for the gain score below 0.3. These results are also compared with the qualifications for learning outcomes that apply at the Universitas Lambung Mangkurat.

RESULTS AND DISCUSSION

This research on the effectiveness of multimodel-based learning and the wetland environment uses a pre-experimental design. This research design was chosen considering the limited number of research participants. In addition, the measurement of learning outcomes through pretest and posttest can provide a clear description of comprehensive student learning outcomes (in the form of higher-order thinking skills) as a cumulative impact of the treatment given.

By the chosen design, this research begins with implementing a pretest to determine the initial abilities of students. The study continued by giving lectures using a multimodel setting, where the first lecture chose the direct learning model. The selection of this learning model is to equip students with the basic concepts of kinematics in the form of declarative knowledge and procedural skills in problem-solving related to lecture topics.

The second lecture uses a cooperative setting where students solve a given academic problem in groups. Armed with previous knowledge of kinematics' basic concepts and principles, students discussed formulating various equations that apply to free-fall motion, vertical motion (up and down), and parabolic move. Because during the Covid-19 Pandemic, the lecture process is still carried out online using zoom meetings by optimizing break out room facilities in small groups. The class is

divided into eight small groups with four major discussion themes. So two groups discussed the same topic to confront their findings in an extensive class discussion session.

The third lecture, Back, uses direct learning to remind students of the basic concepts in Circular Motion Kinematics. Students are also provided with systematic problem-solving procedures in solving problems related to circular motion kinematics.

The fourth lecture is carried out in an inquiry learning setting. Students are directed to solve academic problems related to Motion Dynamics, especially Newton's laws. Students examine the relationship between variables through scientific investigation activities using virtual laboratory applications (PhET applications). Similar to the setting of the second lecture, students were divided into eight small groups to conduct scientific investigations and discuss the results in the main room discussion session of the zoom meeting.

The class discussion for each meeting begins by raising events or general conditions that are often encountered by students in daily activities in the Wetland Environment. The movement of dropping an object hung at a certain height using a water spray is an example of an event raised at the beginning of the lecture. This competition, often held in Banjarmasin, is dedicated to the Fire Department (BPK). This competition is held annually in Banjarmasin and other cities in South Kalimantan. Students are invited to think about the strategies that the BPK must use to win the contest effectively and efficiently. The discussion is an application of motion in physics, namely Parabolic motion.

Another local wisdom raised in lectures as the basis for discussing lecture topics is

the Gumbaan tool. Gumbaan is a traditional tool used by farming communities in South Kalimantan to separate the filled and empty rice grains. This tool is moved manually. Through this tool, students are invited to discuss the circular motion.

Incidents of small ships pulling large ships and events pushing large ships towards rivers/piers are activities/events often found in Banjarmasin and the coastal areas of South Kalimantan. Small vessels pulling large ships are closely related to the Dynamics of Motion in Physics. It becomes an exciting material to be displayed to

students in starting lectures. Students are also invited to think about choices to facilitate the work in terms of physics concepts.

The lecture process with a multimodel setting by highlighting daily events in the wetland areas of South Kalimantan was carried out for four meetings. After that, students are given a post-test (final test) to see their learning progress. Table 1, Figure 1, and Figure 2 show descriptive statistics of learning outcomes and their distribution, both before and after learning activities.

Table 1 Descriptive Statistics of student learning outcomes before and after treatment

Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
Pretest	26	10.0769	4.32595	4.00	20.00
Posttest	26	67.1538	10.66468	46.00	92.00

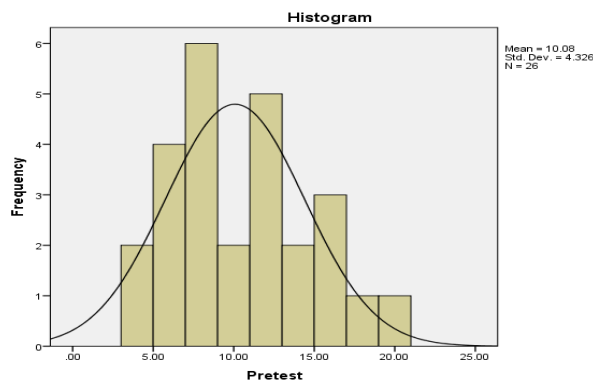


Figure 1 Distribution of Pretest Results

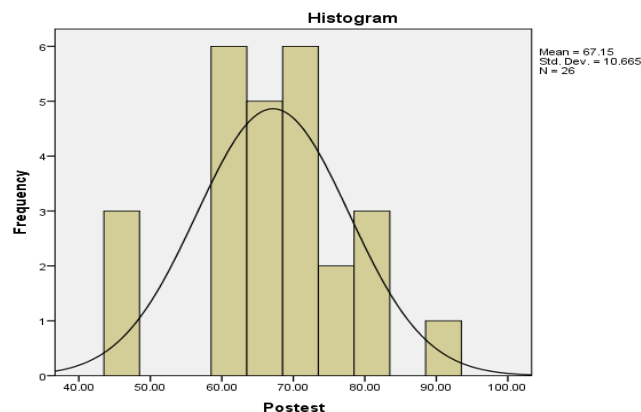


Figure 2 Distribution of Posttest Results

Table 2 Normality Test Results of Pretest and Posttest
One-Sample Kolmogorov-Smirnov Test

		Pretest	Posttest
Normal Parameters ^b	N	26	26
	Mean	10.0769	67.1538
Most Extreme Differences	Std. Deviation	4.32595	10.66468
	Absolute	.146	.136
	Positive	.146	.087
Test Statistic	Negative	-.080	-.136
	Asymp. Sig. (2-tailed)	.146	.136
		.162 ^c	.200 ^{c,d}

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

The mean pretest of students was 10.07 with a standard deviation of 4.33. The highest score obtained by students is 20 out of a possible 100 score, while the lowest score obtained is four from a minimum score of 0. After implementing learning using multimodel-based teaching materials and a wetland environment, the student's post-test average is 67.2 with a standard deviation of 10.6. The highest score obtained by students was 92 out of a maximum score of 100. Furthermore, the lowest score received was 46, from a minimum score of 0.

Before carrying out the gain score test, a normality test was first carried out on the

research data, both pretest and post-test. The normality test results using SPSS 22.0 are shown in Table 2. The test results give a significance value of 0.162 on the pretest and 0.200 on the post-test. With a significance value greater than 0.05, pretest and post-test data are declared normal.

The calculation of the gain score was carried out using the formulation by Hake (1998). The calculation results obtained a gain score of 0.63 in the medium category. The complete components of the gain score calculation are shown in Table 3 and the proportion of HOTS achievements shown in Figure 3.

Table 3 Calculation of Gain Score

Pretest	Posttest	Gain Score	Category
10,1	67,2	0,63	medium

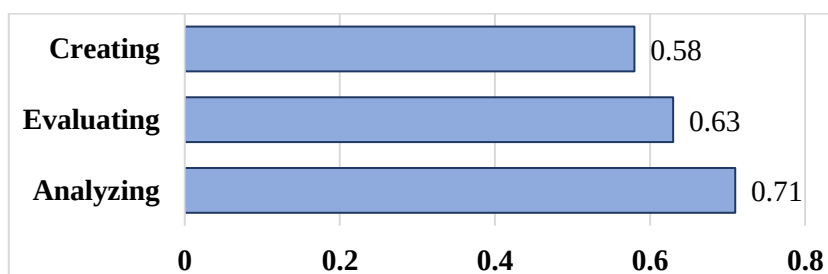


Figure 3 The proportion of HOTS Achievements

Table 3 shows that learning physics based on multimodel and wetland environments has increased students' HOTS. This study also strengthens the results of previous studies on the effectiveness of multimodel (Maria, 2010; Prasetyo & Syahmani, 2011; Salam et al., 2017; Salam & Arifuddin, 2018; Salam & Miriam, 2016), environment-based learning (Suparman et al., 2016), as well as learning based on local wisdom (Fitriah, 2019) in improving learning outcomes, including students' higher-order thinking skills.

However, based on Figure 3, we can see that the proportion of HOTS achievements is still below 75%. The proportion of HOTS achievement follows the complexity of the cognitive level, where the achievement of creative ability as the highest cognitive level has the lowest proportion (only 0.58), followed by the ability to evaluate (0.63) and analyze (0.71).

Students' relatively high analytical ability is due to its lower complexity than other parts of HOTS and because it is more often trained in secondary schools. Generally, the questions teachers prepare in schools are applying level (C3), and some are analyzing.

The creating skill tested in this test is the ability to design experiments. Strongly suspected, this ability is still fragile because it is rarely even trained in high school (Salam & Arifuddin, 2018). The creating skill is also exacerbated by the less than optimal implementation of learning amid the Covid-19 Pandemic. First-year students experienced online-based emergency learning for 1.5 years in high school due to the Covid-19 pandemic.

However, from the results of distributing student response questionnaires, data was obtained that 93.7 students stated that it was easier to

understand physics if the learning involved practicum activities and discussions. The remaining 6.3% expressed doubt, and none of the students rejected the statement. Thus, the ability to design and carry out experiments/practicums can be improved and developed. Interest in learning is related to motivation, which continues with effort intensity (Handhika, 2012). This high learning motivation correlates with learning outcomes (Grahito Wicaksono, 2016; Nurhasanah & Sobandi, 2016).

This research indicates the importance of integrating practical activities and theory in learning in the classroom. Through this integration, it is hoped that students' learning motivation will be maintained and more optimally improve learning outcomes, especially higher-order thinking skills. In terms of attitude towards pandemic conditions and mixed learning, further adjustments are needed to obtain maximum results.

CONCLUSION

Based on the data presentation and discussion, it can conclude that Multimodel-based Learning and Wetland Environment effectively improve learning outcomes with a gain score of 0.63 (medium category). This achievement is still likely to be improved, mainly if it is associated with high student interest in physics learning settings involving practicum activities. Thus, the use of this kind of learning pattern needs to be increased, including its development to support hybrid learning.

ACKNOWLEDGMENTS

The research team would like to thank to the Rector and Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Lambung Mangkurat for funding this research through DIPA

Universitas Lambung Mangkurat Fiscal Year 2021 Number: SP DIPA – 023.17.2.677518/2021 November 23, 2020

REFERENCE

- Arends, R. I. (2012). *Learning to teach* (9th ed.). McGraw-Hill.
- Arifuddin, M., Salam, A., & Mawaddah, S. (2017). Pengembangan bahan ajar berwawasan lingkungan bantaran sungai untuk melatih kemampuan 5M. *Jurnal Sains Dan Fisika*, 13(1), 248–254.
- Asyafah, A. (2019). Menimbang model pembelajaran (kajian teoretis-kritis atas model pembelajaran dalam pendidikan islam). *Tarbawy: Indonesian Journal of Islamic Education*, 6(1), 2599–2481
- Erfan, M., & Ratu, T. (2018). Pencapaian HOTS (higher order thinking skills) mahasiswa program studi pendidikan fisika fkip universitas samawa. *Jurnal Pendidikan Fisika Dan Teknologi*, 4(2), 208
- Grahito Wicaksono, A. (2016). Korelasi motivasi belajar dan gaya belajar dengan prestasi belajar ilmu alamiah dasar mahasiswa prodi pgsd. *Profesi Pendidikan Dasar*, 3(2), 122–126.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74.
- Handhika, J. (2012). Efektivitas media pembelajaran im3 ditinjau dari motivasi belajar. *Jurnal Pendidikan IPA Indonesia*, 1(2), 109–114.
- Kurniasari, R. T. A., Koeshandayanto, S., & Akbar, S. (2020). Perbedaan higher order thinking skills pada model problem based learning dan model konvensional. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 5(2), 170-174.
- Latief, H., Rohmat, D., & Ningrum, E. (2014). Pengaruh pembelajaran kontekstual terhadap hasil belajar (studi eksperimen pada mata pelajaran geografi kelas vii di smpn 4 padalarang). *Jurnal Geografi Gea*, 14(2), 14-28.
- Maria, H. T. (2010). Implementasi pembelajaran multimodel berbasis pendekatan kontekstual untuk meningkatkan pencapaian kompetensi dasar fisika di sltp. *Jurnal Pendidikan Matematika Dan IPA*, 1(2), 35–44. <https://doi.org/http://dx.doi.org/10.26418/jpmipa.v1i2.198>
- Nuraisah, E., Irawati, R., & Hanifah, N. (2016). Perbedaan pengaruh penggunaan pembelajaran konvensional dan pendekatan kontekstual terhadap kemampuan berpikir kritis matematis dan motivasi belajar siswa pada materi pecahan. *Jurnal Pena Ilmiah*, 1(1), 291-300.
- Nurhasanah, S., & Sobandi, A. (2016). Minat belajar sebagai determinan hasil belajar siswa (learning interest as determinant student learning outcomes). *Jurnal Pendidikan Manajemen Perkantoran*, 1(1), 128–135.
- Prasetyo, S., & Syahmani, S. (2011). Implementasi multimodel group investigation dan murder (MGIM) pada pembelajaran materi larutan penyangga. *Quantum, Jurnal Inovasi Pendidikan Sains*, 2(2), 91–100.
- Salam, A., & Arifuddin, M. (2018). Teknik pemodelan fisika dalam setting pembelajaran berbasis learner autonomy. *Jurnal Fisika Flux*, 15(1), 47.
- Salam, A., & Miriam, S. (2016). Pembelajaran berbasis learner autonomy untuk melatih keterampilan proses sains. *Jurnal Sains dan Pendidikan Fisika*, 12(3), 233–239.

- Salam, A., Miriam, S., & Misbah, M. (2017). Pembelajaran fisika berbasis learner autonomy dengan metode pemecahan masalah pad topik gelombang. *Jurnal Sains Dan Pendidikan Fisika*, 13(3), 231–237. <https://ojs.unm.ac.id/JSdPF/article/view/6192>
- Suparman, M., Muris, & Jasruddin. (2016). Pengembangan media pembelajaran fisika berbasis lingkungan dengan memanfaatkan komputer siswa kelas x sma negeri 1 ulaweng. *Jurnal Sains Dan Pendidikan Fisika*, 12(2), 136–145.
- Zubaidah, S. (2016). Research-based on herbs exploration and use of animal models: Nature materials towards supporting evidence-based medicine view project simas eric learning model view project. *Prosiding Seminar Nasional Pendidikan*, 1–16.