



# Proceeding SYMBION (Symposium on Biology Education)

<http://seminar.uad.ac.id/index.php/symbion>

2540-752X (print) | 2528-5726 (online)



## Critical thinking skills of students through problem-based learning assisted by electronic learner worksheet (e-LKPD) of body defense system

Sheeren F Danty<sup>1</sup>, \*; Heni Setyawati<sup>2</sup>,

Tadris Biology, UIN Kiai Haji Achmad Siddiq, Jember, Indonesia

<sup>1</sup> sheerenfadia14@gmail.com\*; <sup>2</sup>henisetyawati0787@gmail.com

\* Corresponding author

### ARTICLE INFO

#### Article history

Submission Dec 11<sup>th</sup>, 2022

Revision May 10<sup>th</sup>, 2023

Accepted May 17<sup>th</sup>, 2023

#### Keyword

Problem-based learning

Electronic Learner

Worksheet (E-LKPD)

Critical thinking skills

### ABSTRACT

Critical thinking skills are one of the competencies that must be achieved by students in 21st century learning that can be raised by applying a problem-based learning model. This critical thinking ability can be realized through learning using the Problem Based Learning (PBL) model. In a problem-based learning model, learning media is needed that can support the learning process, one of which is Electronic Learner Worksheets (E-LKPD) which can provide practicality and effectiveness for students in learning. The purpose of this study is to describe students' critical thinking skills after being taught using a problem-based learning model assisted by E-LKPD on the material of the body's defense system for class XI MIPA at SMAN 1 Cluring Banyuwangi in the 2021/2022 academic year. This research is a quantitative descriptive research with the research form Nonequivalent Group Pretest Posttest Design. Sampling was done by purposive sampling technique. Data collection techniques using tests, observation and documentation. The data analysis technique in this study used the N-Gain calculation. The results showed that there was an increase in the critical thinking ability of students who were taught using a problem-based learning model assisted by E-LKPD with an average N-Gain value of 0.4975 in the medium category.

This is an open-access article under the [CC-BY-SA](#) license



## Introduction

Science and technology is one of the guidelines that must be prepared in order to produce quality humans in facing the 21st century. Learning in the 21st century is learning that produces critical thinking and problem solving skills, as well as information and communication skills. Critical thinking skills are very important in the 21st century and are very important for students to have, because it allows students to be able to solve social,

scientific and practical problems effectively<sup>1</sup>. Critical thinking is a reflective thinking ability that focuses on decision-making patterns about what to believe, what to do and what can be justified<sup>2</sup>. With the ability to think critically, students are expected to be able to solve existing problems with their abilities. But in reality the majority of students in Indonesia only have critical thinking skills at a low level or Low Order Thinking Skills (LOTS) not High Order Thinking Skills (HOTS), this can be seen from the results of the Trends In International Mathematics and Science Study (TIMSS) survey conducted by the International Association for the Evaluation of Educational Achievement (IEA) that Indonesia was ranked 45 out of 48 countries with a score of 397 in 2015<sup>3</sup>.

Biology learning is part of science that includes facts laws and principles resulting from scientific processes that require problem solving through critical thinking skills. Critical thinking has an important role in preparing students to solve problems, explain reasons and evaluate information. Based on the results of interviews at SMAN 1 Cluring, it is known that students of class XI MIPA SMAN 1 Cluring are less than optimal in learning biology material, it is due to the lack of student understanding of the material presented. The results of observations on biology learning in class XI MIPA SMAN 1 Cluring showed that of the 33 students in the class only about 5-8 students were actively involved in learning such as asking and answering questions from the teacher. The use of conventional learning models by only giving assignments available on Google Classroom makes students passive in the learning process, students do not have curiosity about the material and do not have the desire to think deeply or think critically about the material presented by the teacher. This can result in weak students' critical thinking skills.

The learning model is the factor that is considered to most influence critical thinking skills<sup>4</sup>. A learning model that can bring out students' critical thinking skills is a problem-based learning model. Problem-based learning is an approach to learning that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills, as well as to gain essential knowledge and concepts from learning materials<sup>5</sup>.

The use of problem-based learning models can motivate students to carry out thinking activities in understanding and deepening concepts so as to improve students' critical thinking skills. This is supported by the results of research conducted by Ahmad Farisi, et al., which states that problem-based learning can improve students' critical thinking skills<sup>6</sup>. The stages in problem-based learning can support students to have critical thinking and creative thinking skills. Problem-based learning can improve students' critical thinking skills because in the problem-based learning process, students are invited to find a problem that exists in biological material, identify possible problem-solving solutions, determine the best solution to solve the problem and review and evaluate the solution applied<sup>7</sup>. So with the application of problem-based learning models in biology learning, it is expected that students will be able to improve their critical thinking skills.

The problem-based learning model is a learning model that emphasizes the direct involvement of students<sup>8</sup>. So that learning media is needed that can support the learning process, one of which is the Electronic Learner Worksheet (E-LKPD). The use of E-LKPD in problem-based learning can provide practicality for students, besides that the use of E-LKPD makes the steps in problem solving more organized so as to make learning more effective. This is in line with the research of Diah Juhaeriyah, et al., which states that the use of LKDP in problem-based learning can improve students' critical thinking skills compared to not using LKPD<sup>9</sup>.

Based on the description above, the researcher is interested in examining the effect of problem-based learning models assisted by Electronic Learner Worksheets (E-LKPD) on the material of the body's defense system on the critical thinking ability of students in class XI MIPA at SMAN 1 Cluring Banyuwangi in the 2021/2022 academic year.

## Method

Quantitative descriptive research with Nonequivalent Group Pretest Posttest Design. In the research using experimental class and control class. The population in this study were all students of class XI MIPA at SMAN 1 Cluring Banyuwangi for the 2021/2022 academic year consisting of five classes. Sampling using purposive sampling technique. Class XI MIPA 5 was used as the experimental class and class XI MIPA 2 as the control class.

The data collection technique was carried out in two stages, namely pre-test and post-test. The pre-test was given to see students' initial abilities while the post-test was given to determine students' critical thinking skills after treatment. The results of the pre-test and post-test were tested using the N-Gain test to determine the increase in students' critical thinking skills.

## Results and Discussion

Based on the results of the critical thinking ability test after being taught using the problem-based learning model assisted by E-LKPD, it shows that the average pre-test and post-test scores obtained by the experimental class are higher than the average pre-test and post-test scores in the control class presented in table 1.

Table 1. Average Results of Critical Thinking Ability Tests

Class	Average	
	Pretest	Posttest
Experiment	43.94	72.48
Control	41.39	65.15

Based on table 1, it can be seen that there is an increase in the average value of the critical thinking ability test in the experimental class after being taught using a problem-based learning model assisted by E-LKPD. In addition, students who are taught using a problem-based learning model assisted by E-LKPD have a pretest average value of 43.94 and a posttest of 72.48 higher than students who are taught using conventional learning with a pretest average value of 41.39 and a posttest of 65.15.

In this study, to determine the increase in students' critical thinking skills before and after being taught using problem-based learning assisted by E-LKPD, the N-Gain test was used. The results of N-Gain using SPSS v.26 in experimental and control classes can be seen in appendix 28 and are presented in figure 1.

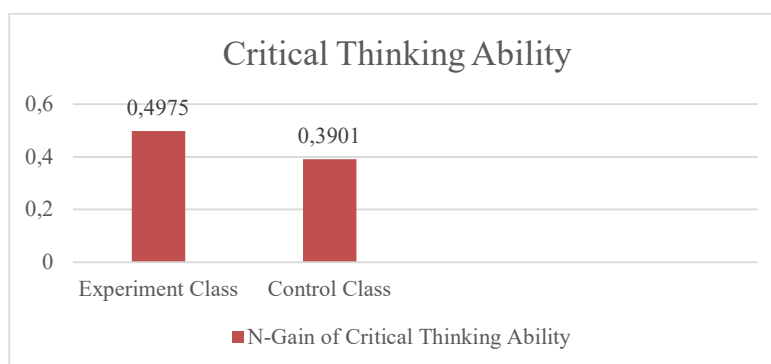


Fig 1. Diagram of Students' Critical Thinking Ability Level

Based on Figure 1, the average N-Gain value of the experimental class is 0.4975 in the medium category, while the average N-Gain value of the control class is 0.3901 in the low category. This shows that the average N-Gain value of the experimental class is higher than the

average N-Gain value of the control class. So it can be concluded that students in the experimental class who were taught using problem-based learning assisted by E-LKPD experienced an increase in critical thinking skills higher than students who were taught using conventional learning models.

The difference is obtained one of them because the use of a problem-based learning model assisted by E-LKPD can provide opportunities for students to train and develop their critical thinking skills because it uses problems that students often encounter in everyday life as an initial concept in learning and the use of E-LKPD which can help the steps in problem solving to be more organized. This is in accordance with the research of Diah Juhaeriyah, et al., which states that the use of LKDP in problem-based learning can improve students' critical thinking skills compared to without using LKPD, this is because LKPD which begins with the presentation of the problem, can direct students to be able to solve problems through procedures and students are directed to be able to make conclusions<sup>9</sup>.

Based on the results above, it can be concluded that the problem-based learning model assisted by E-LKPD can improve students' critical thinking skills, this is also in accordance with Alita's research that problem-based learning models can improve critical thinking skills in each cycle and can improve students' understanding<sup>10</sup>. This is also in line with research by Herzon Hamdalia Hayuna, et al., that the problem-based learning model has a positive impact on students' critical thinking, this can be seen by the seriousness of students when discussing with their groups in the process of solving problems, and the application of problem-based learning can optimize learning experiences such as experience in terms of solving case studies, recording data, finding relevant sources, and presenting the results of discussions with their groups<sup>11</sup>.

## Conclusion

Based on the results of research and data analysis that has been carried out in this study, it can be concluded that the critical thinking skills of students in the experimental class taught using a problem-based learning model assisted by E-LKPD on the material of the body's defense system have increased higher than students taught using conventional learning models, marked by the average N-Gain of the experimental class of 0.4975 in the medium category, while the average N-Gain of the control class is 0.3901 in the low category.

## References

- 1 Ongesa, C. M. Critical thinking skill gap in the Kenyan educational curriculum: The 21st-Century skills for the Global Citizen. *Journal of Interdisciplinary Studies in Education* **9**, 178-191 (2020). [https://doi.org:https://doi.org/10.32674/jise.v9iSI.1860](https://doi.org/https://doi.org/10.32674/jise.v9iSI.1860)
- 2 Ennis, R. H. The nature of critical thinking: An outline of critical thinking dispositions and abilities. *University of Illinois* **2**, 1-8 (2011).
- 3 Setiawan, W. Meningkatkan kemampuan berpikir kritis matematis siswa SMP dengan menggunakan model penemuan terbimbing. *Jurnal Ilmiah P2M STKIP Siliwangi* **2**, 91-97 (2015). [https://doi.org:https://doi.org/10.22460/p2m.v2i1p91-97.168](https://doi.org/https://doi.org/10.22460/p2m.v2i1p91-97.168)
- 4 Tumanggor, M. *Berfikir kritis: Cara jitu menghadapi tantangan pembelajaran abad 21*. (Gracias Logis Kreatif, 2021).
- 5 Maryati, I. Penerapan model pembelajaran berbasis masalah pada materi pola bilangan di kelas VII sekolah menengah pertama. *Mosharafa: Jurnal Pendidikan Matematika* **7**, 63-74 (2018). [https://doi.org:https://doi.org/10.31980/mosharafa.v7i1.342](https://doi.org/https://doi.org/10.31980/mosharafa.v7i1.342)
- 6 Farisi, A., Hamid, A. & Melvina, M. Pengaruh model pembelajaran problem based learning terhadap kemampuan berpikir kritis dalam meningkatkan hasil belajar siswa

- pada konsep suhu dan kalor. *Jurnal Ilmiah Mahasiswa Pendidikan Fisika* **2**, 283-287 (2017).
- 7 Surya, E., Khairil, K. & Razali, R. Penerapan pembelajaran berbasis masalah (PBL) untuk meningkatkan kemampuan berpikir kritis siswa pada konsep sistem pernapasan manusia di SMA Negeri 11 Banda Aceh. *Jurnal EduBio Tropika* **2**, 121 - 186. (2014).
- 8 Afridiani, T., Soro, S. & Faradillah, A. Pengaruh model problem based learning (PBL) berbasis lembar kerja peserta didik (LKPD) terhadap kemampuan pemahaman konsep matematis. *Euclid* **7**, 12-21 (2020).  
<https://doi.org/http://dx.doi.org/10.33603/e.v7i1.2532>
- 9 Juhaeriah, D., Hidayat, S. & Sudrajat, A. Pengaruh Model Pembelajaran Berbasis Masalah Berbantuan LKPD Dan Kemampuan Berpikir Kritis Terhadap Kemampuan Memecahkan Masalah Matematika Siswa Kelas VI SD. *Jurnal Muara Pendidikan* **6**, 157-165 (2021). <https://doi.org/https://doi.org/10.52060/mp.v6i2.495>
- 10 Alita, K. U. Penerapan Model Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Kelas V Sdn Ledok 5 Tahun Pelajaran 2018/2019. *Basicedu* **3**, 169-173 (2019). <https://doi.org/https://doi.org/10.31004/basicedu.v3i1.97>
- 11 Herzon, H. H., Budijanto & Utom, D. H. Pengaruh Problem-Based Learning (PBL) terhadap Keterampilan Berpikir Kritis. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan* **3**, 42-46 (2018).