



The Influence of Problem-Based Learning and Blended Learning on Students' Creative Thinking Ability in Class XI SMAN Plus Riau Province Material Body Defense System

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Received: August 5, 2022

Revised: April 17, 2023

Accepted: April 27, 2023

Published: April 30, 2023

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DOI: [10.29303/jppipa.v9i4.1973](https://doi.org/10.29303/jppipa.v9i4.1973)

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Abstract: This research aims to analyze the effect of the Problem Based Learning model through Blended Learning on students' creative thinking skills. This research was conducted in class XI SMAN Plus Riau Province in the even semester of the 2021/2022 academic year. The research parameter is students' creative thinking ability, with 4 indicators, that is fluent thinking ability, flexible thinking ability, original thinking ability and elaborating thinking ability. Data were collected using test questions. The results of the study in the control class obtained an average value of 63.75 (less creative category) and an N-gain value of 0.13 (less effective category). In the experimental class, the average value was 77.63 (creative category), with an N-gain value of 0.43 (effective category). Of the four indicators in the control class and the experimental class, the highest indicator is fluent thinking with values of 67.50 and 80.00 respectively, while the lowest indicator in the control and experimental classes is obtained in elaboration thinking, with values of 60.00 and 75.55 respectively. Problem Based Learning model through Blended Learning has a positive effect on the creative thinking skills of class XI students of SMAN Plus Riau Province on the material of the body's defense system.

Keywords: Blended Learning; Creative Thinking Skills; Problem Based Learning

Introduction

Education is a very important factor in advancing and also educating the life of the nation and as a means that builds people, especially in Indonesia as a whole. Education is also a useful provision in the future of the nation's generation to become more directed and better in this era of digitalization, teachers are required to be able to use very appropriate media in providing an assessment rubric, and receive reports or conduct a consultation service for students (Prayogi et al., 2018). One example of the application of digitalization media that can be used is the creation of assessment rubrics or questionnaires for completing student assignments using a google form, monitoring communication and consulting services for working on a student project using WhatsApp groups or video conferences, or google classroom (Permata et al., 2022). It has been investigated where active learning leads to deep understanding of problem solving (Rogers et al., 2021).

Model Problem-Based Learning (PBL) stimulates high order thinking in problem problem orientation of situations. Students are said to be able to solve a problem if they student can study a problem and can use their knowledge in a new situation. These abilities are commonly known as high order thinking skills (Dinni, 2018). Previous studies have intensively conducted interactive and innovative learning models, one which is Problem-Based Learning (Dahl, 2018).

According to Nita and Surya (2021), the result that can be done to involve students in learning is to apply certain learning models. A learning model that can be adapted to the needs of the classroom so that learning takes place effectively and efficiently. The Problem Based Learning (PBL) model is expected to be able to given the creative thinking skills of students because this model begins by exposing students to examine problems related to the topics raised and the problems that have been found.

How to Cite:

Anggraini, D., Yustina, Y., Daryanes, F., & Natalina, M. (2023). The Influence of Problem-Based Learning and Blended Learning on Students' Creative Thinking Ability in Class XI SMAN Plus Riau Province Material Body Defense System. *Jurnal Penelitian Pendidikan IPA*, 9(4), 1916-1921. <https://doi.org/10.29303/jppipa.v9i4.1973>

Abdurrozak et al. (2016), the problem-based learning model can trigger students' thinking ability. This model has the advantage that students will have an open mindset, reflective and creative learning, as well as facilitate the success of problem-solving, communication, group work, and interpersonal skills within better. Hasanah et al. (2017), PBL is used to stimulate higher-level thinking in problem-oriented situations, including the ability to think creatively. Biology is a study with a scope that is closely related to humans and their environment (Astika, 2020). Model Problem Based Learning has a characteristic is learning based on authentic problems.

Cahyani et al. (2022), said Blended Learning (BL) is a learning method that combines face-to-face learning and learning that uses online learning resources. Blended Learning (BL) is one of the best ways of combining face-to-face learning with e-learning. The application of Blended Learning can minimize conventional learning problems that are not able to facilitate various kinds of student difficulties in learning, demanding teachers and students to develop guiding questions. Remember that each learner has a different learning style.

This learning model can be combined with Blended Learning is the Problem Based Learning (PBL) model. Blended Learning (BL) based learning is believed to be able to improve of quality for the learning with a combination of conventional learning with online-based learning. This learning model can make students more active and creative (Rizki et al., 2020).

Students are said to be able to solve a problem if they are able to examine a problem and are able to use their knowledge in new situations. These abilities are usually known as Higher Order Thinking Skills (Yustina et al., 2020a.)

Higher Order Thinking Skills (HOTS) is a process of thinking from the students in a higher cognitive level that developed from various concepts and cognitive method and taxonomy of learning, teaching, and assesment. The main purpose of high order thinking skills is how to improve student's thinking ability in a higher level, especially the ability to think critically in receiving many kinds of information, to think creatively in solving a problem using the acquired knowledge and also to make decision in complex situations (Hatta, 2016).

Biology material is a learning that is often encountered in everyday life. One of the biological materials that are often discussed during the current transition period is the body's defense system (immunity). This body defense system material is also a material that is quite difficult for students because it needs to be studied further and then analyzed its characteristics and mechanisms, and also the learning model presented by the teacher uses lectures and

demonstrations that are teacher-centered, making creative thinking skills still in the category of not good, so teachers need to pay attention to the right learning model and the teacher must also lead his students in challenging questions so that the mastery of the material towards the students is deeper. To anticipate these problems, an alternative learning model is needed that can train students' creative thinking skills.

Method

Time, Place, and Type of Research

This research was carried out in class XI of SMA Negeri Plus Riau Province. The time of the study was conducted from January-June 2022. For the population in this study is students of classes XI MS 1 and XI MS 2. This type of research is quasi-experimental research.

Research Design

The design of the study is

KE	O1	X	Q1
KK	O2	-	Q2

Figure 1. Research Design The non-equivalent control group design.

Description:

KE: Experimental class

KK: Control class

O1: Experimental class creative thinking ability

O2: Control class creative thinking ability

X: Treatment using the PBL model via BL

Q1: Experimental class creative thinking ability

Q2: Control class creative thinking ability

Data Collection Techniques

Table 1. Indicators of being able to think Creatively

Indicators	Observed aspects
Think Fluently	Spark a lot of ideas Answer with several answers if there is a question
Flexible Thinking	Have many ideas about a problem Generate varied answers Provide various concepts or ideas on a problem
Original Thinking	Classify different things (categories) Able to think of new ideas about a problem Able to make unusual combinations of parts or elements
Thinking Elaboration	Able to express unique answers or ideas Go deeper into the answer so that it is more interesting Enrich and develop an existing object or idea Able to respond to the opinions of friends by demonstrating works that have not been shown by the presenter regarding the material being presented

(Source: Williams, 1979)

Table 2. Creative Thinking Ability Test Sheet Grid

Aspects of the Indicators of Thinking Kreatif	Question Grid	Cognitive Levels
Think Fluently	Determining the body's defense system	C5
Flexible Thinking	Identifying the tissue/cell structure of the body's defense system	C5
	Proving various disorders in the body's defense system	C4
Original Thinking	Structuring the process of occurrence of the body's defense system	C5
	Deciphering the response forms the body's defense system	C4
Thinking Elaboration	Connecting the skin's response mechanism with the body's defense system	C4
	Analyzing the various diseases of the body's defense system	C5
	Determining the healing range of the body's defense system	C5

Data Analysis Techniques

Table 3. Categories of Creative Thinking Completion

Value	Information
80 - 100	Highly Creative
70 - 79	Creative
60 - 69	Quite Creative
50 - 59	Less Creative
40 - 49	Very Less Creative

(Source: Majir, 2019)

Table 4. Categories of Analysis Results Using *Gain Score*

G < value >	Category
> 0.7	Highly Effective
0.3 - 0.7	Effective
< 0.3	Less Effective

(Source: Puspitasari, 2015)

Result and Discussion

Result

Students' ability to think creatively is reviewed based on the results of the pretest and posttest, presented in Table 5.

Discussion

The indicator of thinking smoothly through the pretest-posttest value in the control class with scores of 62.50 and 67.50 categories was less creative, while in the experimental class it was 65.83 and 80.00 categories creative (table 5). From research results of the N-gain test in the control class with a value of 0.13, 4 categories were less effective, while in the experiential class men 0.41 effective categories (table 5). This is because in the

experimental class apply the PBL model in the problem orientation syntax, the teacher stimulates students with problems in the form of pictures of someone who has *influenza* viruses, these images are shared by the teacher through *Google Classroom* ONLINE, with instructions given by the teacher carried out before the implementation of OFFLINE learning in the conventional class. This makes students improve their ability to think fluently when they come up with many ideas or ideas from problems instructed by the teacher. Student can determine the correct reason for the cause of a person who has the *influenza* virus. Supported by the results of the researchers Yustina *et al.*, (2020a) which state, that in PBL learning students are given problems, then students are creative in sparking many ideas or ideas. The result of the researches Syamsiara *et al.*, (2020) which state, to improve in PBL learning had a positive effect and increased, related problems in everyday life with specific topic of discussion that help students discuss. Andari *et al.*, (2019) by giving the problems students encounters in everyday life make motivated to learn and increase their motivation to learn. And the result of researchers Rizki & Firosalia (2021) the PBL model is student-centered and makes the learning process more active, to problems smoothly and can increase student vocabulary. This for condition can helps to students with various insight and various alternatives providing solution in solving problems from teachers (Budhi *et al.*, 2018). This kind of learning process can given that a person creative thinking skill will be heigher if one can show many possible answers to a problem properly.

Table 5. N-gain data on creative winding ability control class and experimental class students

Aspects of Creative Thinking Ability	Control Class		N-Gain	Category	Experimental Class		N-Gain	Category
	Pretest	Posttest			Pretest	Posttest		
Think smoothly	62.50	67.50	0.13	Less Effective	65.83	80.00	0.41	Effective
Flexible thinking	58.33	65.00	0.16	Less Effective	64.16	78.83	0.41	Effective
Original thinking	57.50	62.50	0.11	Less Effective	58.33	76.66	0.44	Effective
Elaboration thinking	53.33	60.00	0.14	Less Effective	54.44	75.55	0.46	Effective
Average	57.91	63.75	0.13	Less Effective	60.69	77.63	0.43	Effective

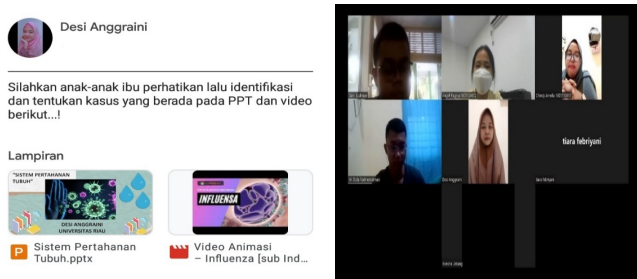


Figure 2. Online Learning (Google Classroom & Zoom Meeting)

Indicators of flexible thinking ability through pretest-posttest value in the control class with scores of 58.33 and 65.00, the results of the N-gain test in the control class with a value of 0.16 were less creative categories, in the experimental class with 64.16 and 78.83 creative categories (table 5). This is because students in the experimental class use the PBL model in syntactic organizing students to learn, teachers encourage students to organize students to student worksheet related to problems given by teachers in *Google Classroom* ONLINE, with instructions given by teachers carried out in *Zoom Meeting* before the implementation of OFFLINE learning in the conventional class. So that students can improve their ability to think flexibly. Flexible thinking can be seen in the ability of students to solve problems with different points of view. In line with the results of Elizabeth & Mary (2018), research in organizing students to learn, with the PBL model students are given the freedom to build knowledge related to the material by extracting information from various learning resources around students. The result of Li & Tsai (2017) on the several previous studies that whith implemented this model on students' conceptual understanding and have a positive effect on students' long-term for knowledge retention. The findings in this study are in line with previous studies, that the apply of PBL has a positive impact on the effectiveness for the learning by encouraging learning motivation carried out by teachers (Luo, 2019). Besides, which is the implementation to the learning process will be increase the flexibility required to solve problems from a different point of view and approach (Fisher et al., 2019).



Figure 3. Offline Learning (Face-to-face in The Conventional Class)

Indicators of original thinking ability through pretest-posttest value in the control class were 57.50 and

62.50, from the results of the N-gain test in the control class 0.10, were category was less effective, while in the experimental class it was 58.33 and 76.66 with the results of the N-gain test 0.43 in category creative (table 5). This is because students in the experimental class use the PBL model in syntax guiding individual and group participants, the teacher encourages students to collect appropriate information, with instructions given by the teacher carried out in *Zoom meeting* ONLINE, before the implementation of OFFLINE learning in the conventional class. So that students can improve students original thinking skills. Original thinking can be seen in the ability of students to answer questions correctly and students' ability to express new ideas by scientific concepts. Based the results of research by Yustina *et al*, (2020b) on the ability to think originality, students can give answers from their findings and differ from what has been given by the teacher, because students are used to finding new things or answering with a variety of answers and by using sentences look for references in various online sources. According to Sun & Chen (2016), using problem based learning through online learning, it can be interpreted that online learning plays important role in increasing creativity. The result of Mayarni & Yulianti (2020), using essay type questions can provide oppurtunities for students to express their creative ideas. The result of research by Safitri & Suparwoto (2018) the aspect of originility is viewed from students' skill to answer question based on their opinions or findings, which come from their minds.

Indicators of elaboration thinking ability through the pretest-posttest value in the control class were 53.33 and 60.00 the results of the N-gain test in the control class, 0.14 categories were less effective, while in the experimental class 54.44 and 75.55 the results of the N-gain test 0.46 were creative categories (table 5). This is because students in the teacher's experimental class use the PBL model in syntactic to develop and present the results of the work, the teacher encourages students to submit the results of group discussions to be presented in front of the class offline. The students can improve their ability to elaborate. Disambiguating and developing detailed ideas from students' ability to answer questions, namely determining and concluding. From the results and the research of Yustina *et al.*, (2020b) a person's creative thinking ability is influenced by personal characteristics, problem character, and a person's point of view. In addition, the potential for everyone's creative thinking ability is different both from the point of view and from the characteristics of the creative thinking he has. The result of Herdiawan et al. (2019), the increase in skill has increased, occuring because students are trained to be able to describe ideas from the Learning resources they get. The results of the research Isma et al. (2021), analysis show that the application of this Problem-Based Learning model, can

be seen an increase. This is because the Problem-Based Learning model is direct at increasing the active role of students during the Learning process, so that through discussion students can express opinions and ideas in their groups and make the Learning process more meaningful.

Therefore, the Problem Based Learning model through Blended Learning affects the ability to think creatively. Seen in the Learning process that associates the Problem Based Learning model with Blended Learning. In problem orientation the teacher gives cases through Google Classroom so that students can think smoothly in finding ideas. Organizing students, the teacher directs students to work on assignment sheet (worksheets) through Zoom Meeting and develops various kinds of flexibility ideas to be conveyed. Assisting independent or group investigations, the teacher asks students to determine the formulation of the problem, being able to think of originality and up-to-date answers. Developing and presenting their work, students convey ideas that have been discussed with their friends obtained from the Internet, on the through OFFLINE learning in conventional class. Analyzing and evaluating, students are able to elaboration develop a variety of interesting answers and students are able to defend opinions with effective communication.

Conclusion

Based on the results and discussion, it can be drawn that overall using the *Problem Based Learning* model through *Blended Learning*, has an more effective and significant influence on increasing students' creative thinking ability to the material on the body defense system at SMAN Plus Riau Province.

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