The Effect of Blended Learning Based on The Problem-Based Learning Model Assisted by Puzzle Media on The Critical Thinking Skills of Fifth Grade Students on Ecosystem Themes

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A R T I C L E I N F O

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A B S T R A K

Rendahnya kompetensi ilmu pengetahuan alam yang disebabkan oleh penggunaan model pembelajaran yang kurang optimal membuat siswa kesulitan dalam memahami materi pembelajaran. Penelitian ini bertujuan untuk menganalisis pengaruh *blended learning* berbasis model *problem based learning* berbantu media *puzzle* terhadap kemampuan berfikir kritis siswa kelas V tema ekosistem SDN 03 Pegundan. Jenis penelitian ini merupakan penelitian eksperimen menggunakan *pre-experimental design* dengan bentuk *one-group pretest-posttest design*. Jumlah sampel dalam penelitian ini adalah seluruh siswa kelas V SDN 03 Pegundan yang berjumlah 26 siswa dengan menggunakan sampling jenis sampling jenuh. Pengumpulan data dalam penelitian ini diperoleh melalui wawancara, tes dan dokumentasi. Teknik analisis data dalam penelitian ini adalah teknik analisis data statistik kuantitatif. Hasil penelitian ini memperoleh hasil uji-t diperoleh t hitung > t tabel yaitu 8,829 > 1,706 dan hasil uji hipotesis yang menyatakan adanya pengaruh motivasi belajar yaitu uji regresi diperoleh hasil sebesar 62,1%. Berdasarkan hasil analisis tersebut dapat disimpulkan bahwa ada pengaruh *blended learning* berbasis model *problem based learning* berbantu media *puzzle* terhadap kemampuan berfikir kritis siswa kelas V tema ekosistem SDN 03 Pegundan.

A B S T R A C T

The low competence of natural Science caused by using a learning model that is less than optimal makes it difficult for students to understand the learning material. This study aims to analyze the effect of blended learning based on a problem-based learning model assisted by puzzle media on the critical thinking skills of fifth-grade students on the ecosystem theme of SDN 03 Pegundan. This type of research is an experimental study using a pre-experimental design in the form of a one-group pretest-posttest design. The number of samples in this study was all students of class V SDN 03 Pegundan, totaling 26 students using saturated sampling type. Data collection in this study was obtained through interviews, tests, and documentation. The data analysis technique in this research is quantitative statistical data analysis techniques. This study obtained t-test results obtained t count > t table, 8.829> 1.706 and the results of hypothesis testing which stated that there was an effect of learning motivation, the regression test, the result was 62.1%. Based on the results of this analysis, it can be concluded that there is an effect of blended learning based on a problem-based learning model assisted by puzzle media on the critical thinking skills of fifth-grade students on the ecosystem theme of SDN 03 Pegundan.

Introduction

Elementary school education aims to develop the basic abilities of each student, where each student learns actively because of the encouragement in himself and an atmosphere that makes it easy for his optimal development (Erwanto, 2020; Febriana et al., 2020; Rohati et al., 2018). Learning is a process of interaction between students and educators and learning resources in a learning environment. Learning is also assistance provided by educators to students to obtain information, abilities and form attitudes that can later be applied in everyday life. The learning process in educational units is organized in an interactive, inspiring, fun, challenging, motivating students to participate actively. It provides sufficient space for initiative, creativity, and independence according to students' talents, interests, and physical and psychological development.

For this reason, each education unit carries out lesson planning, implementation of the learning process, and assessment of the learning process to increase the efficiency and effectiveness of the achievement of graduate competencies. Learning in schools runs according to what is expected. Each education unit must carry out learning planning, implementing the learning process, and assessing the learning process to increase the efficiency and effectiveness of the achievement of graduate competencies, and innovation is needed in learning. Teachers must have good abilities in delivering material to students, especially at the elementary school level.

At the elementary school level, science subjects are among the most important and necessary subjects in everyday life. For example, practicing critical thinking to solve a problem makes someone accustomed to solving life's problems systematically and easily. It is reinforced by opinion (Afrizon et al., 2012; Firdaus et al., 2020; Suriasa, 2018), which states that critical thinking can be developed through science learning, as already stated that critical thinking is needed because it plays an important role in solving problems in everyday life and Science is one of the sciences that has a role in improving critical thinking skills, Science can be used to train critical thinking because Science plays a very important role in human life where the problems that occur in daily human life are related to nature. So that student are expected to have the ability to think critically to help solve problems well. But, in Science learning, the ability to think critically has not been fully developed. Students' critical thinking skills, especially in science learning, is still very low.

Based on the results of interviews on science learning with fifth-grade guardians, it was found that there were 26 fifth-grade students. The KKM score set for the fifth-grade science subject is 75. Of the 26 total students, the percentage of completeness of the Science UTS in grade five SDN 03 Pegundan Pemalang only reaches 40%. Meanwhile, the percentage of incompleteness reaches 60%. It shows that many fifth-grade students have low learning outcomes. Besides that, students also do not understand and still have difficulty regarding the basic concepts of multiplication and division in mathematics. Students have difficulty understanding and solving problem-solving problems. Students immediately write down their answers without writing down the steps to solve the problem. In addition to low learning outcomes, researchers found several problems, that learning was still centered on the teacher to lack the students' activeness and independence. Students are not careful in solving problems, which results in low learning outcomes related to problem-solving, resulting in low critical thinking skills of students in science subject matter.

According to (Burhanah Farida, 2015; Hadinata et al., 2017; Sayekti & Kinasih, 2018), that Science is a science that deals with natural phenomena and things that are systematically arranged, generally accepted in the form of a collection of observations and experiments / systematic (regular) means that knowledge is arranged in a system, does not stand alone, one another is interrelated. , to explain each other so that all of them constitute one unified whole, while generally accepted means that knowledge is not only valid or by someone or several people with the same experimentation method will get the same or consistent results.

The reasons for the content of science lessons that need to be taught in elementary schools are: (1) Science is the basis of technology, so that Science is beneficial for a nation. One cannot be a good doctor without a broad study of natural phenomena; (2) Science is a subject that provides opportunities to think critically and objectively. It will be created, for example, by applying the find yourself method. 3) Science is not a mere rote subject if it is taught through experiment; (4) Science subjects have educational values, they have the potential to shape the personality of the child as a whole (Christiana et al., 2014; Fatimah, 2017; Wicaksono et al., 2020). After understanding the above statement, it can be concluded that Science is a step that aims to understand nature using scientific work, to gain an understanding of scientific principles, concepts, laws, and attitudes, as well as critical thinking skills that can be useful in everyday life.

The ability to think critically is a convergent thinking pattern. Convergent thinking is the process of processing information from various perspectives to obtain a conclusion. According to (Hasanah et al., 2018; Indriyani et al., 2019; Marudut et al., 2020) suggesting critical thinking is a skilled and responsible process when someone studies a problem from all points of view and is involved in investigations so that they can get the best opinion, judgment or consideration using their intelligence to conclude. Critical thinking is concerned with using cognitive skills or strategies that increase the likelihood of obtaining the desired impact.

There are five domains of expertise with various indicators regarding critical thinking, : (1) interpretation, understanding and expressing the meaning or importance of different experiences, situations, data, events, assessments, findings, beliefs, rules, procedures or criteria; (2) analysis identifies trends and actual conclusions on the relationship between statements and questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, thoughts, information and opinions; (3) evaluation to assess the credibility of questions or other important representations or depictions of people's perceptions; (4) conclusions to analyze and believe the elements needed to draw reasonable conclusions, to form hypotheses and estimates, to take into account relevant information and to take into account the consequences that flow from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, a description of the data, statement, or other form of representation; (5) explanation, to state the results of thoughts, to state the

results of thinking, to impress thoughts in terms of evidence, concepts, methods, criteria and contextual considerations that form the basis of one's thinking and to present people's thoughts in the form of a strong statement (Erwanto, 2020; Miatun & Khusna, 2020; Nurdin et al., 2020).

The improvement of student learning outcomes depends on the role of the teacher in carrying out the learning process. Therefore a teacher is required to have good teaching skills when delivering material in class. This ability can be seen when the learning process is active, fun, and innovative, which can be helped using learning media. According to (Dwicahyani et al., 2019; Khaulani et al., 2019; Sundari, 2019), media in learning are all forms of communication tools that can convey information from sources to students to stimulate them to take part in learning activities. Media are forms of communication, both printed and audiovisual, and their equipment. The media should be able to be manipulated, can be seen, heard, and read. Whatever the limits are given, there are similarities between these limits. The media can transmit messages from sender to receiver to stimulate thoughts, feelings, concerns and interests, and students' attention so that the learning process occurs. In this study, puzzle media will be used. Puzzle media is a simple media that is played by loading pairs. Puzzles as a science learning media help students to understand the subject matter more easily. It is hoped that with this puzzle, media students will be more enthusiastic and increase students' enthusiasm for learning because in this medium and students learning, they can also play. Selection of puzzle media, in addition to being interesting and able to focus students' attention which will add to the learning process will be more interesting because by using puzzles students in learning participate actively and the benefits of puzzles for children train concentration, patience and can train children to think (Rumakhit, 2017; Trimantara & Mulya, 2019; Widiana et al., 2019).

According to (Heru & Yuliani, 2020; Siregar & Manurung, 2020; Surahman & Surjono, 2017), a learning model is a plan or pattern that we can use to design face-to-face teaching patterns in the classroom or organize tutorials and to determine learning materials/tools including books, films, types, programs. Computer media program and curriculum (as a course for learning). Blended learning based on the Problem Based Learning model of learning uses real (authentic) problems that are not structured (ill-structured) and is open as a context for students to develop problem-solving skills and critical thinking as well as build new knowledge with learning objectives designed to be able to stimulate and engage learners in problem-solving patterns. This condition can develop learning skills in the field directly in identifying problems.

The problem-based learning model is a plan or procedure used by the teacher to convey learning to students to achieve teaching goals properly (Pratiwi & Setyaningtyas, 2020; Rohati et al., 2018; Suryawati et al., 2020). The learning model consists of four, inquiry learning, discovery learning, problem-based learning, and project-based learning. One of the learning models, the problem-based learning model, which includes a learning model in its delivery, presents a problem. According to (Abdurrozak & Jayadinata, 2016; Febriana et al., 2020; Maryatun & Metro, 2017), that Problem Based Learning (Problem Based Instruction) is learning to use real (authentic) problems that are not structured (ill-structured) and are open as a context for students to develop problem-solving skills and critical thinking as well as build new knowledge. In contrast to conventional learning, which makes real problems as an application of concepts, PBM (Problem Based Learning) makes real problems as triggers for students' learning process before they know formal concepts. In addition, this learning model involves students solving a problem through the stages of the scientific method so that students can learn knowledge related to the problem and at the same time have the skills to solve problems.

This research is supported by previous research relevant to this research, such as (1) research conducted by (Siregar & Manurung, 2020). The result shows that blended learning affects the creativity of prospective teacher students at Medan State University. (2) research conducted by (Abdurrozak & Jayadinata, 2016), The result is that the problem-based learning model affects students' creative thinking skills. (3) research conducted by (Royantoro et al., 2018), the result is the problem-based learning model of students' high order thinking skills.

Based on the background of this study and based on the problems in science learning, this study aims to analyze the effect of blended learning based on a problem-based learning model assisted by puzzle media on the critical thinking skills of fifth-grade students the ecosystem theme of SDN 03 Pegundan.

Method

The research was conducted at SD Negeri 01 Petanjungan. When the research was carried out on October 22-24, 2020 in a blended manner. This research is quantitative. The research design used in this study was a pre-experimental design with a one-group pretest-posttest design. In this design, using a pretest before being given action, the treatment results can be more accurate because they can compare with the conditions before being treated.

The population is a generalization area consisting of objects/subjects with certain qualities and characteristics determined by the researcher to study and then draw conclusions (Heru & Yuliani, 2020; Siregar & Manurung, 2020; Surahman & Surjono, 2017). In this study, the population is SD N 03 Pegundan. The sample used in this study were fifth-grade students of SD Negeri 03 Pegundan. In this sample, 26 students consisted of

16 female students and 10 male students. In this study, the researcher used a saturated sampling technique, the sampling technique when all members of the population were used as the sample. Another term saturated sample is a census, where all members of the population are sampled.

Data collection techniques were using interviews, tests, and documentation. The research instrument is in interview sheets, documentation of learning activities, test forms, test preparation methods, test instrument tests (validity, reliability, difficulty level, distinguishing power).

The data analysis technique used is the quantitative statistical data analysis technique in the initial normality test (pretest), the final normality test (post-test), t-test, regression test, and completeness test. This analysis technique analyzes blended learning based on a problem-based learning model assisted by puzzle media on students' critical thinking skills.

Result and Discussion

This research was conducted on the foundation of the State 03 Pegundan, Petarukan District, Pemalang Regency. This research was conducted in fifth grade in the first semester of the 2020/2021 school year, consisting of 26 students consisting of 16 female students and 10 male students. This study focuses on measuring student learning outcomes as seen from the ability to think critically in science learning, especially on the theme of the ecosystem for the first five-grade class of the 2020/2021 academic year.

Retrieval of data on 22, 23, 24 October 2020 with three meetings. The research was conducted in a blended manner. The researcher acted as an adjunct. The research begins by conducting a preliminary study at school to find existing problems and determine the population, sample, and sampling techniques. Based on the problems found, the researcher used a problem-based learning model with puzzle media to improve the critical thinking skills of fifth-grade students of SD Negeri 03 Pegundan, Pemalang Regency. Then the researchers made an instrument about the material about the ecosystem.

The step is taken before the research was to test the instruments that had been made. The instrument test in this study was conducted at SDN 02 Loning, Pemalang Regency, totaling 30 students with 20 items in the form of essays. After testing the instrument, the data is tested in 4 stages, validity, reliability, difficulty level, and differentiation. Based on the results of the instrument trial, there were 10 valid questions and 10 invalid questions. These valid questions were then used as pretest and post-test questions.

The research design used in this study was pre-experimental in the form of a one-group pretest-posttest design. A pretest is a preliminary test to determine students' initial ability in the learning process before getting treatment with problem-based learning models. Then the researcher gave a post-test after giving treatment using a problem-based learning model. This post-test is the final test to determine students' ability after being given treatment with a KKM score of 75. In the pretest results of 26 students, 25 students did not complete, and 1 student who did. Whereas in the post-test results, 5 students did not complete and 21 students who did. The students' pretest and post-test scores were processed and the values obtained were shown in Table 1.

Table 1. Pretest and posttest scores

Information	Nilai pretest score	Posttest score
Lowest Score	35	56
Highest Score	83	93
Average	52,15	79,62
Percentage of increase	**27,47%**	

From table 1, it is found that the average test score before being given treatment is 52.15, with 25 students declared incomplete and 1 student declared complete. After learning with a problem-based learning model, the average post-test score of students was 79.62, with 5 students declared incomplete and 3 students declared complete. The percentage increase is 27.47%. The conclusion from the above explanation shows that the initial ability is obtained on a relatively low average. After being given treatment using a problem-based learning model, there was an increase in student learning outcomes. It can be seen in Figure 1.

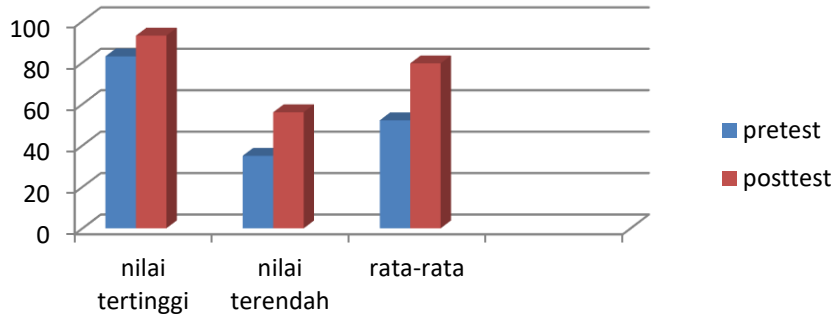

Figure 1. pretest and postest scores

After it is known that the post-test results have increased, then the initial and final data normality test is carried out, one-party t-test, two-party t-test, and learning completeness test. The initial data normality test that is calculated is the pretest value to find out whether the data is normally distributed or not. This normality test uses the Liliefors test with a significant level of 5%. The following is a recapitulation of the initial normality test, which can be seen in Table 2.

Table 2. Initial Normality Test

Data	Learning Outcomes	Conclusion
L_0	0,132	Normal distribution
L_{tabel}	0,174	

Based on the data in table 2 that at the level of 5% and n = 26, it is obtained that L_0 (0,132) $<L_{tabel}$ (0,174) then H_0 is accepted, indicating that the data comes from a normally distributed population.The final data normality test that is calculated is the post-test value to find out whether the data is normally distributed or not. This normality test uses the Liliefors test with a significant level of 5%. The following is a recapitulation of the final normality test, which can be seen in Table 3.

Table 3. Final Normality Test

Data	Learning outcomes	Information
L_0	0,084	Normal distribution
L_{tabel}	0,174	

Based on the data in table 3 that at the level of 5% and n = 26, it is obtained L_0 (0,084) $<L_{tabel}$ (0,174), so H_0 is accepted, indicating that the data comes from a normally distributed population. After testing the data and data analysis requirements, the learning outcomes are normally distributed, testing the hypothesis. Hypothesis testing in this study is calculated using the t-test technique to determine the difference in the average pretest, and post-test learning outcomes can be seen in Table 4.

Table 4. T-Test Results

Respondent	t_{hitung}	t_{tabel}	Ket.
26	8,829	1,706	H_0 rejected

Table 4 shows that after applying the problem-based learning model assisted by puzzle media, there are differences in the average value of student learning outcomes. It is proven that with db = n-1 = 25 and a significance level of 5%, the t-table is 1.706. From the calculation, it is obtained t_count of 8.829. Based on the criteria t count > t table, 8.829 > 1.706 so that H_0 is rejected and H_a is accepted. It means that there are differences in the learning outcomes of the fourth-grade students of SD Negeri 01 Petanjungan.

The hypothesis states that there is an effect of learning motivation on blended learning with the problem-based learning method on the critical thinking skills of fifth grade students on the theme of the SDN 03 Pegundan Pemalang ecosystem proven by regression calculations can be seen in Table 5.

Table 5. Regression Test Results

Respondent	f_{hitung}	f_{tabel}	Ket.
26	1528,56	4,26	H_0 rejected

The calculation of the regression test obtained by the equation Y = 90.41 - 0.13, X. The acquisition of Fcount 1528.56 and Ftable is obtained from dk numerator = dbreg = 1 and dk denominator = dbres = 24 at the real level α 5%, so that Ftable = 4.26. So Fcount> Ftable or 1528.56> 4.26 then Ho is rejected. There is an influence on applying the cooperative model of problem-based learning blended learning on the critical thinking skills of fifth-grade students on the ecosystem theme of SDN 03 Pegundan Pemalang. To find out the magnitude of the influence of the problem based learning model assisted by puzzle media, it was obtained r^2 of 0.621 or 62.1%. It means that the effect of the problem-based learning model assisted by puzzle media on the critical thinking skills of fifth-grade students of SDN 03 Pegundan ecosystem theme is 62.1%. The results of the learning mastery test can be seen in Table 6.

Table 6. Learning Completeness Test Results

No.	Learning Outcomes	Completeness level	Percentage	
			Complete	Not Complete
1	*Pretest*	75%	4%	96%
2	*Posttest*	75%	81%	19%

The percentage of student learning completeness shows that learning without using a problem-based learning model with puzzle media is 4% of students who complete and as many as 96% of students who do not complete, then after being treated using a problem-based learning model with puzzle media as many as 81% of students who complete and 19% of students who did not complete. The difference in research treatment applies the Problem Based Learning model assisted by puzzle media and applying conventional learning. In conventional learning, students are passive because they only listen to the material presented by the teacher. Students tend to accept the material presented by the teacher. Conventional learning makes students quickly bored in learning. Conventional learning, where learning tends to be the dominant teacher, makes students feel bored so that when learning takes place many students play.

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Conclusion

The calculation results show a significant difference in student learning outcomes as seen from their ability to complete. So, it can be concluded that the problem-based learning model assisted by puzzle media affects the critical thinking skills of fifth-grade students on the ecosystem theme of SDN 03 Pegundan.

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