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Problem Based Learning Model Assisted by Visual Media Improves Critical Thinking Skills of Grade IV Elementary School Students

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ABSTRAK

Pembelajaran yang masih berpusat pada guru mengakibatkan siswa menjadi pasif selama proses pembelajaran. Hal ini membuat siswa kurang mampu berpikir kritis karena kurangnya kesempatan dalam mengembangkan kreativitasnya. Penelitian ini bertujuan untuk menganalisis model pembelajaran problem based learning berbantuan media visual terhadap kemampuan berpikir kritis siswa kelas IV di SD. Jenis penelitian yang digunakan adalah eksperimen semu dengan desain non-equivalent control group design. Populasi pada penelitian ini adalah siswa kelas IV SD sebanyak 215 siswa. Sampel ditentukan dengan teknik Cluster Random Sampling. Sampel pada penelitian ini pada kelompok eksperimen sebanyak 30 siswa dan pada kelompok kontrol sebanyak 29 siswa. Metode pengumpulan data pada penelitian ini digunakan metode tes kemampuan berpikir kritis dengan menggunakan rubrik penilaian. Data post-test yang diperoleh dianalisis menggunakan teknik analisis uji-t dengan rumus separated varians. Berdasarkan hasil analisis, F hitung 1.148 dan F tabel 1.875 pada taraf signifikansi 5% (α sama dengan 0,05) sehingga data dinyatakan homogen. Simpulan penelitian bahwa terdapat pengaruh yang signifikan model pembelajaran problem based learning berbantuan media visual terhadap kemampuan berpikir kritis siswa kelas IV SD.

ABSTRACT

Learning that is still teacher-centered results in students becoming passive during the learning process. This makes students less able to think critically because of the lack of opportunity to develop their creativity. This study aims to analyze the problem-based learning model assisted by visual media on critical thinking skills for grade IV students in elementary school. The type of research used is a pseudo-experiment with a non-equivalent control group design. The population in this study were grade IV elementary school students as many as 215 students. The sample was determined by Cluster Random Sampling technique. The sample in this study in the experimental group was 30 students and in the control group was 29 students. The data collection method in this study used the critical thinking ability test method using an assessment rubric. The post-test data obtained was analyzed using t-test analysis technique with separated variance formula. Based on the analysis results, F count 1.148 and F table 1.875 at a significance level of 5% (α equals 0.05) so that the data is declared homogeneous. The conclusion of the research is that there is a significant effect of problem-based learning model assisted by visual media on critical thinking skills for grade IV elementary school students.

1. INTRODUCTION

In the era of globalization that is happening throughout the world, it has a big impact on the order of life. Globalization causes everything to experience rapid development and cannot be anticipated. The occurrence of such significant developments in various fields and aspects of life requires human resources (HR) to be able to compete with the progress of the times. In an effort to improve the quality of human resources influenced by the quality of education. Education actually has a very important role in the life of the nation and state, namely in the effort to create quality human resources (NAP Lestari et al., 2021; Londa & Domu, 2020; Prasetyo & Kristin, 2020). This poses a challenge to the government to continue to improve

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the quality of education in Indonesia in order to produce competent human resources through curriculum improvements. The implementation of the current curriculum is called the independent curriculum which will be implemented starting in the 2022/2023 school year. Education in the 21st century is currently in line with the rapid development of technology. The implications for the role of education are becoming increasingly important in preparing young people who have learning and innovation skills, skills in using information technology and media, and can work, and survive using skills for life. (NAP Lestari et al., 2021; Rauf et al., 2022; Wati, 2022). The 21st century skills are known as the 4C skills which consist of critical thinking, communication, collaboration, and creativity (Barta et al., 2022; Polat & Aydın, 2020). This capability is a benchmark in improving education in Indonesia, because basically the PISA assessment emphasizes the skills needed for 21st century education. (Purwasih et al., 2021; Selman, 2020). These skills are not acquired from human birth, but can be developed through learning activities, practice and experience. Therefore, educators need to understand how to educate so that students have 21st century skills.

One of the important skills developed in the 21st century at the elementary school level is the ability to think critically (critical thinking). Having skills in critical thinking is also very necessary in the current 4.0 revolution era, where students are directed to become individuals who are competent and skilled in critical thinking and can solve problems. (Oktaviani, 2022; Susianita & Koto, 2019; Talib et al., 2019). It is hoped that critical thinking skills can be developed in all existing subject matter, especially in the main subjects, one of which is the Natural Sciences content. In the content-free curriculum, Science and Social Sciences are integrated into what is called the Natural and Social Sciences (IPAS). Science education can help students to develop curiosity about phenomena or symptoms that occur in their surroundings. Through a learning process that seeks to develop critical thinking skills, students can also learn and practice solving a problem in their daily life. Critical thinking skills can develop well during the learning process (Cucurostanti & Herlina, 2020; Juano & Pardjono, 2016). The learning in question is innovative learning emphasizing the ability of students to use their minds to determine solutions to the problems they face. Innovative learning means that teachers must be able to make updates to learning models and methods. Educators have an important role in creating varied and meaningful learning processes. Educators should have the ability to package learning that is effective, innovative, conducive and fun for students (Juliantini et al., 2020; Mariskhantari et al., 2022). Through this process the teacher is able to guide students so they can develop critical thinking skills. The critical thinking skills referred to in this study are students' abilities in analyzing problems, evaluating, concluding and making judgments or making decisions on information and problems in their daily lives.

Based on the interviews and observations that have been carried out, it was found that the ability to think critically in the content of students' natural sciences was still relatively low because learning did not emphasize the development of critical thinking skills. This can be seen from interviews conducted with the homeroom teacher of class IV, it was revealed that there were 64% of students who had not been able to identify or analyze problems, provide explanations, draw conclusions so that they were not able to solve problems from science questions that required higher-order thinking skills. Meanwhile, science lessons should be able to open up space for discussion and challenge students to develop critical thinking skills in the process of solving problems they face and make students understand the social environment more and more. (Bakri et al., 2021; Marfilinda, 2019; Setiawan, 2017). From the observations made, it is known that learning is still teacher-centered, where the teacher explains more of the subject matter while students listen and take notes on the subject matter so that students become passive during learning can be a trigger for underdeveloped students' critical thinking skills in science. When the teacher asked questions to students related to the subject matter, most of the students had not been able to provide arguments or personal opinions but there were also students who answered by reading their notes and looked hesitant in answering. Furthermore, in science lessons students tend to be directed to memorize material and the teacher has not guided students to carry out problem solving activities. Memorizing-oriented learning, rarely using learning media, resulting in learning to be meaningless so that teaching materials will be quickly forgotten by students. In addition, in learning the teacher does not use learning media, so students only learn from the teacher's explanations and learning resources such as student books and work on questions on worksheets.

The learning process should not only be dominated by the teacher but students must be more active, thus students can develop the ability to think critically, creatively, innovatively and be able to solve problems. From these conditions, it is necessary to have a method that can be applied by educators in creating an innovative learning process and can develop students' critical thinking skills (Ghasya, 2017; Primary, 2023; Sitompul, 2021). In an effort to develop students' critical thinking skills in science content, it is necessary to have an appropriate learning model to hone students' critical thinking skills. The learning model is a conceptual framework that describes systematic procedures that structure learning experiences

in order to achieve learning objectives and serves as a basis for educators in planning teaching and learning activities (Endah, 2020; Frianto et al., 2018; Novitasari & Laili, 2023). So, to achieve the learning objectives that have been set, innovation from the teacher is needed in the implementation of learning specifically on science content, namely in the form of a learning model, students are required to be able to develop critical, creative, systematic thinking skills, and be able to solve problems independently (Seibert, 2020). One of the appropriate learning models to overcome the problems of this research is the problem-based learning model or problem-based learning model. The application of the problem-based learning model is expected to be better for developing students' thinking skills.

Learning that is less varied also has an impact on students who easily feel bored and don't focus on learning due to a lack of motivation to learn (Anggraini et al., 2022; Sutrisno et al., 2019). Problem based learning model is a learning process that involves students (student-centered) and prioritizes real problems obtained both in the school, home and community environments as a basis for acquiring knowledge and concepts through critical thinking skills and problem solving (Ahmad & Sari, 2019; Devi & Bayu, 2020). Problem-based learning has various advantages, namely it can strive to develop students' critical thinking, encourage students' willingness and independence in work, stimulate student motivation or initiative to learn, and improve relationships to enhance cooperation between students (Ratana Subha Tusitadevi & Suhandi Astuti, 2021; Salombe & Harjono, 2022). Applying the problem-based learning model, the teacher acts as a facilitator who must try to develop students' basic abilities, namely helping students by directing or guiding them to observe, try, solve problems and make conclusions, so that students are expected to be able to develop their thinking skills. So, with this problem-based learning model it is possible to help students develop their critical thinking skills.

The findings of previous research stated that problem-based learning models can improve problem-solving skills faced when learning and students' self-efficacy (Saepuloh et al., 2021; Saputra et al., 2019). PBL is one type of learning that gives problems to students and expects students to be able to solve these problems through active learning activities and accompanied by the teacher as a facilitator. (Effendi et al., 2021; Puriasih & Trisna, 2022). This study will focus on IPS content, because IPS material is in semester II, while Science material is contained in semester I. The IPAS content uses the principles of the scientific method which will train students' scientific attitudes which include high curiosity, critical thinking skills, analytical and the ability to draw the right conclusions. Based on this explanation, in this study it was tried to apply the Problem Based Learning model with the help of visual media and analyze its effect on students' critical thinking skills in science content. This study aims to analyze the problem-based learning model assisted by visual media on critical thinking skills in the science content of fourth grade students in elementary school.

2. METHOD

This study analyzed the Problem Based Learning model assisted by visual media on critical thinking skills in the science content of fourth grade elementary school students. The approach used in this study is quantitative, where the results obtained are in the form of numbers used to determine the relationship between variables. This study uses a quasi-experimental research design (Quasi Experiment Design) on students in a class or group. The quasi-experimental design has a control group, but cannot fully function in controlling external variables that affect the implementation of the experiment (Sugiyono, 2019). This type of research was chosen because the ability to observe student behavior is very limited, especially when students are outside the school environment, so that outside variables that can affect the implementation of experiments are difficult to control. The purpose of research with quasi-experiments is to obtain information which is an estimate for the information obtained with actual experiments in circumstances that make it impossible to control or manipulate all relevant variables. The design used in this study was a non-equivalent control group design. This design was chosen because it is not possible to change existing classes and this design is often used in educational research and other behavioral research. The population in this study were all fourth grade elementary school students. The distribution of the population in this study consisted of 8 schools with a total of 215 students.

The data collection method is a series of methods used to collect data in the research conducted. The data collection method used is the test method. The method used in this study was a test method to obtain data regarding critical thinking skills in the science content of fourth grade elementary school students. The research instrument grid is needed as a guide or guide in formulating items or questions. The instrument grid must include the scope of teaching materials and research variables, the types of questions, the number of questions, and the time required. In addition, the grid must describe indicators for each variable. The indicators contained in the grid are adjusted to the curriculum and teaching materials. In the test grid there is learning achievement (CP), learning objectives (TP), types of learning outcomes, number

of questions, and number of questions. The test grid in this study is in the form of a description of 10 items. The competency measured in this research is the ability to think critically in the content of Science and Technology related to the material in chapter 5 which is in the cognitive aspect, namely analyzing (C4), evaluating (C5), and creating (C6). Details of the essay test instrument lattice are in Table 1.

Table 1. Essay Test Instrument Grid

Learning Outcomes (CP)	Learning objectives (TP)	Knowledge Competency Level						Form Question
		C1	C2	C3	C4	C5	C6	
Students identify a variety of natural landscapes and their interrelationships with community professions	1. Students can analyze the characteristics of the variety of landscapes that exist in the area where they live appropriately				√			Description
	2. Students can analyze the natural resources that exist in the area where they live appropriately				√			Description
	3. Students can relate geographic influence to the natural wealth that exists in the area where they live carefully				√			Description
	4. Students can choose a wise way to properly utilize natural resources in the area where they live				√			Description
	5. Students can describe geographical influences with the dominant livelihoods of the people in their area of residence properly and correctly				√			Description
	6. Students can assess the impact of the presence of immigrant communities carefully					√		Description
	7. Students can plan problem solving to deal with the impact of the presence of immigrant communities properly and correctly						√	Description

Instruments that have been collected, then the instrument is tested. Furthermore, the results obtained will be tested for the validity of the contents and the validity of the instrument items. The test instrument is said to be good if it meets the requirements including having validity and reliability. The data analysis method used in this research is inferential statistical analysis method. The inferential statistical analysis that will be used is the t-test technique.

3. RESULT AND DISCUSSION

Result

The description of the data in this study is to present the results of the post-test of the ability to think critically in science in the experimental group and the control group of fourth grade elementary school

students. The object under study is the results of students' science critical thinking skills which are the result of treatment between students who are taught with the problem based learning model assisted by visual media in the form of PowerPoint and the results of students' critical thinking skills in science which are not taught by the problem based learning model assisted by visual media in the form of PowerPoint . The data obtained in this study were grouped into two, namely data on the results of critical thinking skills in the experimental group and data on the results of critical thinking skills in the control group. As for the description of the results of the critical thinking skills of students in class IV SD Science. In this study, the experimental group consisted of 30 students in grade IV elementary school. The instrument used to collect data is a description test. Students in the experimental class were given treatment in the form of a Problem Based Learning model assisted by visual media, namely PowerPoint for 6 meetings. At the end of the study, students were given a post-test to obtain data on science critical thinking skills. As for the recapitulation of the calculation results of the post-test score data for students' critical thinking skills in the experimental group, they are presented in Table 2. At the end of the study, students were given a post-test to obtain data on science critical thinking skills. As for the recapitulation of the calculation results of the post-test score data for students' critical thinking skills in the experimental group, they are presented in Table 2. At the end of the study, students were given a post-test to obtain data on science critical thinking skills. As for the recapitulation of the calculation results of the post-test score data for students' critical thinking skills in the experimental group, they are presented in Table 2.

Table 2. Results of Science Critical Thinking Ability Class IV SD No.1 Sibangkaja (Experimental Group)

No.	Post-Test Score	No.	Post-Test Score
1	93	16	95
2	90	17	90
3	78	18	83
4	75	19	63
5	65	20	88
6	63	21	83
7	73	22	85
8	73	23	70
9	83	24	88
10	75	25	70
11	83	26	83
12	75	27	95
13	78	28	73
14	73	29	70
15	73	30	85
Amount			**2363**

In this study the control group consisted of 29 students in grade IV SD. The instrument used to collect data is a test (description). All students were given treatment in the form of learning activities not using the problem-based learning model assisted by visual media (PowerPoint) for 6 meetings. At the end of the study, students were given a post-test to obtain data on science critical thinking skills. As for the recapitulation of the results of data analysis post-test scores of students' critical thinking skills in the control group, presented in Table 3.

Table 3. Results of Science Critical Thinking Skills for Class IV Elementary School (Control Group)

No.	Post-test score	No.	Post-test score
1	75	16	58
2	83	17	68
3	68	18	58
4	70	19	60
5	73	20	65
6	68	21	78
7	80	22	68
8	78	23	80
9	63	24	78
10	50	25	70
11	43	26	60

No.	Post-test score	No.	Post-test score
12	70	27	58
13	73	28	68
14	63	29	83
15	80		
Amount			**1980**

The normality test was carried out to find out whether the distribution of data was normally distributed or not. So, to prove whether the distribution of data on the critical thinking ability of the Science in the experimental group and the control group is normally distributed or not, so in this study the *Liliefors* formula was used. The test criteria in the normality test of data distribution are the significance of the test at L0 or L-count compared to the L-table *Liliefors* value at a significance level of 5%. If the value of L-count ≤ L-table, then the distribution of data in the two groups can be said to be normally distributed. In the normality test of data distribution, it was carried out on data on critical thinking skills in the science content of grade IV students in the experimental group and the control group. Based on the data analysis performed,

Table 4. Recapitulation of the Normality Test Results for the Distribution of Research Sample Data

Sample Group	L-count	L-table	Conclusion
Experiment Group	0.125	0.16	Normal Distribution
Control Group	0.075	0.17	Normal Distribution

The homogeneity test of variance was carried out based on data on students' critical thinking skills in the experimental group and the control group. In this study, the homogeneity of variance was calculated using the F test. With the provision that if F-count ≤ F-table, then the sample is homogeneous at a significance level of 5% with degrees of freedom for the numerator n1 – 1 and degrees of freedom for the denominator n2 – 1. The results of the homogeneity test for variance in the group the research sample is presented in Table 5.

Table 5. Recapitulation of Research Sample Homogeneity Test Results

Sample	S12	S22	Dk	F-count	F-table	Conclusion
Experiment Group	-	84,806	28	1.148	1875	Homogeneous
Control Group	97,368	-	29			

Discussion

Based on the results of data analysis, it showed that the two groups initially had equal abilities, after being given treatment in the form of learning using the Problem Based Learning model assisted by visual media (PowerPoint) the value of students' critical thinking skills in science increased. The average critical thinking ability of students in class IV in the experimental group was better than the average critical thinking ability in class IV in the control group. The Problem Based Learning model can improve and stimulate students' critical thinking skills, because this learning model stimulates students' ability to solve problems (KC Lestari et al., 2021; Mabruroh, 2019; Nurlaeli, 2022). This can be seen from the students who take part in learning using the Problem Based Learning model assisted by visual media (PowerPoint) is higher than the average score of students who take part in learning not using the Problem Based Learning model assisted by visual media.

The second finding shows that learning activities using the Problem Based Learning model assisted by visual media (PowerPoint) can run optimally. This is because the Problem Based Learning model assisted by visual media (PowerPoint) has a good impact on learning activities. In addition, the Problem Based Learning model assisted by visual media (PowerPoint) can help students become more active, be able to solve problems both individually and in groups, work in teams, and be able to construct their own knowledge through problems given during the learning process. (Melindawati et al., 2021; Nurlaeli, 2022; Sugiharti et al., 2020). Through existing problems, indirectly students can practice and try to find a concept and hone critical thinking skills in finding a solution to solving the problems given related to the content of the Science content. In addition, the use of visual learning media in the form of PowerPoint resulted in students being more interested in participating in learning activities and students becoming more understanding of the material presented (Analicia & Yogica, 2021; Putri & Suniasih, 2022). This is because the visual media in the form of PowerPoint is able to increase students' interest and motivation to learn, so that it can improve student learning outcomes.

The third finding, in the control class is learning not using problem-based learning models assisted by visual media. The learning approaches and models in the independent curriculum cannot be applied properly, so that learning activities are not optimal. This can be seen in the learning process which is still dominated by the teacher while students listen more to the teacher's explanations. Lack of student involvement in the learning process results in students becoming passive, so students find it difficult to understand the material being studied and are less able to develop their thinking skills (FN Lestari et al., 2022; Nastiti et al., 2022; Nazilatul Mukhlisoh et al., 2023). This is of course caused by inappropriate learning methods where teacher-centered learning is less able to train students to learn independently. In addition, the use of visual media can help students understand the material, because visual media contains attractive displays such as image captions that can provide good understanding for students.

The research findings are strengthened by the findings of previous studies stating that the right learning model to achieve maximum learning goals also requires appropriate learning media (Frianto et al., 2018; Saepuloh et al., 2021). Problem-based learning: Strategies for cultivating Generation Z's critical thinking and perseverance (Rezkillah, 2020; Seibert, 2021). Choosing the right learning model can influence the development of students' critical thinking skills in science. This study proves that the Problem Based Learning model assisted by visual media (PowerPoint) is well applied in the learning process as an effort to improve students' critical thinking skills in science. Through the application of the Problem Based Learning model assisted by visual media (PowerPoint) it can build students' self-confidence, increase students' interest and motivation in learning, learning becomes more fun, students are able to find solutions to problems given both in groups and individually, students become more participating and active in participating in learning which results in the development of students' critical thinking skills in science. When compared with the results of research on classes that were not taught using the problem-based learning model assisted by visual media, students tended to be passive, lack interest and motivation to learn, and students felt bored more quickly during the learning process. The implications of this research are that teachers are expected to choose the appropriate learning model, so that learning activities are more varied. One way is to apply the Problem Based Learning model assisted by visual media (PowerPoint) in science learning.

4. CONCLUSION

The results showed that there was a significant difference in the critical thinking skills of students' science content between groups of students who were taught using the Problem Based Learning model assisted by visual media (PowerPoint) and groups of students who were not taught using the Problem Based Learning model assisted by visual media (Power point) in class. IV SD. The results of this study can be used as input for teachers to choose an appropriate learning model, so that learning activities are more varied. One way is to apply the Problem Based Learning model assisted by visual media (PowerPoint) in science learning.

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