THE EFFECT OF PROBLEM-BASED LEARNING MODEL BASED ON CONCEPT MAPPING ON CRITICAL THINKING SKILLS OF GRADE V STUDENTS AT SD NEGERI CENTRE MALINO

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ARTICLE INFO	ABSTRACT
	The research conducted is a quasi-experimental study using a nonequivalent control group design model. The objectives of this study are: (1) to describe the implementation of problem-based learning based on concept mapping in Grade V at Centre Malino Public Elementary School; (2) to depict the critical thinking skills of Grade V students at Centre Malino Public Elementary School; (3) to determine whether there is an influence of implementing problem- based learning based on concept mapping on the critical thinking skills of Grade V students at Centre Malino Public Elementary School. The population for this study consisted of 45 students from Class VA and Class VB at Centre Malino Public Elementary School. The sample size was 22 students from Class VB, selected using simple random sampling. Data collection techniques included tests, observations, and documentation. The results of the study were processed using descriptive statistical analysis and inferential statistical analysis. The descriptive analysis indicated that the implementation of problem-based learning based on concept mapping was categorized as "very good", and the feasibility of the learning activities conducted by students was categorized as "good". The description of students' critical thinking skills after the treatment was in the "good" category. The inferential statistical analysis, using paired sample t-test, showed a probability value less than 0.05, then the null hypothesis (Ho) is rejected, and the alternative hypothesis (Ha) is accepted. Consequently, it can be inferred that there is an influence of implementing problem- based learning based on concept mapping on the critical thinking skills of Grade V students at Centre Malino Public Elementary School.

INTRODUCTION

Education in the 21st century not only demands students in the field of knowledge, but skills also play a very important role in 21st century learning. As stated by (Mardhiyah et al., 2021) who stated that skills are an important component needed in various fields of life. The important skills to have include creative thinking skills, critical thinking and problem solving, communication, and collaboration or referred to as 4C (Septicasari & Frasandy, 2018). This is also in line with the regulations of Law No. 20 of 2003 Article 35 in the Ministry of Education and Culture (2003) which states that graduate competency is a qualification of graduate abilities that include attitudes, knowledge, and skills in accordance with established national standards.

Based on the opinions of researchers and also Law No. 20 of 2003, it can be concluded that in the 21st century, in addition to knowledge, skills are also very important for someone to have. As explained in the study (Mashudi, 2021) which formulated that knowledge and skills are very much needed by students for the 21st century and are very important. One of the most important skills for students to have is critical thinking skills. Critical thinking is a directed and clear process used in solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research (Septicasari & Frasandy, 2018). Critical thinking skills are one of the skills that can be applied using constructivist learning theory. As explained by (Ikhtiana

et al., 2019) who stated that critical thinking skills can be developed by teachers using constructivist theory. Constructivist theory is based on a person's cognitive level, then cognition is built through student experience, while the teacher's job is only to be a facilitator and motivator. Thus, this learning theory needs to be supported by using learning approaches and models that can direct the development of critical thinking skills in students. One learning model that can support students' critical thinking skills is the problem-based learning model. As explained by (Ariana, 2020) stated that problem-based learning can support students' critical thinking skills and adjustment to new knowledge because it helps transfer their knowledge to understand problems in the real world. Thus, it can be concluded that problem-based learning is a learning model that requires students to think critically in solving a problem. Based on the theory of constructivism, one approach that can support students' critical thinking skills is the concept mapping approach. According to (Darnella & Afriansyah, 2020) stated that the application of the concept mapping approach has an effect on students' thinking skills in schools. Through learning with the application of the concept mapping approach, students will be able to collect data that will be used for various purposes systematically, develop ideas or knowledge, make it easier to review ideas and ideas, which can hone critical thinking skills because they are filled with creativity. The application of the concept mapping approach in the learning process not only stimulates a deeper understanding of concepts but can directly support the development of students' critical thinking skills. By training students to analyze, synthesize, and evaluate information and the relationship between concepts, the concept mapping approach thus creates a learning environment that can improve students' critical thinking skills. Thus it can be concluded that the application of the problem-based learning model integrated with the concept mapping approach will create a learning environment that is able to support students' critical thinking skills. Based on the results of initial observations at school, the problems found in learning activities are that there are still teachers who play a role in transferring knowledge in the teaching and learning process so that students tend to be passive in learning activities. The activities of participants

Students in the learning process are copying and memorizing all the materials taught by the teacher which makes it difficult for students to develop their skills, especially critical thinking skills. Therefore, the challenge for a teacher is how to create a teaching and learning process that can improve students' critical thinking skills in the learning process. Therefore, as a teacher, it is expected to build innovative and fun teaching and learning activities but do not eliminate the learning objectives to be achieved and are able to hone students' critical thinking skills. Teachers must always motivate students to always develop critical thinking skills in learning activities. to motivate students to always develop critical thinking skills is to apply the right strategies as often as possible in learning activities that require students to always develop critical thinking skills. As explained by (Rohana, 2021) who stated that the best way to motivate students is to use all strategies as often as possible because to gain an understanding of student motivation is to apply all strategies simultaneously and then see where there is a good understanding and where there are gaps. Therefore, as a teacher, it is very important to create a learning environment that can accustom students to think critically. Based on the description above, the researcher applies the problem based learning model based on concept mapping in the learning process with the hope that the problem based learning model based on concept mapping can influence students' critical thinking skills. As stated by (Ariana, 2020) in her research, the problem based learning model can support students' critical thinking skills. Then according to (Darnella & Afriansyah, 2020) it is stated that the application of concept mapping influences students' thinking skills at school. It can be concluded that the problem based learning and concept mapping learning models can influence students' critical thinking skills.

From the description of the background, the formulation of the problem in this study is (1) How is the description of the application of the problem based learning model based on concept mapping in class V of SD Negeri Center Malino? (2) How is the description of the critical thinking skills of class V students of SD Negeri Center Malino? (3) Is there an effect of the application of the problem based learning model based on concept mapping on the critical thinking skills of class V students of SD Negeri Center Malino?

METHOD

This research is an experimental research with a quantitative approach. The research design used was a quasi-experimental design using a nonequivalent control group design model. This research was conducted at SD Negeri Center Malino in class V (five) with a population of 45 students where class VA had 23 students and class VB had 22 students. The sampling technique in this study was simple random sampling. The class

used as the sample class was class VB with 22 students consisting of 14 female students and 8 male students. Data collection techniques in this study were tests, observations and documentation, thus the instruments used were pretest and posttest descriptive questions, as well as teacher and student observation sheets. The data analysis technique for this study consisted of descriptive statistical analysis and inferential statistical analysis. In testing the research hypothesis, the researcher used the Independent Sample t-test which was used to see the difference in the average of two different groups.

RESULTS AND DISCUSSION
Results
1. Overview of the Implementation of Learning Activities
a. Overview of the Implementation of the Problem Based Learning Model Based on Concept Mapping.

The initial step taken by the researcher was to open the learning activity by reading a prayer and checking the attendance of students. Furthermore, the researcher provided an apperception related to the subject matter in the previous meeting. The next step is entering the syntax of the activity according to the problem based learning model. The first phase is the orientation of students to the problem, the activities carried out are first of course the researcher conveys the learning objectives to students, divides students into several groups. After that, the researcher conveys the material to be studied. The researcher conveys a little material using the concept mapping approach. The application of concept mapping carried out by the researcher is by providing several questions

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Based on the opinions of researchers and also Law No. 20 of 2003, it can be concluded that in the 21st century, in addition to knowledge, skills are also very important for someone to have. As explained in the study (Mashudi, 2021) which formulated that knowledge and skills are very much needed by students for the 21st century and are very important. One of the most important skills for students to have is critical thinking skills. Critical thinking is a directed and clear process used in solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research (Septicasari & Frasandy, 2018). Critical thinking skills are one of the skills that can be applied using constructivist learning theory. As explained by (Ikhtiana et al., 2019) who stated that critical thinking skills can be developed by teachers using constructivist theory. Constructivist theory is based on a person's cognitive level, then cognition is built through student experience, while the teacher's job is only to be a facilitator and motivator. Thus, this learning theory needs to be supported by using learning approaches and models that can direct the development of critical thinking skills in students. One learning model that can support students' critical thinking skills is the problem-based learning model. As explained by (Ariana, 2020) stated that problem-based learning can support students' critical thinking skills and adjustment to new knowledge because it helps transfer their knowledge to understand problems in the real world. Thus, it can be concluded that problem-based learning is a learning model that requires students to think critically in solving a problem. Based on the theory of constructivism, one approach that can support students' critical thinking skills is the concept mapping approach. According to (Darnella & Afriansyah, 2020) stated that the application of the concept mapping approach has an effect on students' thinking skills in schools. Through learning with the application of the concept mapping approach, students will be able to collect data

that will be used for various purposes systematically, develop ideas or knowledge, make it easier to review ideas and ideas, which can hone critical thinking skills because they are filled with creativity. The application of the concept mapping approach in the learning process not only stimulates a deeper understanding of concepts but can directly support the development of students' critical thinking skills. By training students to analyze, synthesize, and evaluate information and the relationship between concepts, the concept mapping approach thus creates a learning environment that can improve students' critical thinking skills. Thus it can be concluded that the application of the problem based learning model integrated with the concept mapping approach will create a learning environment that is able to support students' critical thinking skills. Based on the results of initial observations at school, the problems found in learning activities are that there are still teachers who play a role in transferring knowledge in the teaching and learning process so that students tend to be passive in learning activities.

Table 1 - The activities of participants

Score	Category	Score Acquisition	
		Teacher	Learners
81%-100%	Very Good		
61%-80%	Good		
41%-60%	Pretty Good	91%	78,68%
21%-40%	Not Good		
<20%	Very Poor		

The results of the analysis of the observation sheet for the implementation of learning activities by applying the problem based learning model based on concept mapping, namely, when carrying out learning activities in accordance with the syntax of the problem based learning model combined with the concept mapping approach, the average student has a good response during the learning activities carried out. On average, students are very enthusiastic in question and answer activities, group work, discussions and group presentation activities. In addition, students are also very enthusiastic when the researcher explains the learning objectives and delivers the material to be studied.

In the activity of explaining the material to be studied, the researcher writes several concepts to be studied on the board by applying the concept mapping approach. The researcher conducts question and answer activities with students while describing the concepts to be studied. After carrying out the question and answer activities, the researcher divides students into several groups, the student response is quite good after the researcher divides the groups randomly.

In group work activities, the average group member is enthusiastic in group work activities. The form of student enthusiasm is by dividing up tasks to be worked on. In group work activities, the average group member is active in discussing and competing to work on the LKPD distributed by the researcher. When group members do not understand, group members are immediately enthusiastic to ask the researcher and ask what is not understood. It can be concluded that group work activities are in the good category with the response of each group member who is actively involved in group work activities and discussions.

In the group work result presentation activity, the researcher directed each group to appoint one group member to do a presentation, but each group wanted all group members to present the results of their group work. So that all group members are actively involved in the presentation activity. When the researcher asked several questions to each group member, each group member enthusiastically answered the questions raised by the researcher. It can be concluded that the group presentation activity has gone well because the enthusiasm of the students is very active.

During the learning activities, it can be concluded that the learning activities have gone well because of the active enthusiasm of the students. However, of course there are still some students who are still less actively involved in learning activities.

Based on table 1 and the results of the analysis of the teacher and student observation sheets, it can be seen that the implementation of learning activities shows that the percentage of implementation of learning activities by teachers is 91% with a very good category, then the percentage of implementation of learning activities in students after being averaged is 78.68% with a good category. Based on the percentage results of the observation sheet, it can be concluded that the researcher has implemented learning activities with the application of the problem based learning model based on concept mapping which is very good. Meanwhile, the implementation of learning activities carried out by students has also gone well. 2. Overview of Students'

Critical Thinking Skills

Students' critical thinking skills in this study can be measured through students' ability to answer pretest and posttest questions. The pretest aims to determine students' initial ability in answering questions, while the posttest aims to determine how students' ability is in answering after being given treatment or application of the problem based learning model based on concept mapping in learning activities. The pretest and posttest questions are questions in the form of answers with a total of 10 questions that are worked on for 20 minutes. The questions on the critical thinking skills indicator provide a simple explanation of 5 questions, the indicator of building basic skills is 1 question, the indicator of concluding is 1 question, the indicator of providing further explanations is 2 questions and the indicator of developing strategies and tactics is 1 question. After the students have completed the pretest and posttest questions, the researcher then analyzes the results using normality and homogeneity test analysis. The description of students' critical thinking skills for the control class and experimental class is as follows:

Table 2 - The description of students' critical thinking skills for the control class and experimental

Descriptive Statistics	Pretest
Number of Samples	22
Lowest Value	27
The Highest Score	40
Average (Mean)	33,36
Range	13
Standard Deviation	4,21
Median	33,5

Based on table 2, it can be seen that the average value (Mean) of the experimental class pretest is 33.36 with a data distribution (standard deviation) of 4.21. Thus, it means that the standard deviation value is smaller than the average value so that it can be concluded that the average value can represent all data. The range of values between the highest and lowest values is 13. If the pretest scores of critical thinking skills of students in the experimental class are grouped into 5 categories, then a list of frequency distribution and percentage of the experimental class pretest result categories is obtained in the following table:

Table 3 - List of frequency distribution and percentage of the experimental class pretest result categories

Score	Category	Frequency	Presentation
80-100	Very Good	-	-
61-80	Good	-	-
41-60	Pretty Good	-	-
21-40	Not Good	22	100%
0-20	Very Poor	-	-
Amount		22	100%

Based on table 3, it can be seen that 22 students got the less category with a percentage of 100%. The results of the pretest analysis of the experimental class, the critical thinking skills of class VB students were in the less category with an average score of 33.36. After analyzing the results of the pretest questions, it can be seen that of the five indicators of critical thinking skills, only one indicator was sufficiently fulfilled, namely the indicator of providing a simple explanation with the sub-indicator of analyzing arguments where on average students were sufficiently able to identify and handle relevance and irrelevance when working on pretest questions. In addition, some students were also sufficiently able to fulfill the sub-indicator of answering an explanation or challenge, namely by answering the question why in the pretest question.

Based on the results of the descriptive analysis that has been carried out, it can be concluded that the results of the pretest of the experimental class are in the less category. When viewed from the average value, the critical thinking skills of students in the experimental class are lacking.

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Table 4 - The critical thinking skills of students in the experimental class are lacking.

Descriptive Statistics	Pretest
Number of Samples	23
Lowest Value	24
The Highest Score	42
Average (Mean)	31,52
Range	18
Standard Deviation	5,92
Median	29

Based on table 4, it can be seen that the average value (Mean) of the experimental class pretest is 31.52 with a data distribution (standard deviation) of 5.92. Thus, it means that the standard deviation value is smaller

than the average value so that it can be concluded that the average value can represent all data. The range of values between the highest and lowest values is 18. If the pretest scores of critical thinking skills of students in the control class are grouped into 5 categories, then a list of frequency distribution and percentage of the experimental class pretest result categories is obtained in the following table:

Table 5 - List of frequency distribution and percentage of the experimental class pretest result categories

Score	Category	Frequency	Presentation
80-100	Very Good	-	-
61-80	Good	-	-
41-60	Pretty Good	2	8,69%
21-40	Not Good	21	91,30%
0-20	Very Poor	-	-
Amount		23	100%

The results of the posttest analysis of the critical thinking skills of class VA students in the control class are in the good category with an average score of 51.69. After analyzing the results of the posttest questions, it can be seen that there are 3 students who are quite able to fulfill the five indicators of critical thinking skills, namely, providing simple explanations, building basic skills, providing further explanations, and developing strategies and tactics. Thus, 3 students on average already have very good critical thinking skills.

The critical thinking skills of students who are in the good category are 5 students. Based on the results of the analysis of the posttest questions, it can be concluded that of the five indicators of critical thinking skills, on average students are only quite able to fulfill the indicators of providing simple explanations, providing further explanations and developing strategies and tactics, but on average there are still two indicators of critical thinking skills that have not been sufficiently fulfilled, namely the indicator of building basic skills, and the indicator of concluding.

The critical thinking skills of students who are in the sufficient category are 6 students. Based on the results of the analysis of the posttest questions, it can be concluded that of the five indicators of critical thinking skills, the average student is only able to meet the indicators of providing simple explanations, developing strategies and tactics, but the average student is still not able to meet three indicators, namely the indicator of building basic skills, the indicator of concluding and the indicator of providing further explanations.

The critical thinking skills of students who are in the less category are 9 students. Based on the results of the analysis of the posttest questions, it can be concluded that of the five indicators of critical thinking skills, the average student is only able to meet the indicator of providing simple explanations, while the four indicators of critical thinking skills are still not sufficiently met.

Based on table 4.9, and the results of the analysis, it can be seen that 3 students obtained the very good category with a percentage of 13.04%. The good category was 5 students with a percentage of 21.73%. The sufficient category was 6 students with a percentage of 26.08%. And the less category was 9 students with a percentage of 39.13%. Based on the results of the descriptive analysis that has been done, it can be concluded that the results of the control class posttest are in the sufficient category with an average value in the control class of 51.69. When viewed from the average value, it can be concluded that students' critical thinking skills are in the sufficient category. 3. Inferential Statistical Analysis a. Normality Test

Table 6 - Inferential Statistical Analysis Normality Test

Descriptive Statistics	Pretest
Number of Samples	23
Lowest Value	27
The Highest Score	92
Average (Mean)	51,69
Range	65
Standard Deviation	21,58
Median	48

Based on table 6, it can be seen that the average value (Mean) of the experimental class posttest is 51.69 with a data distribution (standard deviation) of 21.58. Thus, it means that the standard deviation value is smaller than the average value so that it can be concluded that the average value can represent all data. The range of values between the highest and lowest values is 65. If the posttest scores of critical thinking skills of students in the control class are grouped into 5 categories, then a list of frequency distribution and percentage of the control class posttest result categories is obtained in the following table:

Table 7 - List of frequency distribution and percentage of the control class posttest result categories

Score	Category	Frequency	Presentation
80-100	Very Good	3	13,04%
61-80	Good	5	21,73%
41-60	Pretty Good	6	26,08%
21-40	Not Good	9	39,13%
0-20	Very Poor	-	-
Amount		23	100%

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Table 8 - The results of the experimental class pretest, the results of the experimental class posttest, the results of the control class pretest, and the results of the control class posttest

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Based on table 8, it can be seen that the results of the experimental class pretest, the results of the experimental class posttest, the results of the control class pretest, and the results of the control class posttest are normally distributed because the significance value of all data is greater than 0.05. Because the data is normal, the data can be processed using parametric statistics.

Table 9 - The posttest results of students' critical thinking skills in the experimental class and control class

Results	Test of Homogeneity of Variances		
Levene Statistic 31	df1	df2	dF3
	1	43	739

Based on table 9, it can be concluded that the significance value of the posttest results of students' critical thinking skills in the experimental class and control class is 0.739 > 0.05. Thus, it can be concluded that the variance of the posttest data of the experimental class and control class is homogeneous.

Table 10 - The results of the hypothesis test on the effect of implementing the problem based learning model based on concept mapping on the critical thinking skills of fifth grade students at SD Negeri Center Malino.

Data	T	Df	Probability Value	Information
Posttest of experimental class	2.468	43	.000	0,000 < 0,05 = There is influence

Based on table 10, it can be concluded that the sig. (2-tailed) value is 0.000. If the sig. (2-tailed) value is 0.000 <0.05. Based on the results of the hypothesis test in table 10, it can be concluded that the sig. (2-tailed) value is 0.000 <0.05, which means that HO is rejected and Ha is accepted, then the results of the hypothesis test in this study are that there is an effect of the application of the problem based learning model based on concept mapping on the critical thinking skills of class V students of SD Negeri Center Malino

Discussion

1. Overview of the Application of the Problem Based Learning Model Based on Concept Mapping in Class V SD Negeri Center Malino.

The application of the problem based learning model based on concept mapping in class V SD Negeri Center Malino is a learning activity process by applying the problem based learning model using the concept mapping approach to learning activities. The application of the problem based learning model applied by the researcher has six syntaxes. The syntax of the problem based learning model applied by the researcher is in accordance with the syntax proposed by (Syamsidah & Suryani, 2018), namely: (1) the phase of student orientation to the problem; (2) the phase of formulating the problem; (3) the phase of formulating alternative strategies; (4) the phase of data collection; (5) the phase of discussion; (6) the phase of conclusion and evaluation.

The application of this problem based learning model was applied in the experimental class, namely class VB where the number of students was 22 students. The learning activities by applying the problem based learning model are learning activities that are in accordance with the syntax of the problem based learning model. In addition, the researcher also applied the concept mapping approach in learning activities.

The application of the concept mapping approach is not applied to all syntax of the problem based learning model. The researcher only applied the concept mapping approach to the phase of student orientation to the problem, the phase of data collection, and the phase of conclusion and evaluation. In the phase of student orientation to the problem, the researcher applied the concept mapping approach to convey learning objectives, convey the material to be studied, question and answer activities and student activities analyzing reading texts. In the data collection phase, students also apply the concept mapping approach where each group works on the

LKPD distributed by the researcher by creating a concept map. In the conclusion and evaluation phase, the concept mapping approach is also applied where each group member presents the results of their LKPD work in the form of a concept map. After each group member presents their work, the researcher then provides direct reinforcement by applying the concept mapping approach.

The implementation of the application of the problem based learning model based on concept mapping can be seen in table 1 where the results are that the implementation of learning activities has a percentage of 91% with a very good category, then the percentage of implementation of learning activities carried out by students is 78.68% with a good category. The implementation of learning activities has gone well where on average students are actively involved in question and answer activities, group work, discussions, and group presentations. During learning activities, there are still some students who are less actively involved in learning activities because students still lack confidence. based on the results of the analysis, it can be concluded that the implementation of learning activities with the application of the problem based learning model based on concept mapping has gone well.

2.   Description of Critical Thinking Skills of Grade V Students of SD Negeri Center Malino.

The critical thinking skills of grade V students of SD Negeri Center Malino after being given a pretest both in the experimental class and the control class were still said to be lacking. This is indicated by the percentage results in the experimental class which had an average of 33.36 so that the critical thinking skills of students in the experimental class were in the lacking category. While for the control class it had an average of 31.52, so that the critical thinking skills of students in the control class were that there were two students who had a sufficient category and 21 students were in the lacking category.

Based on the results of the description of the posttest results, students in the experimental class had an average score of 67.22, so that the critical thinking skills of students in the experimental class were that there were 7 students in the very good category, 6 students in the good category, 6 students in the sufficient category and there were still 3 students in the lacking category. While for the control class it had an average score of nsep) and its influence on students' critical thinking skills. Darmani stated that the application of the concept mapping approach has an influence on students' critical thinking skills. Thus, the research conducted by previous researchers is also similar to the results of research conducted by researchers at SD Negeri Center Malino, namely that there is an influence of the application of the problem based learning model based on concept mapping on the critical thinking skills of class V students at SD Negeri Center Malino.

CONCLUSION

Based on the results of the research that has been carried out, several things can be concluded, including:
1.   The application of the problem-based learning model to the critical thinking skills of class V students at SD Negeri Center Malino is in the good category.
2.   The critical thinking skills of students in the experimental class are in the good category as seen from the average value (mean) after being given a posttest. While the critical thinking skills of students in the control class are in the sufficient category as seen from the average (mean) after being given a posttest.
3.   There is an influence of the application of the problem-based learning model based on concept mapping on the critical thinking skills of class V students at SD Negeri Center Malino. This is shown based on the significance value of 0.000 which is less than 0.05, which means that Ho is rejected and Ha is accepted.

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