

The effectiveness of the problem-based learning model with mind map supplements improves the critical thinking ability of grade IV students of SD Inpres Roja 2, Ende City

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Abstract. The purpose of this study is to determine the effectiveness of problem-based learning learning models with mind map supplements to improve the critical thinking skills of grade IV students of SD Inpres Roja 2 Kota Ende. The type of research used is pre-experimental design with one group pre-test -post test design design. The population of this study was all grade IV students of SD Inpres Roja 2 Kota which amounted to 24 people. The sampling technique used is non probability sampling with a saturated sampling type. Data collection techniques in this study are in the form of multiple choice tests and essays. Data on the implementation of the problem-based learning model with the supplement of mind maps improved critical thinking skills at meeting I with a score of 75% in the good category and the second meeting with a score of 85.4% in the excellent category. Data on the critical thinking ability of students were tested for normality by the kolmogorov smirnov method and then tested for homogeneity in the variance test. The results of this test show that the distributed data is normal and homogeneous. Hypothesis testing using the t-test obtained a t-count of 11.445 while the t-table at a significant level of 5% was 2,019. The results show that the t-count is greater than the t-table so that it can be inferred H_a in the received and H_0 in the rejected. The effectiveness of the Problem Based Learning Model learning model with mind map supplements Improving critical thinking skills Grade IV students of SD Inpres Roja 2 Kota Ende were tested for effect size using the cohen's effect size formula, the results showed 2.62 with a range of criteria in the cohen's formula, which is 0.8-2.0 which is classified as high based on the classification of the effect size test, which means that the problem-based learning learning model with the supplement of the mind map is effective in improve critical thinking skills.

Keywords: , The effectiveness, problem-based learning learning models, mind mapping, critical thinking skills.

How to Cite: Suni, Sunimbar, dkk. (2023). The effectiveness of the problem-based learning model with mind map supplements improves the critical thinking ability of grade IV students of SD Inpres Roja 2, Ende City. *Proceeding The 5th International Conference on Elementary Education*, 5(1), 623-628.

INTRODUCTION

Education is an indispensable need by all human beings around the world. Pancasila and the 1945 Constitution rooted in the nation's culture put forward an indispensable character in facing the challenges of the 21st Century (Rifa Hanifa Mardhiyah et al., 2021). To be able to play a meaningful role in the era of globalization in the 21st century, every citizen is required to have the ability to answer the demands of the times (Rawung et al., 2021, p. 21). 21st century learning is learning that integrates literacy skills, knowledge skills, skills and attitudes, as well as mastery of technology. Therefore, teachers as the spearhead of human developers must know about the development & change of the times.

21st century learning in formal education has been echoed by the government in recent years. Through the 2013 curriculum, the government has made efforts to develop abilities to students. Students are a generation of Indonesians who are expected to be able to grow into individuals who can compete in the global arena. 21st century skills in education demand that learners have more skills such as critical thinking and problem solving, creative thinking, communicating, and collaborating. The four skills are commonly known as 21st century skills, namely 4C (critical thinking, and problem solving, creative thinking, communication, and collaboration) (Sahidah & Sulistyani, 2022) With 21st century skills applied in schools, through the teaching and learning process, it is hoped that it will produce superior human resources

(Kumalasani & Kusumaningtyas, 2022). Entering learning in today's era, students are expected to have seven competencies that must be mastered, namely: critical thinking skills, collaboration and leadership, adaptability, being able to access and analyze information, have high curiosity, initiative and have an entrepreneurial spirit, able to communicate effectively both morally and in writing (Pratiwi et al., 2019)

The ability to think critically in elementary school students is something that must be developed. This is because through the ability to think critically will train students to observe, analyze and evaluate information or opinions before determining whether to accept or reject the information. Thus, learning in schools should train students to explore abilities and skills in finding, processing, and assessing various information critically (Sulistianingsih & Amir, 2021)..

Students' formal thinking skills which include hypothetical-deductive thinking skills, proportional thinking skills, combinatorial thinking skills, and reflective thinking skills as basic thinking abilities (Nugroho & Prayitno, 2017), needs to be used as a substance that must be worked on seriously in the world of education. This basic thinking ability must be continuously developed towards critical thinking abilities and skills. Critical thinking is an important and vital topic in the modern era of education. The specific purpose of critical thinking learning in science education and other disciplines is to improve students' thinking skills and at the same time prepare them to be successful in living their lives (Paramitha et al., 2022) Critical thinking skills can be developed through learning oriented to the scientific method. Critical thinking cannot be taught through the lecture method, because critical thinking is an active process. Intellectual skills of critical thinking including analytical thinking, synthesis thinking, reflective thinking, and so on must be learned through the actualization of appearance (performance) (Hidayanti & Syahri, 2020). One of the learning models that can improve critical thinking skills is the problem-based learning model.

The learning that occurred at SDN Inpres Roja 2 Kota Ende was based on the results of observations and interviews with the grade IV teacher, Ibu Saidah, S.Pd. Gr, students' critical thinking skills have not been seen because students still rely on my mother's answers, but to explain based on their own thoughts have not been seen at the time of learning. This is due to the lack of learning models used during learning activities, the focus of learning is only on teachers who deliver material monotonously without any learning variations, such as exposing students to a problem that makes students find for themselves the answer to each problem given. If students know for themselves the answers to the problems given, they can hone students' thinking skills. From this observation, it can be explained that the low critical thinking ability of students is the unpreparedness of teachers in presenting learning, learning media is one of the factors that result in students' critical thinking skills being low, this is in line with opinions (Yanti, 2021) which states limited and less interesting learning The use of unattractive learning media makes students dislike learning causing students' interest in learning to be low.

It is a challenge for an educator to create a fun teaching and learning process in order to improve students' critical thinking skills. Therefore, educators are expected to be able to create innovative and enjoyable teaching and learning processes but not eliminate the learning objectives to be achieved. One of the models that teachers can use is the Problem Based Learning (PBL) model with the supplement of mind maps can improve critical thinking skills This model stimulates students to be able to solve problems given by the teacher (Hasyda & Arifin, 2020)

METHOD

The type of research used in this study is pre-experimental is a research design that has not been categorized as a real experiment. This is because in this design, random sampling has not been carried out and insufficient control of disruptive variables that can affect bound variables (Yusuf, 2014). The design form is one group pretest -post test design. This design uses one group, before and after the treatment is held. The difference in the final test score (T-2) with the initial test (T-1) is considered to be the effect of the treatment (X). The main feature of this design is that the group is compared with itself. If the T2-T1 difference score is significantly different, then this difference is the influence of the treatment (Sugiyono, 2019: 109). The population of this study was all grade IV students of SD Inpres Roja 2 Kota which amounted to 24

people. The sampling technique used is non-probability sampling with a saturated sampling type (Sari, 2019). The research instrument used in this study is in the form of a multiple choice test with 15 questions and essays

which totals 5 questions to measure the critical thinking ability of students who have received learning with a problem-based learning model with a mind map supplement. The data is then categorized based on the criteria for critical thinking ability, which is as follows

Table 1 Categories of Critical Thinking Ability Percentage

Presentase	Karakteristik
85-100	Tall
69-84	keep
53-68	Low
37-52	Very low

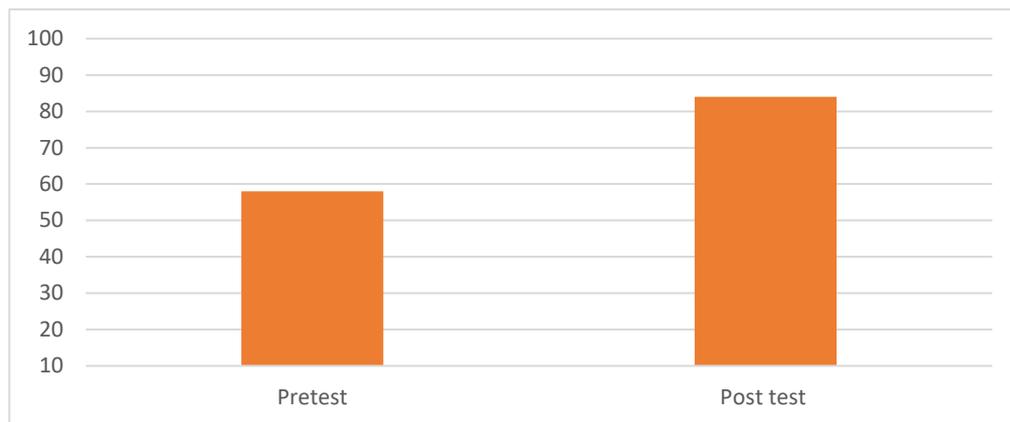
(Adaptasi Setyowati & Subali, 2011)

Data on the results of students' critical thinking skills are obtained from pre-test and post-test scores. Pre-tests are used to obtain data on students' initial abilities before being given treatment and post-tests after being given treatment in experimental classes. Normality testing in this study used SPSS aids, with one sample kolmogorov smirnov test, with a significance level of 0.005. The homogeneity test was used levene test formula and analyzed using the help of the SPSS program. The hypothesis test in this study used a t-test (independent sample t-test) and was analyzed using the help of SPSS. The effect size test in this study used the formula cohens d (Cahyani et al., 2020)

RESULTS

The treatment given in the experimental class with the number of students was 24 people. The treatment is carried out by applying a problem-based learning learning model with the supplement of a mind map. Researchers used observation sheets of student activities during the learning process on science material on the relationship of dependence between living things and their environment. In this case, the researcher acts as a teacher to see the activities of students and the implementation of learning in the experimental class using a problem-based learning model with a mind map supplement. The use of problem-based learning models with the above mind map supplements has been carried out well and has received a good response from students who are actively involved in learning activities. This is seen from the scores achieved by students at the meeting I obtained with 75% good categories Furthermore, at the second meeting during the learning process, they got a score of 85.4% with an excellent category. The data of this study consists of criteria for the ability to think critically. The data obtained the measurement results with test questions. The test questions used in this study consisted of 20 questions consisting of 15 multiple-choice questions and 5 essay questions, using the highest answer scoring technique, namely 4. The critical thinking ability criteria of the experimental and control class are composed of very high, medium, low, very low. Students' critical thinking skills can be interpreted in the diagram as follows:

Diagram Critical thinking ability



Based on the initial conditions at the time of pre-test, it is known that the average value is 56.5 when compared to the range of critical thinking ability categories with a percentage of 53-68 (Low) which means entering the low category after being given treatment using a problem-based learning learning model with a mind map supplement the posttest results have an average score of 85 with a percentage of 85-100 (High) which means entering the high category. This shows that the value of critical thinking ability in class IV SDI Roja 2 Kota Ende which uses a problem-based learning learning model with mind map supplementation has changed compared to using conventional learning models. Based on the explanation above, it is clear that the problem-based learning model with mind map supplements needs to be applied in a learning process because it involves the activeness of students in learning process activities so as to improve the way students think Another research that is in line with the results of this study is a study entitled The Influence of Problem-Based Learning Models on Science Literacy Ability in Class V SD.

The results of the study showed that learning with a problem-based learning model has a high effect on increasing science literacy in science learning (Utami & Sabri, n.d.) After the results of the participants' critical thinking ability were obtained, then tested to see whether the data were normally distributed using the kolmogorov smirnov formula with the help of the IBM 21 SPPS program, it was found that the significance values were 0.030 and 0.092 for the pre-test while for the post-test the significance values were 0.035 and 0.200 when compared to the significance level of 0.05 the significance value of the normality test was good, it can be concluded that the research data are distributed Usual. Then the homogeneity test was carried out, the results of the homogeneity test of the research variables were known to be the results of the posttest critical thinking ability obtained a significance value of .021, from the results of calculating the significance of the posttest data greater than 0.05 ($\text{sig} > 0.05$), it can be concluded that the data in this study have a homogeneous variance

After testing for normality and homogeneity, a hypothesis test is carried out using an independent samplet-test. The calculated value obtained was 11.445. The mean difference is 16.79167 and the difference ranges from 13.83833 to 19.74501 (seen from the lower and upper). Degree of freedom ($df = 24 + 24 - 2 = 46$), obtained a ttable result of 2.012. It can be concluded that the calculated value ($11,445 > \text{ttable} (2,012)$) means that H_0 is rejected and H_a is accepted, so it means that there is an influence of problem-based learning learning models on the critical thinking ability of grade IV students of SD Inpres Roja 2 Ende City. Furthermore, the Effect Size test is to see the influence of problem-based learning models on students' creative thinking ability. Based on the results of the calculation of the effect size test value above, a result of 2.62 was obtained from the criteria in the range of 0.8-2.0 values, which means that the problem-based learning model with mind map supplementation has a major effect on the critical thinking ability of grade IV students of SD Inpres Roja 2 Kota Ende Lesson 2022/2023.

DISCUSSION

This study aims to determine the influence of problem-based learning models with mind map supplementation on the critical thinking ability of grade IV students of SD Inpres Roja 2 Academic Year 2022/2023. This study used pretest and posttest by giving special treatment to the experimental group, namely by applying a problem-based learning model with mind map supplementation to hone students' critical thinking skills and compare pretests that had been carried out at the beginning of the study. The initial stage of this study was carried out by giving a test (pre-test) to class IV to find out the initial ability of each student in the class with an average score of 56.6 pre-test results, these results showed that the class did not fall into the high category in the percentage of critical thinking. The activity in the next stage of this research is the provision of treatment in the form of learning designed using a problem-based learning model with a mind map in the experimental class, the treatment is carried out as many as two meetings. In the final stage after the treatment is completed, the next step is the administration of a final test (post-test) to the experimental class to find out the comparison of students' critical thinking ability to the material of the relationship of dependence between living beings and their environment. These results are in line with research (Aiman et al., 2019) which show that there is a positive relationship between critical thinking ability and student science literacy, the higher the student's science literacy score. (Wijayanti et al., 2020) Stated In general, the use of the science literacy-based PBL model provides a good way for the learning process the use of a science literacy-based problem-based learning model that has been carried out is able to improve students' critical thinking more deeply about the problems that have been given by the teacher to students so that they are able to find solutions to solve these problems.

CONCLUSION

This study aims to determine whether there is an influence of problem-based learning models with mind map supplementation on the critical thinking ability of grade IV students of SD Inpres Roja 2 Academic Year 2022/2023. This study uses pretest and posttest by giving special treatment to the experimental group, namely by applying a problem-based learning model with mind map supplementation to hone students' critical thinking skills and compare pretests that have been carried out at the beginning of the study. The initial stage of this study was carried out by giving a test (pre-test) to class IV to find out the initial ability of each student in the class with an average score of 56.6 pre-test results, this result shows that the class does not enter a high category in the percentage of critical thinking ability. The activity at the next stage of this study is the provision of treatment in the form of learning designed using a problem-based learning model with a mind map in the experimental class, the treatment is carried out as many as two meetings. In the final stage after the treatment is completed, the next step is the provision of a final test (post-test) to the experimental class to find out the comparison of students' critical thinking skills on the material of dependence relationships between living things and their environment. These results are in line with research (Aiman et al., 2019) showing that there is a positive relationship between critical thinking ability and student science literacy, the higher the student's science literacy value.

ACKNOWLEDGMENTS

The author would like to thank Allah SWT and to all school residents of SD Inpres Roja 2 Kelurahan Paunpanda, South Ende District, Ende Regency, East Nusa Tenggara Province who have provided opportunities for researchers to research collaboratively

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