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APPLICATION OF MIND MAPPING LEARNING MODEL BASED ON HIGHER ORDER THINKING SKILLS (HOTS) ON CRITICAL THINKING ABILITY ON HUMAN AND ENVIRONMENTAL MATERIAL OF GRADE V STUDENTS OF SDN 04 SINGKAWANG

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ABSTRACT

This study aim to (1) identify students' critical thinking skills; (2) to identify differences in students' critical thinking skills; (3) to identify students' responses to the *mind mapping learning model* based on *higher order thinking skills* . Research This implemented at SDN 4 Singkawang . The data collection technique in this study used test and non- test techniques. that is in the form of a critical thinking ability test sheet for students and a student response questionnaire technique. The data analysis techniques used are Prerequisite Test, Hypothesis Test and N Gain . Based on results of hypothesis testing and two -sample t-test can known difference ability think critical students in class experiments and classes control . From the t-test shows $t_{count} > t_{table}$ that is 4,322 > 2,024. Statement on can concluded that There are differences in the critical thinking abilities of students who are given the *Mind Mapping learning model.* based on *Higher Order Thinking Skills* and direct models on human and environmental material in class V of SD N 4 Singkawang. From the test data the improvement ability think critical students in class experiment with implementing learning models *mind mapping* experiencing improvement ability think critical students . Improvement the shown with N-gain acquisition of 0.64 with criteria in and out of class control with implementing learning models direct obtained an N-gain of 0.27 with criteria low . So by using the *mind learning model mapping* based on *Higher Order Thinking Skills* increased. Response students towards the *mind learning model mapping* based on *Higher Order Thinking Skills* of 80.93 in the very good criteria .

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1. INTRODUCTION

In the 2013 curriculum, students must start to get used to thinking systematically, analytically, critically, logically and creatively to achieve the main goals in education. The main goal of education is to achieve high-level thinking skills. In the current curriculum (K13), students are required to be able to analyze, evaluate and create, this is in line with *Higher Order Thinking Skills.* includes several processes such as the process of analyzing (C4), evaluating (C5), and creating (C6). With this, students are expected to have the ability high-level thinking that is easily stimulated to develop their thinking patterns. Critical thinking indicators according to Siddin Hamzah (2021) indicators of critical thinking skills are (1) the ability to ask and answer questions, (2) the ability to induce and consider the results of induction, (3) the ability to observe and consider the results of observations, (4) the ability to identify assumptions, and (5) the ability to determine an action. For example,

in the material humans and the environment critical thinking is needed to cover the whole process like getting, compare, analyze, evaluate, And act beyond science and values.

In learning humans and the environment critical thinking skills Students play a big role in achievement Study, reasoning formal, learning success, and creativity because thinking is the core regulator of student actions. Critical thinking skills are important in learning in the context of everyday school students are indeed inseparable from the ability to ask and answer questions, determine an action. However, several research results show that students' critical thinking skills are still low.

Based on the research conducted at SD N 4 Singkawang through interview and test techniques . Interview the done with a teacher named Arif Setiawan who is guardian class V SDN Negeri 4 Singkawang . He state that the learning process Still not enough effective Because lack of facilities and infrastructure available at the school the so that cause student not enough understand when explained . Impact from lack of facilities and infrastructure the student No follow active in the learning process as well as Still focus to books and teachers. In addition, another impact that arises is that students are busy themselves, such as playing and talking to their friends. Teachers also have not can find the right model For increase ability think critical students . When giving a critical thinking ability test on the material that has been delivered by the teacher, the students did not understand and asked many questions and the answers were still not quite right, some could not even answer the questions given. Of the 20 students who could answer the questions correctly and achieve the KKM, there were 7 students and 13 students No achieve KKM. This causes students' grades to be incomplete, while the completion of the science subjects that has been set by the school is 75.

From the problems above when giving pre-research questions, it can be concluded that students' critical thinking skills are still relatively low. One of the materials that is still lacking and often experiences incompleteness is the material on humans and the environment. Humans and the environment is easy material but because it covers the concept of population density, environmental pollution, and environmental management. But in reality students are bored and sometimes do not pay attention to the teacher's explanation. Because students think this material is easy, coupled with the way teachers teach who do not apply or use learning models. The author took the material of humans and the environment because in this material there are still many fifth grade students of SD N 4 Singkawang who often experience incompleteness or do not achieve the KKM expected by the school, which is 75.

To support students' high critical thinking skills, the learning process... must using the right learning method, model, or approach. The learning model that is estimated to be related to learning that improves students' critical thinking skills is the *Mind Mapping learning model* . *Mind Mapping* is a learning technique by writing the main theme as a central point and connecting the main branches to the central point and connecting the second-level branches to the first level, the third-level branches to the second level and so on, using a single keyword on each line by combining colors, symbols, and images to make it easier for the brain to absorb the information received (Buzan, 2013).

Mind Mapping Model according to Nita, Dear Mr. et al . , (2014) can also be applied in learning the main material on humans and the environment, because the main material on humans and the environment has the characteristic of describing very complex material and identifying several factors related to population dynamics, including births, deaths and migration, environmental damage factors. For That writer choose and try apply A alternative learning models *Mind Mapping* so that students can better understand the material when they discuss, responding to the concept put forward by the teacher, making a *Mind Mapping image* and provide conclusions during the learning process.

Mind Mapping Model assisted by the use of *Higher Order Thinking Skills* in learning proven to effectively improve students' critical thinking skills (Priantini , 2016) HOTS assessment can train and develop important aspects of critical thinking skills. After conducting research and proving that HOTS can improve critical thinking skills, the government included *Higher Order Thinking Skills* questions in students' mathematics textbooks, one of which is on human and environmental material. The advantages of *Higher Order Thinking Skills* are that it is easier to think about things that are explicit and have a directed learning reference because students learn by following the directions or materials given by the teacher.

The disadvantage of *Higher Order Thinking Skills is* that not all materials are suitable for using problem-based learning models. Materials that are suitable for using this learning model are materials that require solving a problem. The application of the mind mapping learning model based on *Higher Order Thinking Skills* is so that students are able to solve or are able to think critically about the material that has been delivered by the teacher by making *Mind Mapping* . The way to think critically is that students make mind mapping by mapping thoughts that are made in a creative way about the material, then note down only important things in the mind mapping so that what they want to find can be fulfilled or resolved. In addition to being able to think critically, students can also be creative so that they can produce good learning values.

The results of the critical thinking skills test conducted by Larasati (2020) shows that the *discovery learning* model based on *Higher Order Thinking Skills* influential significant to ability think critical elementary

school students . Findings study This in line with study previously that the *Discovery Learning* model based on *Higher Order Thinking Skills* influential significant to ability think critical elementary school students . Then, based on the research results by Agustin, Mutia , et al ., (2021), it was shown that (1) Influence HOTS questions regarding skills think critical students in theme 8 sub theme 3 learning 1 and learning 2 in grade IV of elementary school were 55.7%, meaning there is significant influence on HOTS questions on skills think critical students . (2) Influence HOTS questions regarding results Study students in theme 8 sub theme 3 learning 1 and learning 2 in grade IV of elementary school were 49.0%, meaning there is significant influence on HOTS questions on results Study student . (3) Response student to HOTS questions on theme 8 sub theme 3 learning 1 and learning 2 in grade IV SD in very good category . This is can seen in the score obtained 49 with percentage of 89.09%. Based on the background description that has been presented, the author interested in conducting research with the title "Application of *the Mind Mapping Learning Model"* Based on *Higher Order Thinking Skills (HOTS)* On Critical Thinking Skills On Human and Environmental Material "Class V students of SDN 4 Singkawang".

2. RESEARCH METHODS

The method in this research is quantitative descriptive research. Sugiyono (2016) explains that method study quantitative is method based on to philosophy positivism , used in researching population and sample research . Research quantitative is research that presents data in the form of numbers as results his research . Method study descriptive is a method in study group human , object , condition thoughts , or incident moment This . Research descriptive quantitative is research that describes variable in a way What there is support with data in the form of generated numbers from condition Actually .

Data collection techniques in study This in the form of tests and questionnaires . Arifin (2016) argues that test is a techniques used in frame carry out activity measurements in it there is various question or a series tasks to be done done or answered. According to Nazir (2013) the questionnaire is question or statement that is logical relate with problem research , each question is available answers meaning in test hypothesis .

Instrument data collection used in research This is test ability critical thinking . Test This used aiming For assess and measure ability student to material humans and the environment in class V SD N 4 Singkawang . Type test in study This in the form of test essays that amount to 7 Questions . Indicators of critical thinking skills are (1) Interpretation, (2) analysis, (3) evaluation. The student response sheet in this study aims to describe the percentage of student responses to the *Mind Mapping learning model* based on *Higher Order Thinking Skills.* The student response sheet used is a questionnaire sheet. This questionnaire sheet consists of 16 questions. The questionnaire is an instrument data collection is carried out by giving a set of questions or written questions to respondents to answer (Sugiyono, 2018) . The questionnaire sheet used in this study was adopted from Miranda (2021) which totals 32 statements.

3. RESULTS AND DISCUSSION

3.1. Results

1. Based on the hypothesis that has been mentioned namely (1) whether there is differences in critical thinking abilities of students who are given the *Mind Mapping learning model* based on *Higher Order Thinking Skills* and models direct learning on human and environmental materials in class V of SD 4 Singkawang , (2) how to improve critical thinking skills using the *Mind Mapping learning model* based on *Higher Order Thinking Skills* students on human and environmental material in class V of SD 4 Singkawang (3) how do students respond to the *Mind Mapping learning model?* based on *Higher Order Thinking Skills* on the critical thinking skills of students in class V of SD N 4 Singkawang .

After prerequisite test conducted data analysis and known class data experiment normally distributed and has same variance or homogeneous , then For test the average similarity of the two class using a two- sample t-test . The results are two sample t test calculation as following .

Table 1. Results of Two- Sample T -Test Calculation

Group	Control	Experiment
Dk	38	38
F^2_{count}	4,322	
Alpha	5%	5%
F^2_{table}	2,024	
Decision	H_a Accepted	
Conclusion	Homogeneous	

Based on two sample t test calculation known t_{count} 4,322 and t_{table} 2,024 obtained $t_{count} > t_{table}$ that is 4,322 > 2.024 then H_a accepted and H_0 rejected . Then can concluded there is difference ability think critical

student between classes that use learning models *mind mapping* based on *higher order thinking skills* with classes that use learning models direct class V of SDN 4 Singkawang .

For know improvement ability think critical student Class V of SDN 4 Singkawang with implementation of learning models *mind mapping* based *higher order thinking skills* in class experiment so used N-gain formula. Based on results *pretest* and *post test* student obtained results *pretest* and *posttest* scores are as follows following .

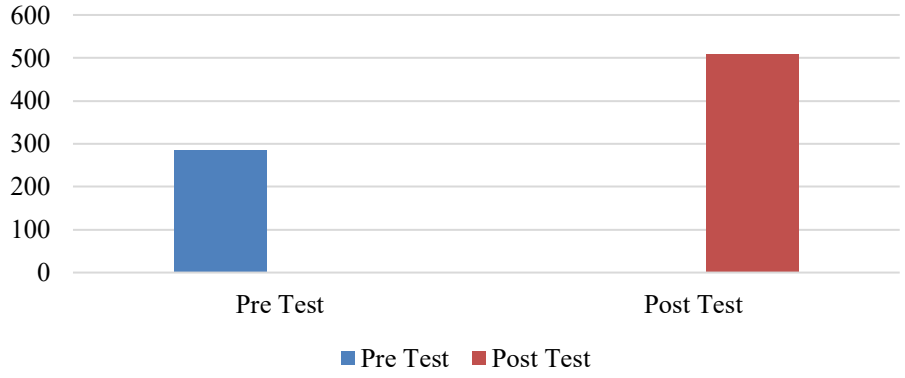

Figure 1. Chart of Increase *in PreTest* to *PostTest* Scores

Based on Figure 1 above, it is found that the overall score of *the pretest* is 286, while the *posttest score* has increased to 509. After obtaining *the pretest* and *posttest scores* , the data is then calculated using the N-gain test. The critical thinking ability after normalization obtained an average N-gain value of 0.64 and is included in the moderate criteria. From the results N-gain calculation can concluded that with use learning model based on *mind mapping* based on *higher order thinking skills* on the material humans and the environment Class V of SDN 4 Singkawang experience improvement ability think critical .

From the second hypothesis test, we obtained $F_{hitung} > F_{tabel}$, namely F_{hitung} = 4.6325 > F_{tabel} = 4.17. From the results of the calculation it can be concluded that the hypothesis is accepted .

For know Student responses to the *Mind Mapping learning model* based on *Higher Order Thinking Skills* on students' critical thinking skills , worksheets questionnaire given to student For get description about response students . Questionnaire given to 20 students after given a learning model *mind mapping* based *higher order thinking skills* (hots) . Recapitulation response student presented in the table as following .

Table 2. Recapitulation Presentation Response Student

	Presentation
Average	80.93%
Criteria	Very good

Table 2 show that student interested with learning models with an average of 80.93% with very good criteria. So the conclusion of student responses to the *mind mapping learning model* based on *higher order thinking skills* is suitable to be applied or very enjoyable to be applied to the learning model.

3.2. Discussion

3.2.1. Difference Ability Think Critical Students In Class Experiment and Control

Based on research conducted by Ma'ruf (2019) "The effect of HOTS-based *mind mapping* learning models on student motivation and learning outcomes" states that the results of research using HOTS-based mind mapping are different compared to students who use direct models in learning. This study is certainly different if it does not use *a higher order thinking skills*- based *mind mapping model* , indirectly, there is also a significant difference in learning outcomes in the control and experimental classes.

3.2.2. Improvement Ability Think Critical Class Experiments and Classes Control

From the research results, it can be said that students' critical thinking skills after applying the *mind mapping learning model* based on *higher order thinking skills* increased. This is evidenced by the results of *the posttest score* which is higher than the results of *the pretest* t. The maximum score of creative thinking ability measured is 32 points. In *the pretest* with a score of 286, while *the posttest* increased to 509.

3.2.3. Student Response After Applying HOTS-Based *Mind Mapping Model*

Students' responses to science learning on the material of animal and human locomotor organs using *mind mapping* based on *Higher Order Thinking Skills* showed a very good category response. Based on the results of the percentage of student responses after the application of the mind mapping learning model based *on* higher *order thinking skills* from the data on filling out the student response sheets. students are very happy to follow science learning using the *mind mapping learning model* based on *higher order thinking skills* . This is shown by the student response with the results of the percentage of student response questionnaires overall with a percentage of 80.93% with very good criteria. This is in line with the results of calculations from Andriani (2019) "The Effect of the *Contextual Teaching and Learning* (CTL) Learning Model on Critical Thinking Skills of Students in Science Subjects of Class V SDN 2 Singkawang". the use of the *Contextual Teaching and Learning* (CTL) model received a very positive response with enjoyable learning with a feeling of pleasure when delivering student responses to students' critical thinking skills.

From the description above, it can be concluded that *mind mapping learning* based on *Higher Order Thinking Skills* on the material of animal and human locomotor organs has an effect on students' critical thinking skills in science, most students can interpret, evaluate, analyze, and conclude. This statement is reinforced by the theory of Komariah (2016) "Analysis of student responses to the application of *mind mapping learning models* based on *Contextual Teaching and Learning* (CTL) in science learning" which states that the *Contextual Teaching and Learning (CTL) learning model* can improve critical thinking skills which lead to a positive response to the use of *mind mapping learning models* based on *Contextual Teaching and Learning* (*CTL*).

4. CONCLUSION

Based on results of hypothesis testing and two -sample t-test can known difference ability think critical students in class experiments and classes control . From the t-test shows $t_{count} > t_{table}$ that is 4,322 > 2,024. From the statement on can concluded that There are differences in the critical thinking abilities of students who are given the *Mind Mapping learning model* based on *Higher Order Thinking Skills.* and direct models on human and environmental material in class V of SD N 4 Singkawang. From the test data the improvement ability think critical students in class experiment with implementing learning models *mind mapping* experience improvement ability think critical students . Improvement the shown with N-gain acquisition of 0.64 with criteria in and out of class control with implementing learning models direct obtained an N-gain of 0.27 with criteria low . So by using the *mind mapping learning model* based on *Higher Order Thinking Skills* there is an increase. Response student towards learning models *mind mapping* based *Higher Order Thinking Skills* of 80.93 in the very good criteria . For students, the purpose of giving this student response questionnaire is to find out students' responses to the *mind mapping learning model* based on *higher order thinking skills* with response positive towards learning models .

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