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Application Of Rms Model (Reading, Mind Mapping and Sharing) To Improve Student's High Level of Thinking Ability to Learning Physics at SMA Negeri 1 Sigli

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Abstract

This study aims to determine the effectiveness of the RMS (Reading, Mind Mapping, and Sharing) model on students' higher order thinking skills. This type of research is a quasi experimental. The population in this study were students of class XI MIA program at SMA Negeri 1 Sigli, the sampling technique used was purposive sampling. Class XI MIA 2 as the experimental class and class XI MIA 3 as the control class, this research was conducted with the material temperature and heat. The instrument given to measure students' higher-order thinking skills was tested in the form of an essay totaling 8 questions. The independent t-test was used to determine the difference in students' higher-order thinking skills between using the RMS (Reading, Mind Mapping, and Sharing) model with the conventional model. From the results of the research analysis, it is stated that there are differences in higher order thinking skills between students who are treated using the RMS (Reading, Mind Mapping, and Sharing) model and students who are not given treatment or use conventional models. This is evident from the obtained sig value of 0.000, which means the sig value <0.05, it can be concluded that learning Physics using the RMS (Reading, Mind Mapping, and Sharing) model is quite effective on students' higher-order thinking skills. The effectiveness of the RMS model can also be seen in the effect size test which obtains a value of 2.07 which is included in the high category. It can be interpreted that the RMS (Reading, Mind Mapping, and Sharing) model has a high enough effect on the high-level thinking skills of class XI students of the MIA program at SMA Negeri 1 Sigli in the field of physics subjects.

Keywords
rms model (reading, mind mapping, and sharing); higher order thinking ability.

I. Introduction

Quality education is inseparable from the learning process that explores or explores creative ideas so that higher-order thinking skills emerge and are able to relate them to real life or everyday life, so as to create new understandings that are more creative and innovative. The ability to understand usually requires high motivation in one's soul, especially during the learning process. Education is a very important human need because education has a duty to prepare Human Resources (HR) for the development of the nation and state (Pradana et al, 2020). According to Astuti et al (2019) Education is an obligation of every human being that must be pursued to hold responsibilities and try to produce progress in knowledge and experience for the lives of every individual. Education is one of the efforts to improve the ability of human intelligence, thus he is able to improve the quality of his life (Saleh and Mujahiddin, 2020). Education is expected to be able to

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answer all the challenges of the times and be able to foster national generations, so that people become reliable and of high quality, with strong characteristics, clear identities and able to deal with current and future problems (Azhar, 2018). Education and skills are the main keys in gaining social status in community life (Lubis et al, 2019).

Motivation plays an important role in learning, and is a motivating factor from within a person to learn and can also affect a person's learning outcomes. Motivation in student learning is influenced by many factors such as the environment, interaction, and the way the teacher conveys learning, thus motivating students in the teaching and learning process.

Clayton Alderfer in Hamdhu (2011:83) states that: "Learning motivation is the tendency of students to carry out all learning activities that are driven by a desire to achieve the best possible achievement or learning outcomes".

Based on the results of observations made by the author at SMA Negeri 1 Sigli, the learning model that is often used is material and discussion. Especially during the current pandemic atmosphere that makes learning must be online. At online schools, teachers only provide a material system, then if there is something that is not understood, students can directly contact the teacher. After the face-to-face system, the teacher takes grades and evaluates students' abilities by frequently holding quizzes and tests. For grade XI students at SMA Negeri 1 Sigli usually get an average equal to or above the Minimum Completeness Criteria (KKM). The Minimum Completeness Criteria (KKM) for the physics subject itself is 72.

Class XI students at SMA Negeri 1 Sigli, on average they lack interest in physics, lack enthusiasm, and are less motivated to study physics. According to them, physics is boring, less interesting and monotonous learning. So it is difficult to create higher order thinking skills in them.

In physics learning activities at SMA Negeri 1 Sigli in class XI the teacher often uses material and discussion methods. By using this method, students feel better understanding of physics learning which is difficult for students. At the time of the test or semester exam, usually the teacher will give a penalty for each student who does not pass the KKM (Minimum Completeness Criteria) with the obligation to complete 30 physics essay questions within a week. According to the teacher, by being given such a punishment, the motivational spirit in students can be motivated to study physics because these students are required to work on questions as a condition for graduation to improve student scores.

Muhlisin (2017: 27) states that: "The RMS (Reading, Mind Mapping and Sharing) model is one of the breakthroughs that can be used in the 2013 curriculum and is a manifestation of the constructivist approach". In the Reading, Mind Mapping and Sharing (RMS) model, students play a direct role in the learning process. It can be seen from the syntax of the Reading, Mind Mapping and Sharing (RMS) model itself, namely, 1) Reading: students read critically related to certain materials obtained through information/learning resources; 2) Mind Mapping: students make mind maps related to topics that have been read individually and in groups; 3) Sharing: students share mind maps.

The RMS (Reading, Mind Mapping and Sharing) learning model can be used in physics subjects to provide a new atmosphere in the learning process, so as to increase students' creativity and learning outcomes. In understanding physics subjects, one of which is the subject of temperature and heat, a high level of understanding is needed from students. In school learning activities still do not maximize students' higher order thinking skills. Whereas students' higher-order thinking skills are needed for mental development and students' mindsets so that the learning process can be successful.

II. Review of Literature

2.1 Motivation

Lanthanida (2017:175) states that:

"Motivation is a series of efforts to provide certain conditions, so that someone wants and wants to do something and if he doesn't like it, he will try to negate or avoid that feeling of dislike. So motivation can be stimulated by external factors, but the motivation grows within a person. The environment is one of the external factors that can foster motivation in a person to learn.

According to Mc Donald in Kompri (2016: 229) that: "motivation is a change in energy in a person's personality which is characterized by the emergence of affective (feelings) and reactions to achieve goals".

Motivation to learn can arise due to intrinsic factors, in the form of desire and desire to succeed and encouragement of learning needs, hopes for ideals. While the extrinsic factors are awards, a conducive learning environment, and interesting learning activities (Uno, 2016:23).

Khodijah (2014: 150) says that: "Learning motivation is a psychological condition that encourages a person to learn".

Dimyati and Mudjiyono (2009: 96) suggest that:

"*Several elements that affect motivation in learning, namely: 1) The ideals and aspirations of students. The ideals will strengthen students' motivation to learn both intrinsic and extrinsic. 2) Students' abilities. The desire of a child needs to be accompanied by the ability or skill in achieving it. 3) Student condition. Students' conditions which include physical and spiritual conditions affect learning motivation. 4) Students' environmental conditions. The student environment can be in the form of natural conditions, living environment, peer association, and social life.*

Motivation can be interpreted as a person's strength that can lead to a level of willingness in carrying out an activity. Willingness comes from within the individual itself (intrinsic motivation) and from outside the individual (extrinsic motivation). How strong an individual's motivation will determine the quality of the behavior he displays, both in the context of studying, working and in other life (Siti Suprihatin, 2015:81).

Muhlisin et al., (2016) stated that: “Motivation and learning outcomes can be increased through innovation in the teaching and learning process. Innovative learning strategies and learning models are used to support learning objectives to be achieved optimally. One of the innovative learning models that is proven to be able to increase activity in the learning process and learning outcomes is the RMS learning model in which there are steps or projects in making mind maps in the learning process.

Wina Sanjaya (2010:249) says that: “The motivational learning process is one of the most important dynamic aspects. It often happens that students who lack achievement are not caused by their lack of ability, but because there is no motivation to learn so that they do not try to direct all their abilities.

Kompri (2016: 233) states that: "The position of motivation in learning does not only provide the right direction for learning activities, moreover with motivation one will get positive considerations in learning".

2.2 RMS (Reading, Mind Mapping and Sharing) model

The RMS (Reading, Mind Mapping and Sharing) model is a learning model that requires students to hone their higher order thinking skills. In the RMS (Reading, Mind Mapping, and Sharing) model, students are asked to make a mind map which is included in Anderson's taxonomy on the C6 (Creating) indicator.

Muhlisin (2018) states that: “The RMS learning model has three main steps in its learning, namely: 1) reading: students read critically related to certain topics obtained through various information/learning resources; 2) mind mapping: students make mind maps related to topics that have been read individually and in collaborative groups; 3) sharing: students share mind maps to all students”.

The RMS (Reading, Mind Mapping and Sharing) learning model is said to be effective if, after using this learning model, there is an increase in the average higher-order thinking ability which has been categorized into, very high, high, medium and very low (Ari, Masykuri & Elfi, 2014).

In the RMS (Reading, Mind Mapping and Sharing) model, the implementation of learning is adapted to the concept of constructivism, that learning is not only a process of absorbing information, ideas and abilities for materials to be newly built by the brain and knowledge is not only conveyed by the teacher but is built. and improved by himself (Muhlisin, Susilo, Amin, & Rohman, 2016).

Muhlisin (2017:27-36) states that: "The RMS (reading, mind mapping, and sharing) learning model is a learning model based on 21st century skills because it is based on research that can improve critical thinking skills, metacognitive skills, retention, cognitive learning outcomes. , and integrate (integrate) collaborative skills and the ability to communicate in the learning process”.

Cooperation in mind mapping activities directs students to make it easier to discuss, seek information, exchange ideas, analyze, evaluate, ask questions and draw conclusions so that students' thinking skills can be created. With individual activities, discussions, and collaborative group work. This activity makes students are required to take responsibility individually as well as about the success of their learning.

2.3 Higher Order Thinking Ability

Gunawan (2012:171) states that: "Higher Order Thinking Skills (HOTS) are thought processes that require students to manipulate information and ideas in certain ways that give them new understanding and implications".

Higher Order Thinking Skills (HOTS) is a way of thinking that no longer only memorizes verbally but also interprets the nature of what is contained among them, to be able to interpret meaning requires an integralistic way of thinking with analysis, synthesis, association to draw conclusions towards creation of creative and productive ideas (Emawati, 2017:196-197).

The ability to think is an ability that exists in humans so that they can process a mental operation that includes knowledge and creation. Thinking ability is the ability to use the mind in finding understanding and meaning of something that must export ideas, make decisions, think about solutions with the best considerations and revise problems in the thinking process. It can be concluded that thinking ability is the ability that a person has in the process of using the mind to understand and understand a problem, express ideas, make decisions and solve a problem (Ary Kiswanto Kenedi, 2018: 67-68).

Richard (2014:1) says that: "High-order thinking skills are considered by many science educators as an important educational goal for students to receive learning materials".

Lewy (2009:16) states that: “Indicators to measure higher order thinking skills include analyzing, evaluating and creating. Meanwhile, according to Marwah (2017:176) said that: "Indicators to measure higher order thinking skills consist of:

a. Analyzing is separating matter into its constituent parts and detecting how one part relates to another. It includes distinguishing, organizing and connecting.
b. Evaluating is making decisions based on standard criteria, such as checking and criticizing.
c. To create is to put elements together to form a coherent whole or to create original results such as composing, planning and producing.

Thinking ability consists of two parts, namely lower order thinking skills and higher order thinking skills. The abilities included in LOTS are the ability to remember, understand, and apply, while HOTS includes analyzing, evaluating, and creating (Syifa Ulhusna, 2019:19).

Syifa Ulhusna (2019:22) states that: "There are seven characteristics of the process of higher-order thinking skills, namely involving assessment and interpretation, constructing new formulations, seeking meaning, complex, non-algorithmic, ending in solving with various strategies and the need for independence and vigorously. Higher order thinking is related to the ability to make decisions and construct problem formulations, is non-algorithmic and thinks with various solutions and criteria.

III. Research Method

3.1 Research Approach and Type

This research was conducted in a high school in the District of Sigli City, namely SMA Negeri 1 Sigli. Data collection is carried out in the odd semester of the 2021/2022 academic year on 8 to 26 November 2021.

The research approach used is quantitative research. This type of research is quasi-experimental research. The design used is a non-equivalent control group design(Arifin, 2008). The research design is presented in Table 1.

Table 1. Non-equivalent control group design

Group	*Pretest*	Treatment	*Posttest*
Experiment	01	X	02
Control	03	-	04

(Arifin, 2008)

Information:
01 = Measurement of initial ability (Pre-Test) experimental class
02 = Measurement of the final ability (Post-Test) experimental class
03 = Initial ability measurement (Pre-Test) control class
04 = Measurement of final ability (Post-Test) control class
X = Learning the application of the RMS model (Reading, Mind Mapping, and Sharing)

The research design was non-equivalent control group design, namely a research design that included a pretest before being given treatment and a posttest after being given treatment. Thus it can be known more accurately, because it can be compared with being held before being treated (Sugiyono, 2011: 109).

3.2 Data Collection Techniques

In this study, researchers used several techniques in collecting data, namely:

a. Research instruments

Yanti Herlanti (2014:36) states that: "the instrument is a tool to collect data which is then processed and analyzed. The instrument used in this research is a test instrument and the instrument analysis technique includes the level of difficulty, discriminatory power, item validity, and reliability. The following are each of the research instruments and their analysis of the instrument:

b. Higher Order Thinking Ability Test

The higher order thinking ability test in this study was used before being given treatment and after being given treatment. This test is in the form of an essay test for pretest and posttest. The value of students' higher-order thinking skills in physics is obtained from the scoring of students' answers to each item of questions. The scoring criteria used in table 2

Table 2. Higher Order Thinking Ability Test Scoring Guidelines

Criteria	Score
Did not answer the question given	0
Answer the given question but the answer is wrong	1
Answering the questions given but not perfect	2
Answer the questions given correctly	3
Answer questions perfectly	4
Maximum Score	**4**

Source: Zaenal Arifin (2009:127)

Before the test instrument is used in research, the research first conducts a test of the instrument to students who have obtained the material, which will be tested. The data from the test test results are analyzed to obtain information on whether the instrument is feasible or not to be used in research. The following analyzes are used:

c. Validity test

Validity test is used to find valid questions. A valid question is a matter of being able to measure data from the variables studied correctly (Nunung Apitasari, 2015: 7).

Here's the validity formula:

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{(N\Sigma X^2 - (\Sigma X)^2)(N\Sigma Y^2 - (\Sigma Y)^2)}}$$

Information:

r_{xy} :correlation coefficient between variables X and Y
N : number of students
ΣX :number of questions
ΣY :total score
ΣXY :the sum of the multiplications of the variables X and Y
ΣX^2 :sum of squares of questions
ΣY^2 : jumlah kuadrat dari skor

d. Reliability Test

Reliability test is used to increase the level of determination of data collection tools (instruments). Reliability test by comparing the value with Cronbach's alpha formula can be seen:$r_{11hitung}$ $r_{11tabel}$

$$r_{11} = \left[\frac{k}{(k-1)}\right]\left[1 - \frac{\Sigma\sigma_b^2}{\sigma_t^2}\right]$$

Information:
r_{11}: item reliability
k: the number of questions
σ_b^2: number of item variants
σ_t^2: total variance

e. Observation Sheet

Observation sheets are used to assess student activities that are happening from the beginning of learning to the end of learning so that students' implementation of learning can be seen. Can be measured using a Likert scale with the following formula:

$$Persentase = \frac{jumlah\ skor\ yang\ diperoleh}{jumlah\ skor\ maksimal}\ x\ 100\%$$

Table 3. Qualification Results Percentage of Student Learning Activities

Score Range	Category
80%-100%	Very well
60% - 80%	Well
40% - 60%	Enough
20% - 40%	Not enough
< 20%	Less once

(Source: Suharsimi Arikunto & Cepi Safrudin, 2007:18)

3.3 Data analysis technique

The analysis of the research data aims to test the hypotheses proposed in the study.

1. $\mathbf{N_{Gain}}$

Test to determine the improvement of students' higher order thinking skills. The category of improvement through students' higher order thinking is seen by using the equation:$\mathbf{N_{Gain}}$ $\mathbf{N_{Gain}}$

$$N_{Gain} = \frac{SkorPosttestr - SkorPretest}{SkorIdeal - SkorPretest}$$

After the test is calculated, the next step is to see the category of interpretation of the effectiveness of the score which is interpreted in table 3.4.$\mathbf{N_{Gain}}$ $\mathbf{N_{Gain}}$

Table 4. Category Interpretation of Effectiveness Score$\mathbf{N_{Gain}}$

Percentage (%)	Interpretation
< 40	Ineffective

40 -55	Less effective
56 – 75	Effective enough
>76	Effective

(*Source: Adapted from Jesbio Journal, 2016)*

2. Normality test

Normality test is conducted to determine whether the sample under study is normally distributed or not. To test normality in this study using the one Kolmogorof Smirnov test on the SPSS 25 program with a significant rate of 0.05 or 5%. The test hypothesis is: the data is normally distributed or the data is not normally distributed.

3. Homogeneity Test

If the data is normally distributed, then the next step is to use the homogeneity of variance test. In this study, to test the homogeneity of using the homogeneity of variances test from the SPSS 25 program with a significant level of 0.05 or 5%. As for the test hypothesis: there is no effect of the value of the variance of the two classes or there is an effect of the value of the variance of the two classes.

4. Hypothesis testing

If the data is normally distributed and homogeneous, then the independent sample t-test is then carried out with SPSS 25 with a significant level of 0.05 or 5%. The independent sample t-test test hypothesis is as follows:

H_o: there is no effect of the RMS (Reading, Mind Mapping and Sharing) model on students' higher order thinking skills on temperature and heat material at SMA Negeri 1 Sigli.

H_a: there is an effect of RMS (Reading, Mind Mapping and Sharing) model on students' higher order thinking skills on temperature and heat material at SMA Negeri 1 Sigli.

5. *Effect Size*

To determine the magnitude of the impact or effectiveness of the RMS (Reading, Mind Mapping and Sharing) model on higher order thinking skills, the effect size is used. By using the formula:

$$d = \frac{m_A - m_B}{[(sd_A^2 + sd_B^2/2]^{1/2}}$$

Information:

d : effect size

m_A: the average value of the experimental class gain

m_B: the average gain value of the control class

sd_A: standard deviation of the experimental class

sd_B: control class standard deviation

The criteria for the size of the effect size are as follows:

Table 5. Effect Size Criteria

Effect Size	**Criteria**
d < 0.2	Small
0.2 < d < 0.8	Currently
d > 0.8	Tall

(Source: Adapted from Jesbio Journal, 2016)

IV. Result and Discussion

4.1 Research result

That the classification between the experimental and control classes is different. The experimental class value is 69.08 and is included in the quite effective classification. The control class value is 45.09 and is included in the less effective classification. So it can be concluded that the application of learning with the RMS model (Reading, Mind Mapping, and Sharing) which is applied in the experimental class is quite effective in improving students' higher-order thinking skills.$N_{Gain}N_{Gain}N_{Gain}$

To test the normality in this study, the researcher used the one Kolmogorof Smirnov test on the SPSS 25 program with a significant level of 0.05 or 5%. The data is said to be normally distributed if the significant value is > 0.05. If significant <0.05 then the data is not normally distributed.

That the experimental and control classes have sig > 0.05 so that the data on these variables are normally distributed.

The homogeneity test uses the test of homogeneity of variances, the data has the same variance if the significant value is > 0.05. If the significance is < 0.05 then the data obtained does not have the same variance.

The results of the homogeneity test in the experimental and control classes through their learning outcomes can be seen that the data results have a sig > 0.05 so it can be concluded that the variance between these groups is homogeneous.

4.2 Discussion

At the first meeting in the experimental class and the control class, the researcher conducted a pretest to determine the students' initial abilities before being given treatment.

The first stage in the experimental class, the researcher guides students to read critically related to temperature and heat material, after that students are directed to make mind mapping, students in the experimental class are still not familiar with the applied learning model. At the second meeting, some students began to understand about mind mapping. At the third and fourth meetings, students were already familiar with the applied learning model. It can be seen that most of them have started to be active in the learning process. Students are also getting used to making mind maps with their own creativity.

To find out how much the effectiveness of the learning model is, it can be calculated by calculating the effect size. After the calculation, the effect size value is 2.07 (d = 2.07) where the classification is included in the high category, which means that students' higher-order thinking skills are affected by the implementation of the RMS (Reading, Mind Mapping, and Sharing) learning model. Thus, it can be concluded that the RMS (Reading, Mind Mapping, and Sharing) learning model on temperature and heat material is quite effective.

V. Conclusion

Based on the results of data analysis and discussion, it can be concluded that the RMS model is quite effectively applied to improve students' higher-order thinking skills, especially in the experimental class. It can be seen from the acquisition of an average score of 69.08 for the experimental class included in the quite effective classification and 45.09 for the control class included in the less effective classification using conventional models. This can also be seen in the acquisition of an effect size test score of 2.07 which is included in the high category, which means that the RMS model can have a great influence

on higher order thinking skills. Based on the results of the independent sample t-test on the hypothesis test, a significant value of 0.000 <0.05 was obtained, which means that it is accepted.$N_{Gain}H_a$

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