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# Application of the Concept Mapping Type Cooperative Model In Improving Student Learning Outcomes On the Concept of Straight Motion in Class X MIPA-1 Al Qona'ah Baleendah High School, Bandung Regency

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**Abstract**

Application of the Concept Mapping Type Cooperative Model in Improving Student Learning Outcomes on the Concept of Straight Motion in Class X MIPA-1 Al Qona'ah Baleendah High School, Bandung Regency. The purpose of writing this classroom action research (PTK) is to apply the Concept Mapping type cooperative learning model to Straight Motion material. This classroom action research was carried out in three cycles with each cycle including four stages. The four stages are the planning stage, action implementation stage, observation stage, and reflection stage. The approach used in this research is quantitative with descriptive research type. The data collection technique in this research is qualitative data obtained from observations and quantitative data in the form of learning outcomes obtained from learning results tests for each cycle. The data analysis techniques used are descriptive analysis and inferential statistical analysis. The results of classroom action research show: that after giving action in cycle I, cycle II, and cycle III, classically, there was an increase in students' physics learning outcomes as seen from the percentage of learning completeness from 50% in cycle I, to 68.8% in cycle II and 100% in cycle III. This shows that the concept mapping type cooperative learning model used can improve students' physics learning outcomes.

**Keywords:** *Cooperative Model, Concept Mapping, Learning Outcomes, Straight Action*

## INTRODUCTION

According to Law Number 14 of 2005, it is stated that teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education through formal education, basic education, and secondary education. Implementation of the 2013 curriculum which lines up character and competency, plays the role of teachers as shapers of character and competency of students, who must be creative in selecting and sorting, as well as developing methods and learning materials. Teachers must be professional in shaping the character and competence of students according to their individual characteristics and must appear pleasant to students in any condition and atmosphere.

The 2013 Curriculum places more emphasis on three domains that need to be assessed, and the 2013 Curriculum places more emphasis on assessing attitudes, knowledge, and skills. Attitude is the most important assessment before assessing the two things that follow. Referring to these three competencies, the implementation of learning must be set in such a way that the main learning objectives can be achieved. In this regard, there are several principles that teachers must pay attention to when implementing learning, including (1) centered on students, (2), developing students' creativity; (3), creating fun and challenging conditions; (4) containing values, ethics and kinesthetics; (5) providing a diverse learning experience through the application of various learning strategies and methods that are fun, contextually effective, efficient and meaningful.

One of the most important things in achieving student learning outcomes is through learning models. Likewise, at Al Qona'ah Baleendah High School, overall the knowledge, skills, and attitudes that are the results of students' learning are still not in line with expectations, namely meeting the specified Minimum Completeness Criteria (KKM). This was obtained by researchers from the results of observations in October 2021. Based on the results of the observations, learning activities were carried out on a limited PTM basis due to the constraints of the COVID-19 pandemic. After seeing the Limited PTM activities at Al Qona'ah Baleendah High School, especially in class able to reach KKM.

Apart from student problems, the learning carried out so far is still teacher-centered so students are less active and learning seems monotonous, as well as the learning motivation of students who seem to lack interest in physics subjects because they think that physics lessons are difficult. and there are a lot of calculations, so as a result, this physics lesson is still a lesson that some students don't like.

Regarding problems related to this condition, several efforts will be implemented to improve the things that occur. For this reason, changes need to be made, especially in the learning models used in Physics subjects, one of which is the Concept Mapping type cooperative learning model.

According to Warsono & Hariyanto (2014, p. 161), cooperative learning is a learning model that involves several small groups of students working together and

learning together by helping each other interactively to achieve formulated learning goals. Meanwhile, according to Hamdayama (2016, p. 145), cooperative learning is a series of learning activities carried out by students in certain groups to achieve the learning objectives that have been formulated.

This model is simple enough to strengthen students' knowledge and understanding of the material they have read and can be applied to create an interesting learning process. One way to explain the relationship between concepts is learning accompanied by the preparation of concept maps. Learning strategies with the help of concept maps are an alternative that can help improve learning outcomes. According to Trianto (2009), learning concept mapping is a concrete graphic illustration that indicates how a single concept is connected to other concepts in the same category.

After implementing the Concept Mapping type cooperative learning model with the application of a scientific approach, students become more motivated in carrying out learning in class, especially since learning activities are interspersed with games/ice breaking which will make students more interested in participating in learning and can improve participants' learning outcomes. educate.

## METHODOLOGY

This research is classroom action research with implementation stages which include planning, action implementation, observation, evaluation, and reflection. This classroom action research was carried out in three cycles with each cycle including four stages. The approach used in this research is quantitative with descriptive research type. The data collection technique in this research is qualitative data obtained from observations and quantitative data in the form of learning outcomes obtained from learning results tests for each cycle. The data analysis techniques used are descriptive analysis and inferential statistical analysis.

Data obtained from observations and student responses were analyzed qualitatively. Meanwhile, the data obtained from the physics learning test was analyzed quantitatively using descriptive statistics, namely the average score, percentage, standard deviation, and minimum and maximum values achieved in each cycle using the computer assistance program Microsoft Office Excel.

According to Suharsimi Arikunto (2006), there are four stages that a researcher must go through in conducting PTK, namely (1) Planning, (2) Acting, (3) Observing, and (4) Reflecting ). The four stages in the research are elements to form a cycle.

## RESULTS AND DISCUSSION

In general, the description of concept mapping learning for each cycle is as follows:

1. Action Planning Stage

   The action planning stage is carried out to determine the strategies and actions that will be carried out at the action implementation stage. Researchers

develop strategies and actions that are considered appropriate by the concept mapping learning model that will be applied to support the successful implementation of actions. Apart from that, the researcher prepared the necessary equipment and materials such as the Learning Implementation Plan (RPP), reading materials (card pieces), and research instruments.

The research instrument was taken from the analysis of the results of trial questions which were included in the appropriate criteria to be used as a research instrument. In the analysis of the test results, the values for validity, reliability, level of difficulty of the questions, and distinguishing power are calculated, then each is interpreted. From this interpretation, it can be determined which questions are suitable to be used as research instruments.

2. Action Implementation Stage

The next stage is the action implementation stage. The strategies and actions that have been formulated at the action planning stage are implemented by the researcher. Researchers apply a concept mapping learning model based on the learning syntax. The syntax for learning concept mapping is:

a. Introduction

The introductory phase begins with the teacher opening the lesson by saying hello, and then checking the students' attendance. Next, the teacher checks the completeness of the assignments that students must bring. Assignments were given at the previous meeting. Once finished, the teacher distributes pretest questions and students work on them. Next, the teacher provides apperception and motivation to students so that students are more interested and enthusiastic about learning the material they will study. Then the teacher conveys the sub-topics that students will study.

b. Core activities

The core activities in the concept mapping learning model consist of:

1) Phase of organizing students into groups

After the teacher has finished providing motivation and apperception, the teacher then organizes the students into groups. Students are divided into 8 groups. Groups are determined at a previous meeting. Each group consists of 4 students who have diverse (heterogeneous) academic abilities. The heterogeneity of students is determined based on their learning abilities and the results of daily tests on previous material. Each group uses their group name to show the characteristics of their group.

2) Goal Delivery Phase

After the teacher has finished organizing students into groups, the teacher then conveys the learning objectives to be achieved in the lesson that will be implemented.

3) Phase of presenting material

The teacher distributes reading materials (card pieces) containing lesson material to students. Each group gets the same reading material. Representatives from each group take pieces of cards to make a concept map.

4) Concept map creation phase for each group

The teacher guides each group to work on the concept map created by their respective groups.

5) Validation Phase

The teacher guides students in a class discussion and asks representatives from each group to present the results of the concept map work they created. Other groups listen and then compare their group's results with the work of other groups. If there is a discrepancy, other groups can provide opinions for later discussion. The teacher is tasked with guiding students in discussions and then directing students to reach conclusions.

6) Evaluation Phase

After the validation phase is complete, the teacher then distributes the final questions or post-test to the students and the students fill in the questions.

7) Rewarding Phase

After the students have finished working on the questions, the teacher gives an award to one of the groups that have displayed the concept map they made. The award takes the form of giving rewards, thanks, and applause.

c. End activities

At the end of the lesson, the teacher and students reflect. After that, the teacher gives homework assignments, informs about the material for the next meeting, closes the learning activities, and says greetings.

3. Evaluation and Observation stage

Evaluation and observation are carried out simultaneously with the action implementation stage. The evaluation was carried out to determine the increase in the ability to solve questions after receiving action in the form of implementing the concept mapping learning model. Evaluation is given at the beginning of learning (pretest) and the end of learning (posttest).

Observations were carried out by research partners who were tasked with observing the implementation of teacher actions and activities during classroom learning activities. Meanwhile, students' activities during learning were observed by a fellow researcher, namely one of the teachers at Al-Qona'ah Baleendah High School.

4. Analysis and Reflection Stage

This stage is carried out the day after the action implementation stage and the evaluation and observation stage are carried out. The aim is to identify the weaknesses found at the action stage in the previous cycle and then use them as material for consideration and thought at the next action planning stage.

In more detail, the description of the Concept mapping learning model for each cycle is as follows:

1) First Cycle

a. Action Planning Stage

The first cycle of action planning is carried out long before the implementation of the action. Researchers plan actions and strategies that will be carried out at the action implementation stage. The results of action planning in the first cycle are as follows:

1) The class that will be used as the research object is class X MIPA-1
2) The place used as a research location is the class X MIPA-1 classroom.
3) The learning model that will be applied to improve students' activities and learning outcomes is the concept mapping learning model.
4) The focus of attention in concept mapping learning is regarding time, so teachers must be able to manage time well.
5) Socialization of the concept mapping learning model and group formation as well as equipment that must be prepared by students is carried out at the meeting before the implementation of the action.

b. Action Implementation Stage

The implementation of the first cycle of actions was carried out on Friday 12 October 2021. The results of planning at the action planning stage were implemented by the teacher at this stage. The focus of implementing actions in the first cycle is to apply the concept mapping learning model by the learning syntax, namely:

1) Preliminary stage

The teacher opens the lesson by saying hello and then checks the students' attendance. Next, the teacher checks the completeness of the assignments that students must bring (the assignments were given at the previous meeting). After that, the teacher asks for an apperception in the form of questions and answers. The teacher asks questions:

Is it possible for an object's displacement to be greater than the distance it travels?

Some of the students appointed expressed their opinions:

"No, because the movement of an object is only a change in position."

Next, the teacher motivates by asking questions to the students

"Name some examples of rectilinear motion in everyday life?" After completing apperception and motivation, the teacher then delivers the material to be studied, namely Quantities in Straight Motion, then the teacher distributes initial questions (pretest), and students work on these questions.

2) Core Activity Stage

At this stage, the teacher divides students into nine groups, and then the teacher conveys the learning objectives. After that, each group was given pieces of cards regarding the quantities in Straight Motion. Next, each group makes a concept map of quantities in Rectilinear Motion with a total of 20 concepts. Each group is encouraged to make connecting lines between these concepts.

Then the teacher guides students to make concept maps and conduct class discussions. Next, the teacher asked three representatives from the group to present the concept maps they created using a random system. From the results of the concept maps created and presented by group representatives, not every group was able to connect the concepts they created. The teacher is tasked with guiding students in discussions and then directing students to reach conclusions.

Once finished, students then take the post-test given by the teacher. Then in the final stage, the teacher and students reflect.

c. Evaluation and Observation Stage

Evaluation is carried out at the beginning and end of the first cycle. The number of questions given is 5 essay questions.

Meanwhile, observations are carried out by observers regarding the activities of teachers and students during learning

d. Analysis and reflection stage

The following table presents the results of the analysis of student evaluations and the results of observer observations in the first cycle

At the end of the first cycle meeting, a cycle test was held in the form of a learning outcomes test consisting of 5 questions. The success of students is seen in obtaining scores that reach the KKM in physics. The KKM for physics was 70. After analysis, it turned out that the results obtained did not meet the indicators of success, the students who got a score ≥ KKM were 16 students with a percentage of 50%. This percentage is still far from meeting the performance indicators that must be achieved, namely 70% of students who get a score ≥ KKM, so this research is continued to Cycle II. This happened because, in the implementation of the action, there were several shortcomings. The shortcomings are as follows:

1) The number of students in each group is still large and not yet heterogeneous so in each group there are only a few people who actively contribute to the group

2) During class discussions, only the groups that present the results of their group discussions are active

3) There are still many students who just stay quiet and don't do anything in their group and only record the answers from their group friends

4) In implementing the action there are still many technical things, such as during practicum, there are still many students who do not understand how to collect data and use measuring instruments properly so that learning is hampered.

2) Second cycle

a. Action Planning Stage

The second cycle of action planning was carried out based on the results of analysis and reflection in the first cycle. Researchers and research partners plan actions and strategies that will be carried out at the second cycle action implementation stage. The results of action planning in the second cycle are as follows:

1) The teacher must guide and direct students during group discussions so that students begin to have the courage to ask questions, respond, and share ideas with friends.

2) Students must be given direction to be responsible for their respective roles and duties

3) Teachers must be consistent with the distribution of time according to the RPP.

4) All phases of group learning must be carried out well, especially the class discussion phase so that students can know the truth of the results of their work.

b. Action Implementation Stage

The implementation of the second cycle of actions was carried out on Tuesday 26 October 2021. The results of the planning at the action planning stage were implemented by the teacher at this stage. The material studied in the second cycle is about Uniform Straight Motion (GLB) with a total of 15 concepts. The focus of implementing actions in the second cycle is improving the application of the concept mapping learning model by the learning syntax and emphasis on group work.

c. Evaluation and Observation Stage

The evaluation was carried out at the beginning and end of the second cycle. The number of questions given is 3 essay questions. Observations are carried out by observers on the activities of teachers and students during learning.

d. Analysis and reflection stage

The results obtained at the observation and evaluation stage were collected and analyzed as in cycle I. After analysis, it turned out that the results obtained in cycle II had shown an increase but still did not meet the indicators of success, the students who obtained a score ≥ KKM were 22 students with a percentage of 68.8%. This percentage still does not meet the performance indicators that must be achieved, namely, 70% of students who get a score ≥ KKM, so this research is continued to Cycle III.

3) Third cycle

a. Action Planning Stage

Action planning for the third cycle is carried out based on the results of analysis and reflection in the second cycle. Researchers and research partners plan actions and strategies that will be carried

out at the third cycle action implementation stage. The results of action planning in the third cycle are as follows:

1) Re-implementing actions in the second cycle
2) Guiding and directing students to dare to ask questions and give opinions
3) Teachers must pay more attention to students and be firm in giving instructions so that no more students joke around during the lesson.
4) During the discussion the teacher must involve all students to be active and collaborate in making the concept map given.

b. Action Implementation Stage

The implementation of the third cycle of actions was carried out on Wednesday 2 November 2021. The results of the planning at the action planning stage were implemented by the teacher at this stage. The material studied in the third cycle is about uniformly changing straight motion (GLBB) with a total of 18 concepts. The focus of implementing actions in the third cycle is improvements in the application of the concept mapping learning model by the learning syntax and emphasis on group work.

c. Evaluation and Observation Stage

The evaluation was carried out at the beginning and end of the third cycle. The number of questions given is 3 essay questions. Observations are carried out by observers on the activities of teachers and students during learning.

d. Analysis and reflection stage

The results obtained at the observation and evaluation stages were collected and analyzed as in cycles I and II. The results obtained in cycle III compared with the results obtained in cycles I and II turned out to have met the performance indicators with a percentage of 84.4% of students who obtained a score > KKM, while 16% of students obtained a score = KKM, so the research only reached in cycle III.

An overview of improving learning outcomes through concept understanding tests is presented in Table 4.1 below.

Table 4.1. Distribution of Frequency and Percentage Increase in Students' Physics Learning Outcome Scores

| Kategori | SIKLUS | | | | | |
|---|---|---|---|---|---|---|
| | I | | II | | III | |
| | Frekuensi | % | Frekuensi | % | Frekuensi | % |
| <=69 | 16 | 50,0% | 10 | 31,2% | 0 | - |
| 70 -79 | 10 | 31,3% | 3 | 9,4% | 5 | 15,6% |
| 80-89 | 6 | 18,7% | 16 | 50,0% | 20 | 62,5% |

If students' absorption of physics material is grouped into complete and incomplete categories, then based on the KKM standard for physics subjects at Al Qona'ah Baleendah High School, namely 70, the frequency distribution and percentage of physics learning completeness in cycle III are as follows.

Table 4.2. Increasing the Frequency and Percentage of Students' Physics Learning Completeness

| Dayaserap (%) | Kategori ketuntasan | SIKLUS | | | | | |
|---|---|---|---|---|---|---|---|
| | | I | | II | | III | |
| | | jumlah | (%) | jumlah | (%) | jumlah | (%) |
| 0 - 69 | Tidak tuntas | 16 | 50,0 | 10 | 31,2 | 0 | 0 |
| 70 - 100 | Tuntas | 16 | 50,0 | 23 | 68,8 | 32 | 100 |

This research is included in the type of classroom action research carried out to improve students' physics learning outcomes through a concept mapping type cooperative learning model. Actions are given through three cycles, namely cycle I, cycle II, and cycle III.

After giving action in Cycle I, cycle II, and Cycle III, classically, there was an increase in students' physics learning outcomes as seen from the percentage of learning completeness from 50% in cycle I to 68.8% in cycle II and 100% in cycle I. cycle III. This shows that the concept mapping type cooperative learning model used can improve students' physics learning outcomes. This happens because, in concept mapping-type cooperative learning, students are required to strengthen their knowledge and understanding of the material they have read and can apply it in creating an interesting learning process. Learning strategies with the help of concept maps are an alternative that can help improve learning outcomes, and students are also required to learn creatively so that students tend to mobilize all their abilities to find answers to the problems given so that the learning they experience becomes meaningful and absorbed in thoughts of each student.

However, individually, not all students experienced significant improvements in physics learning outcomes, as can be seen from the fact that there were still around 15.6% (5 people) of students who experienced

gradual increases in learning outcomes. This is due to several reasons including:

- These students have poor attendance during the learning period.
- Class management is not good because the number of groups that teachers have to supervise is very large so in handling all students, teachers experience difficulties.

Concept mapping type cooperative learning is suitable to be applied in classes with not too many students. So when the teacher applies this concept mapping type cooperative learning model in classes with a large number of students, the teacher experiences difficulty in controlling the students' activities. during problem-solving observations.

Apart from students' physics learning outcomes, there is also an increase in students' attitudes through changes in students' attitudes that occur during the learning process which can be seen on the students' activity sheets. The changes in attitudes that occurred in the classroom during the research were that students' attention and activeness in participating in learning increased. This can be seen from the increasing number of students who are active in the learning process.

## CONCLUSIONS

Based on the results of the data obtained in this research, it can be concluded that after giving action in cycle I, cycle II, and cycle III, classically, there was an increase in students' physics learning outcomes as seen from the percentage of learning completion from 50% in cycle I to 68.8% in cycle II and 100% in cycle III. This shows that the concept mapping type cooperative learning model used can improve students' physics learning outcomes. However, individually, not all students experienced significant improvements in physics learning outcomes, as can be seen from the fact that there were still around 15.6% of students who experienced gradual increases in learning outcomes. This is due to several reasons, including the level of attendance of these students is still low during the learning period. Class management is also not good because the number of groups that teachers have to supervise is very large so in handling all students, teachers experience difficulties..

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