

THE IMPLEMENTATION OF THE TWO STAY TWO STRAY LEARNING MODEL ASSISTED BY MIND MAPPING TO IMPROVE STUDENTS' UNDERSTANDING CONCEPT

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Abstract

This study aims to determine the implementation of the Two Stay Two Stray assisted by Mind Mapping to improve students' understanding of concept. The method used in this research is quasi-experimental in the form of a one-group pretest-posttest design. The research was conducted at SMP Islam Nurus Syamsi with a sample selection technique using the saturated sample method, namely class VIII students. Collecting data using observation, questionnaire, test, and documentation techniques. The data analysis technique used paired t-test. The results showed that: (1) the implementation of the two stay two stray learning model with the aid of mind mapping got an average result of 97.15% with very good criteria, (2) there were differences in students' understanding of concepts before and after the application of the two stay two stray learning model assisted by mind mapping with a significance value of $0.000 < 0.05$ H_0 was rejected, (3) increase in students' understanding concept after the implementation of the two stay two stray learning model assisted by mind mapping in the medium category was 69,23% and the high category was 30,77% with an average gain value of 0.6531 included the medium category, (4) student responses to the implementation of the two stay two stray learning model assisted by mind mapping obtained an average percentage of 87.02% including the very good category.

Keywords: *Mind Mapping, Understanding Concept, Two Stay Two Stray*

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INTRODUCTION

Education is an important aspect for humans in preparing themselves to face the future. According to Law No. 20 of 2003 on the national education system, education plays a role in improving the quality of human resources because education can be used as a means to increase the potential of students. Education has an important role in the process of nation and state development. Education can take place anywhere such as in schools, families, and communities so education is a shared responsibility (Sudiarsana, 2020).

Learning activities that take place in schools can be done through the learning process. For learning to run well and according to objectives, learning must be active and effective. Therefore, teachers and students have an important role in the learning process. Learning should be centered on students so that they can actively participate in developing their potential and have a deep conceptual understanding of the material being studied.

Understanding the concept is important in solving problems both during learning and in everyday life. The importance of understanding the concepts that students have so that students do not just memorize and work on questions during the learning process (Yufentya et al., 2019). Because understanding the concept will affect learning outcomes, including in the subjects of Natural Sciences. Science is not just a way of finding out about nature but also mastering various facts and concepts based on the results of experiments and observations (Dewi et al., 2018). Science learning should focus on understanding concepts. The indicators of conceptual understanding in this study are restating a concept in various representations, classifying objects based on certain characteristics, providing examples and non-examples of a concept, and using or applying concepts.

Based on observations made at the Nurus Syamsi Islamic Junior High School, learning is teacher-centered. When the learning process takes place students are less active and learning tends to be monotonous. This is because the teacher dominates the learning process and the learning model applied is not appropriate. If the learning model used is not appropriate, it can make students bored so students are less active and do not understand the concept of the material being taught. If students do not understand the material being taught, it will affect student learning outcomes (Juniantari & Kusmariyatni, 2019).

Teachers as facilitators are expected to be able to implement and develop learning models so that

learning becomes directed. Therefore, it is necessary to apply the right learning model during the learning process. One of the learning models that can be applied is the two stay two stray type of cooperative learning model. The application of this learning model will help students to be more active in managing information through question and answer, discussion, seeking answers, explaining and listening to the material presented by their friends, and difficulties in learning can be facilitated (Harahapa & Surya, 2017). In addition, the two stay two stray cooperative learning model is considered effective in increasing students' understanding of concepts (Jusmawati, 2019).

The learning model that is applied becomes more effective and interesting when using appropriate and appropriate learning strategies. The learning strategy that can be used is mind mapping. Mind mapping is a learning strategy in the form of subject matter that is mapped with a combination of colors, shapes, writing, and others so that students easily remember the material that has been learned (Juniantari & Kusmariyatni, 2019).

The materials used in the research are vibrations, waves, and sound. The material was chosen because in research Aulia et al (2018) concluded that in the material of vibration and waves there are misconceptions of 7.40% and do not understand the concept of 61.59%. According to research by Haerunnisa et al (2022) that the teacher's teaching method is not appropriate and students think the material is difficult to understand, causing misconceptions where students believe that the answer is correct, but it turns out that the answer is wrong. Based on the above background, research was carried out on "The Implementation of the Two Stay Two Stray Learning Model Assisted by Mind Mapping to Improve Students' Understanding Concept".

RESEARCH METHOD

The research was carried out at Nurus Syamsi Islamic Middle School, Alassapi Village, Banyuanyar District, Probolinggo Regency in the even semester of the 2021/2022 academic year. The research sample was 13 students of class VIII with a saturated sample technique. The research design is a quasi-experiment in the form of one group pretest-posttest design (William & Hita, 2019).

The learning implementation instruments consist of the syllabus, lesson plans, and worksheets, while the research instruments use learning implementation observation sheets, concept understanding tests, and student response questionnaires. Before being used in research, the instrument was validated by device and material experts. After being declared valid and reliable, the instrument can be used for research.

The concept understanding test questions are in the form of a description test which consists of 10 questions with indicators, namely restating a concept in various representations, classifying objects based on certain characteristics, providing examples and non-examples of a concept, and using or applying the concept, while the student response questionnaire contains 10 statements consisting of 5 positive statements and 5 negative statements. The questionnaire is filled with a "checkbox" in the answer choice column according to the actual situation. The answer choices using a Likert scale consist of four choices, namely "strongly agree" (SS), "agree" (S), "disagree" (TS), and "strongly disagree" (STS). Indicators of student response questionnaires consist of students' interest in learning, students' seriousness in learning, and student responses after the application of the two stay two stray learning model assisted by mind mapping.

Before the implementation of the two stay two stray learning model assisted by mind mapping, a pretest was conducted to determine the understanding of the initial concept. The first, second, and third meetings carried out the implementation of the two stay two stray learning model assisted by mind mapping. At the beginning of learning, students are formed into several groups and asked to review the material being studied and work on the LKS. Furthermore, 2 students were asked to remain in their group tasked with explaining the material that had been studied to guests and 2 other students visiting other groups served as guests and could ask questions. After the activity is complete, students can return to their respective groups and submit and match their findings. Then students make mind maps in groups and explain them in front of other groups. The next meeting was conducted posttest to determine the understanding of students' concepts after treatment and gave questionnaires to students to determine student responses to the application of the two stay two stray learning model assisted by mind mapping.

Data collection techniques by observation, tests, questionnaires, and documentation. The data from the results of the next study were tested for normality, and hypothesis testing, and then analyzed. Normality test using IBM SPSS Statistics 25 software program. Normality test results can be seen in the Kolmogorov-Smirnov column. Hypothesis testing was performed using the IBM SPSS Statistics 25 software program with paired sample t-test.

The formula for data analysis of the implementation of learning is:

$$P = \frac{K}{N} \times 100\% \dots\dots\dots(\text{Yupinus et al., 2020})$$

The criteria for observing the implementation of learning are as follows:

Table 1. Observing Learning Implementation Criteria

| No | Score Percentages | Criteria |
|----|-------------------|--------------|
| 1 | 90% < R ≤ 100% | Very good |
| 2 | 80% < R ≤ 90% | Good |
| 3 | 65% < R ≤ 80% | Intermediate |
| 4 | 55% < R ≤ 65% | Bad |
| 5 | R ≤ 55% | Very bad |

Source: (Yupinus et al., 2020)

The formula for data analysis of the conceptual understanding test is:

$$IPK = \frac{\text{Total score obtained}}{\text{Maximum score}} \times 100\% \dots\dots\dots(\text{Alighiri et al., 2018})$$

The formula for analyzing student response questionnaire data is:

$$P = \frac{\sum S}{\sum N} \times 100\% \dots\dots\dots(\text{Suastika \& Rahmawati, 2019})$$

The n-gain formula according to Melzer to determine the increase in understanding of the concept is:

$$(g) = \frac{\text{posttest score} - \text{pretest score}}{\text{max score} - \text{pretest score}} \dots\dots\dots(\text{Talib et al., 2021})$$

RESULT AND DISCUSSION

1. Results of Validation and Reliability of Learning Instruments

The results of the syllabus validation obtained an average percentage of 88.24% with very valid criteria. RPP obtained an average percentage score of 84.61% with valid criteria. LKS obtained an average percentage score of 88.97% with very valid criteria. The content or material obtained an average percentage score of 88.75% with very valid criteria. Results calculation reliability The syllabus obtained an average percentage of reliability of 92% with very high criteria. RPP obtained an average percentage of reliability of 89.01% with very high criteria. LKS obtained an average percentage of reliability of 87.39% with very high criteria. The content or material obtained an average percentage of reliability of 87.14% with very high criteria.

2. Results of Validation and Reliability of Research Instruments

The results of the validation of the learning implementation sheet obtained an average percentage score of 91.08% with very valid criteria. The concept understanding test obtained an average score of 0.861 with very good validity criteria. The student response questionnaire obtained an average percentage score of 95.84% with very valid criteria. The calculation of the reliability of the learning implementation sheet obtained an average percentage of reliability of 93.06% with very high criteria. The concept understanding test obtained an average percentage of reliability of 92.75% with very high criteria. The student response questionnaire obtained an average percentage of reliability of 95.24% with very high criteria.

3. Learning Implementation Data Analysis

The learning implementation data was obtained from the learning implementation observation sheet given to 2 observers and filled in at the first, second, and third meetings. The first meeting obtained a learning implementation score of 95.45% with very good criteria. The second meeting was 96% with very good criteria and the third meeting was 100% with very good criteria. So overall the average implementation of learning is 97.15% with very good criteria.

Table 2. Percentage of Observation of Learning Implementation

| Meeting | Percentage | | | Criteria |
|---------|------------|------------|---------|-----------|
| | Observer 1 | Observer 2 | Average | |
| 1 | 95,45% | 95,45% | 95,45% | Very good |
| 2 | 96% | 96% | 96% | Very good |
| 3 | 100% | 100% | 100% | Very good |
| | Average | | 97,15% | Very good |

4. Differences in Student Concept Understanding

The data from the pretest and post-test were then analyzed by hypothesis testing using a paired sample t-test with IBM SPSS Statistics 25 software which can be accessed via www.imb.com obtained a sig value of $0.000 < 0.05$ then H_0 is rejected or H_1 is accepted. The results of the hypothesis test indicate that there are differences in students' conceptual understanding before and after the application of the two-stay two-stray learning model with the help of mind mapping. This is by Juniantari & Kusmariyatni (2019) in his research states that it is very appropriate if science learning applies a two stay two stray learning model assisted by mind mapping because students are required to work in groups and be more active, foster cooperative attitudes, build enthusiasm for learning so that it affects their knowledge competence and students can understand the material being studied.

In Piaget's theory of learning cognitivism, physical experience, active interaction, and environmental manipulation play a role in a person's cognitive development (Rohaendi & Laelasari, 2020). In this study, students can actively build an understanding of the concept by interacting and discussing with peers accompanied by mind mapping which can help manage information so that students can build an understanding of the concept.

Table 3. Hypothesis Test Results

| | | Paired Samples Test | | | | | t | df | Sig. (2-tailed) |
|--------|--------------------|---------------------|-----------------|-------------------------------------------|---------|---------|---------|----|-----------------|
| | | Paired Differences | | | | | | | |
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | | |
| | | | | Lower | Upper | | | | |
| Pair 1 | Pretest - Posttest | -49,538 | 10,154 | 2,816 | -55,674 | -43,402 | -17,591 | 12 | 0,001 |

5. Improved Student Concept Understanding

Based on the results of the research conducted, the percentage increase in student's conceptual understanding of each indicator is the first indicator restating a concept in various forms of representation located in questions number 1, 3, 7, and 9. The result of the pretest percentage is 30.83% then at the posttest, there is an increase to 86.67%. The second indicator is to classify objects based on certain characteristics which are located in questions number 2, 4, and 6. The percentage result of the pretest is 32.22% and the posttest is 88.33%. The third indicator is to provide examples and non-examples of a concept located in question number 5. The percentage result for the pretest is 22.5% and for the posttest is 75%. The fourth indicator is using or applying the concepts located in questions number 8 and 10. The results of the average percentage of students' conceptual understanding of these indicators at the pretest are 6.25% and at the posttest is 52.5%.

Based on these data, it shows that there is an increase in students' understanding of concepts in each indicator. Active group activities in the TSTS learning model help students gain knowledge and skills and have the opportunity to understand problems, compare and strengthen the understanding they already have from the results of group discussions so that students can find out how accurate their understanding of concepts (Sefrinal & Roza, 2021). This is by Vygotsky's theory of social constructivism which states that what students learn today through social interaction (groups), in the future can be done independently (Holy, 2018). Mind mapping also helps students to classify interrelated objects so that they are easy to understand and remember it helps in increasing students' understanding of concepts (Evayanti & Sumantri, 2017).

Table 4. Average Percentage of Student Concept Understanding Indicators

| Indicator | Concept Understanding Test | | | |
|------------------------------------------------------|----------------------------|----------|----------|-----------|
| | Pretest | Category | Posttest | Category |
| Restate a concept in various forms of representation | 30.83% | Low | 86.67% | Very high |
| Classify objects based on certain characteristics | 32.22% | Low | 88.33% | Very high |
| Give examples and non-examples of a concept | 22.5% | Low | 75% | High |
| Using/applying the concept | 6.25% | Very low | 52.5% | Currently |
| Average | 22.95% | Low | 75.63% | High |

Overall, the average percentage increase in students' conceptual understanding was 69.23% with moderate criteria consisting of 9 students and 30.77% with high criteria consisting of 4 students. Meanwhile, based on the results of the N-gain test there is an increase in students' understanding of concepts in the medium category, which is 0,6531. This is by research Angriani et al. (2021) in his research showed that students experienced progress in understanding the concept after applying the two stay two stray learning model assisted by mind mapping. Improved understanding of concepts after implementation two stay two stray learning model assisted by mind mapping makes students more active and easier to understand the material being studied.

Table 5. N-Gain Test Result

| Statistics | | |
|----------------|-------------------|----|
| NGain Score | | |
| N | Valid | 13 |
| | Missing | 0 |
| Mean | 0.6531 | |
| Median | 0.6667 | |
| Mode | 0.31 ^a | |
| Std. Deviation | 0.14419 | |
| Variance | 0.021 | |
| Range | 0.59 | |
| Minimum | 0.31 | |
| Maximum | 0.91 | |

6. Student Response

Student response indicators measured include student's interest in learning, students' seriousness in learning, and student responses after applying the two stay two stray learning model assisted by mind mapping. In the indicator of student interest in learning, the percentage of students is 91.35%, which is included in the very good criteria. In line with research by Juniantari & Kusmariyatni (2019) which shows the application of the learning model two stay two stray assisted by mind mapping creates a pleasant learning atmosphere so that students are interested and will concentrate on learning.

The indicator of students' seriousness in learning is 82.70% with very good criteria, meaning that students are serious in learning activities carried out in groups. In group learning, there is a division of tasks so that students will be serious about completing their responsibilities (Dewi et al., 2018).

The indicator of student response after the implementation of the two stay two stray learning model assisted by mind mapping obtained a percentage of 87.02% with very good criteria. So overall the average percentage of student response questionnaires is 87.02% with very good criteria. The indicator contains statements regarding student activity during learning and the ease of understanding the material after the implementation of the two stay two stray learning model assisted by mind mapping. The implementation of the two stay two stray learning model has an impact on student understanding so that students are more active and easier to understand the material being studied (Pritama et al., 2021). Mind mapping also makes learning more fun so that it can make it easier for students to understand and remember the concepts of the material that has been studied (Juniantari & Kusmariyatni, 2019).

Table 6. Percentage of Student Response Questionnaire Results

| Indicator | Statement | Percentage | Average | Criteria |
|------------------------------------------------------------------------------------------------------|-----------|------------|---------|-----------|
| Student interest in learning | 1(+) | 96.15% | 91.35% | Very good |
| | 4 (-) | 90.38% | | |
| | 5 (-) | 88.47% | | |
| | 9 (+) | 90.38% | | |
| The seriousness of students in learning | 3(+) | 88.47% | 82.70% | Very good |
| | 8 (-) | 76.92% | | |
| Student responses after applying the two stay two stray learning model with the help of mind mapping | 2(+) | 90.38% | 87.02% | Very good |
| | 6(+) | 94.23% | | |
| | 7 (-) | 84.62% | | |
| | 10 (-) | 78.85% | | |
| Average | | | 87.02% | Very good |

Note:

(+) = positive statement

(-) = negative statement

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

Based on the results of the study it can be concluded that the implementation of the two-stay two-stray learning model with the help of mind mapping got an average result of 97.15% including very good criteria. There is differences in students' conceptual understanding before and after the application of the two stay two stray learning model assisted by mind mapping as evidence by the significance value of the paired t-test is $0.000 < 0.05$, then H_0 is rejected or H_1 is accepted. Increased understanding of students' concepts after applying the two stay two stray learning model assisted by mind mapping in the medium category by 69.23% and the high category by 30.77 with the average gain value is 0.6531 belongs to the medium category. Student responses to the application of the two stay two stray learning model with the help of mind mapping obtained an average percentage of 87.02% including the very good category.

B. Suggestion

Based on the research that has been done, there are several suggestions put forward, including The study of the two stay two stray learning model with the help of mind mapping can be used as a reference for further research and can be developed by measuring variables and different materials and with a larger number of samples. In future research, it is better if the distribution of questions on each indicator of conceptual understanding is the same so that more appropriate comparisons can be made between indicators. In further research, the scoring on the assessment rubric should be made the same so that the questions have the same level of objectivity.

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