Effectiveness of model numbered head type integrated structure of islamic value against understanding mathematical concept ability

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Abstract. To realize the mandate of law number 20 of 2003, the teacher can integrate Islam value in mathematics learning. This study is a quasi-experimental study that aims to determine the effectiveness of the application of cooperative learning models with numbered structure types that are integrated Islamic values with the ability to understand students' mathematical concepts. The sample of this research is the class X students of SMK Mega Link Majene, amounting to 20 people. Indicators of effectiveness in this study include (1) the value of student learning attain Minimum Completion Criteria (KKM = 70) with 80% classical completeness, (2) observation sheet for student activities in each observed aspect reaching > 75%, and (3) the questionnaire response to the application of cooperative learning models with integrated structure numbered head type Islamic values reached > 75% who responded positively. The analysis results obtained a significant value of 0,000 < α means that \( H_0 \) is rejected and accepts \( H_1 \). While the classical completeness value got 85% of students who achieved KKM, the observation sheet of student activities reached 85% of the eight observed aspects and calculated the students' responses to the application of learning data 88% responded positively. Based on this analysis, the use of cooperative learning models with head types with structural numbers integrated with effective Islamic values on the ability to understand students’ mathematical concepts.

1. Introduction

Expectation Islamic values apply in the learning process can raise awareness in students, and three things can be conveyed in the learning process, namely aqidah, worship, morals. In line with [1] at an international conference on mathematics and Islam, the integration of mathematics and religion has been discussed. in reality, there are still many educators who have difficulty integrating mathematics and religion. Practices found in schools are only verses of the Koran and Hadith about certain topics because there is no standard model for the implementation of mathematics and religion. Opinion [2] formulates four mathematical and Qur’an models, namely (1) mathematics from the Qur’an, (2) mathematics for the Qur’an, (3) mathematics to the Qur’an, and (4) mathematics with the Qur’an. The material taught in this study is the relation and functions that are integrated with Islamic values. Aspects of Islamic values according to [3] in learning are divided into three types, namely (1) the values of aqidah teach humans to believe in the existence of the Almighty and Almighty God as the Creator of the universe, who will always monitor and take into account everything human actions in the world. (2) The values of worship teach humans so that in every act, they are always based on a sincere heart to achieve the blessing of
Allah. Practicing the concept of values of worship will give birth to human beings who are, honest, and like to help others. (3) Moral values teach people to behave and behave well according to the right and ethical norms so that it will bring to life a peaceful, harmonious, and balanced human being. Thus the values of Islamic teachings are values that will be able to bring people to the happiness, prosperity, and safety of humans both in life in the world and the afterlife.

Relationship material and functions integrated with Islamic values require a learning model in its delivery. Solution learning models that prioritize cooperation in completing tasks assigned by the teacher. Vygotsky's social constructivism [4] emphasizes that knowledge is constructed and constructed mutually. Engagement with others opens opportunities for students to evaluate and improve understanding. Experience in a social context provides an essential mechanism for the development of students' thinking so that the learning model used in this research is a cooperative learning model with a numbered structure.

The learning model of the head with a numbered structure is an improvement of the numbered head together with the following steps [5]:

- Students are divided into groups; each student in the group gets a number.
- Assignments are given to each student based on the number of assignments that are sequential. For example, number one has to record questions; student number two works on the problem and student number three reports the results of the work, and so on.
- If necessary, the teacher can order cooperation between groups. Students are told to leave the group and join with several students with the same number from other groups. On this occasion, students with the same assignments can help each other or match the results of student cooperation.
- Report the results and responses from other groups.
- Conclusion.

Learning Model head numbered structure can encourage students to increase the spirit of cooperation, learning becomes fun without any feeling of pressure so that students more easily absorb the concepts that are taught and more freely express the results of their thoughts, especially group assignments given by the teacher.

One of the crucial goals in mathematics learning is the students' mathematical understanding skills. The teacher in providing subject matter is not only rote learning, but the most important thing is understanding students' concepts in each subject matter. [6] Michener (1978) states that understanding is one aspect of Bloom's Taxonomy. Understanding is defined as the absorption of the meaning of material that is learned. To understand an object in depth one must know: (1) the object itself, (2) its relation to other similar objects, (3) its relation with other objects that are not similar, (4) dual relations with other objects of the same type and (5) relations with objects in other theories.

Understanding of concepts is one of the skills or mathematical skills that are expected to be achieved in learning mathematics, namely by showing understanding of the mathematical concepts learned, explaining the interrelationships between concepts and applying concepts or Algorithms flexibly, accurately, efficiently and precisely in problem solving [7], according [8] Understanding the concept needs to be instilled in students early, because students are required to understand the definition, understanding, how to solve problems and operate mathematics correctly. The ability to understand mathematical concepts is one of the main parts to be achieved in learning objectives. [9] Based on these explanations, understanding concepts is a fundamental ability that must be possessed by students.

Indicator of students' ability to understand mathematical concepts according to NCTM [10], namely:
• identifying concepts verbally and in writing.
• making examples and not examples of denial.
• presenting a concept with models, diagrams, and symbols.
• changing a form of representation to another form.
• identifying the characteristics of a concept by recognizing the conditions that determine a concept.
• getting to know the various meanings and interpretations of concepts.

The research that is relevant to this research is that [8] has researched the title Effect of a Numbered Heads Together Learning Model on the Ability to Understand Mathematical Concepts. The results of the study [8] state that there is an influence of the learning model type Numbered Heads Together (NHT) on the ability to understand students' mathematical concepts. The difference from this research is in terms of learning models, the learning model that researchers use is the head numbered structure model which is nothing but the development of the number heads together (NHT) model and the material given to students namely relationships and functions that are integrated with values Islamic values. This study aims to determine the effectiveness of the use of head models with numbered structures in the material relations and functions that are integrated Islamic values to the ability to understand students' mathematical concepts.

2. Research methods
This study uses an experimental method with one group experimental design pre-test post-test design that aims to determine the effectiveness of the application of cooperative learning models with numbered structure type head integrated Islamic values to the ability to understand students' mathematical concepts. In experimental research, there are treatments to students learning by using a cooperative model of head-numbered type with the integrated structure of Islamic value. Thus experimental research methods can be interpreted as research methods used to find the effect of specific treatments on others in controlled conditions [11]. The research subjects were 20 class students of Majene Mega Link Vocational School, amounting to 20 people. Learning activities are carried out in 4 meetings.

2.1 Research design
This study uses a quantitative approach by using an experimental method with one group pre-test post-test design [11]. The research design experiment one-group pre-test post-test design, Pre-test value before being treated, namely \(O_1\); Post value test after being treated \(O_2\); and Treatment (learning by using a cooperative model of head-numbered type with the integrated structure of Islamic values) namely \(X\). Research design experiment one-group pre-test post-test design in figure 1, is as follows:

![Diagram](O_1_X_O_2)

**Figure 1.** Research design experiment one-group pretest-posttest design

2.2 Research instrument
The instruments used in this study were tests of understanding the mathematical concepts, observation sheets of teachers and students, student response questionnaires. The test is given at the pre-test and post-test, which aims to measure the ability of students to understand the problem. Observation sheets
are used to determine student activities during the learning process, while the questionnaire is used to
determine student responses or responses to the application of instructional models with a numbered
structure integrated with Islamic values.

2.2.1 Test of understanding the mathematical concept
The concept understanding test given is in the form of relation and function essay questions integrated
with Islamic values given at the pre-test and post-test.

2.2.2 Observation sheet
Observation of student activities is conducted every time the meeting is as many as four times the
meeting, which aims to determine the teacher's implementation in learning. The table of activity
categories of student activities can be seen in table 1.

| Table 1. Categories of activity of student activities [12] |
|-----------------------------|-------------------------|
| Percentage      | Category                |
| 90% < x ≤ 100% | Very active             |
| 75% < x ≤ 90%  | Active                  |
| 60% < x ≤ 75%  | Less active             |
| 40% < x ≤ 60%  | Not active              |
| 0% < x ≤ 40%   | Very inactive            |

2.2.3 Student Response Questionnaire Sheet
Questionnaires are a list of questions that are given to students to respond according to user requests.
The instrument for questionnaire can be in the form of questions (in the form of entries to be filled out
by the respondent), checklist (in the form of choices by giving a sign on the column provided), and scale
(in the form of choices by marking columns based on an individual level).

| Table 2. Student Response Questionnaire Categories [12] |
|-----------------------------|-------------------------|
| Percentage      | Category                |
| 90% < x ≤ 100% | Very positive           |
| 75% < x ≤ 90%  | Positive                |
| 60% < x ≤ 75%  | Positive enough         |
| 40% < x ≤ 60%  | Less positive           |
| 0% < x ≤ 40%   | Very less positive       |

Then the data analysis technique used is descriptive statistics, which aims to determine the
average test of students' concept comprehension ability and inferential statistics used to test the research
hypothesis before testing, then the pre-requisite test is the normality test.

2.3 Effective Indicator
In this study, learning is said to be effective if at least two of the three aspects assessed are fulfilled
(completeness of learning, student activity, student response) with the following criteria:

- Learning Completeness: if the conceptual understanding of students taught using cooperative
  learning models with head types with structural numbers reaches classical completeness, which
is 85% with the KKM learning completeness value set at 70. The minimum completeness criteria (KKM) at SMK Mega Link Majene like the following table 3.

Table 3. The completeness category of understanding the mathematical concepts of SMK Mega Link Majene (Source: Majene SMK Mega Link Mathematics Subject Teacher)

| Score          | Category          |
|----------------|-------------------|
| $0 \leq x < 70$| Not Complete      |
| $70 \leq x \leq 100$ | Complete         |

- Student activity: if the average score of student activity can achieve success with learning that is applied at least in the active category, which is at the percentage of $75% < x \leq 90%$.
- Student response: if the average score of students' responses are in the positive category of the cooperative learning model, the numbered structure is at the percentage $75% < x \leq 90%$ to the observed aspects.

3. Result and Discussion

The data obtained in this study are quantitative data and qualitative data. Quantitative data is obtained from the results of the pre-test and post-test. Qualitative data is obtained from the results of student activities during the study and student response questionnaires after the end of the study. It was processed and analyzed in order to obtain the conclusions of the research results.

3.1. Data Analysis from Test Instruments

Descriptive statistical analysis of pre-test and Post-class tests class X SMK Mega Link Majene. Based on the results of descriptive data analysis, the value of the comprehension test of the Mathematics concept is the class X students of SMK Mega Link Majene. The results of the pre-test and post-test are described in table 4 below:

Table 4. Descriptive pre-test and post-test descriptive statistics analysis of class X of SMK Mega Link Majene

| Descriptive statistics | Pre test | Post test |
|------------------------|----------|-----------|
| Mean                   | 50,65    | 82,45     |
| Std. Deviation         | 19,79    | 13,20     |
| Variance               | 391,71   | 174,36    |

Based on the data in Table 4, it can be seen that the pre-test scores of class X students obtained an average of 50.65 standard deviations from the student pre-test value data, which was 19.79, then the variance of the data was 391.71. While the post-test scores of class X students obtained an average score of 82.45, the standard deviation generated from the data on the value of understanding the Mathematical concepts achieved by class X students of SMK Mega Link Majene was 13.20 and variance was 174.36

Table 5. Description of completeness in understanding the Mathematics post-test concept of Class X students of SMK Mega Link Majene

| KKM  | Score           | Category      | Pre-test | Post-test |             |
|------|-----------------|---------------|----------|-----------|-------------|
|      | Frequency       | Percentage (%)| Frequency| Percentage (%)|             |
| 70   | $0 \leq x < 70$ | Not completed | 13       | 65        | 3           | 15          |
|      | $70 \leq x \leq 100$ | Complete | 7        | 35        | 17          | 85          |
|      | Total           |               | 20       | 100       | 20          | 100         |
Based on table 5, it can be seen that the number of students who did not complete in the pre-test was thirteen students or 65%, and the complete student category is seven students or 35% of 20 students while in the post-test were three students or 15% of 20 students. And the number of students in the complete category is 17 students or 85% of 20 students. The data shows that students of the SMK Mega Link Majene School class X are completed after the implementation of cooperative learning models with integrated structure numbered types of Islamic values is more significant than the number of students who do not complete. Proves that after the implementation of cooperative learning models with numbered head structures integrated with Islamic values, the conceptual understanding of students has increased. In other words, learning by using cooperative learning models with numbered structure types integrated Islamic values effectively towards understanding students' mathematical concepts.

3.2 Inferential statistical analysis
3.2.1 Pre-test Normality Test
Based on the results of the pre-test normality test obtained a significance value of 0.171, which is higher than 0.05 so that \( H_0 \) is accepted, and \( H_1 \) is rejected, which means that the score data understanding the mathematical pre-test concept of class X SMK Mega Link Majene comes from a normally distributed population.

3.2.2 Post-test Normality Test
Based on the results of the post-test normality test obtained a significance value of 0.147, which is higher than 0.05, so that \( H_0 \) is accepted, and \( H_1 \) is rejected, which means that the score comprehension data concept Post-test math class X SMK Mega Link Majene comes from a normally distributed population.

3.3 Hypothesis testing
Testing the understanding of student posttest concepts was with a One-sample t-test. The formulation of hypotheses in the form of sentences is:

\[ H_0 = \text{Cooperative learning model with integrated structure numbered head type Islamic value is not effective towards understanding the mathematical concepts of class students X SMK Mega Link Majene} \]

\[ H_1 = \text{Cooperative learning model with numbered structure type head integrated Islamic values effectively towards understanding students' Mathematical concepts of class X SMK Mega Link Majene} \]

\begin{table}
\begin{tabular}{c c c c c}
\hline
  & t & df & Sig. (2-tailed) & Mean Difference & 95\% Confidence Interval of the Difference \\
\hline
Posttest & 4.217 & 19 & .000 & 12.450 & 6.27 to 18.63 \\
\hline
\end{tabular}
\end{table}

One-Sample T-Test post-test hypothesis test for class X students has a significance value of 0.000, because of the significance of 0.00 < 0.05. Then it can be concluded that \( H_0 \) is rejected, and \( H_1 \) is accepted. This means that the cooperative learning model with head type with integrated structure is an effective Islamic value towards understanding the concept of Mathematics in class X SMK Mega Link Majene.

3.4 Data Analysis from Non-Test Instruments
3.4.1 Results of Student Activity Observations
Data from observations of student activities during the learning process are carried out analyzed and described. Filling out the observation sheet is done when the learning takes place. Learning is done in 4 meetings.
The results of observation of class X students showed that at the first meeting, the percentage of student activity was 76.32%, the second meeting the percentage of student activity was 82.71%, at the third meeting 87.36%, and the fourth meeting 93.64% so that the average value of observations of student activities is 85%.

Based on table 1, the activity categories of student activities, the activities of students are in the active category with the average value of observations of student activities 85%.

3.4.2 The results of the student response questionnaire
The results of the questionnaire responses of class X students showed that in the first question the percentage of students’ responses was 89.75%, second question 86.41%, third question 76.84%, fourth question 79.94%, fifth question 87.96%, sixth question 96.83%, the seventh question is 90.56%, and the eighth question is 95.71%, so the average score of the student response questionnaire is 88%.

Based on the table 2 categories of Student Response Questionnaire, the students' responses are in the positive category with the average student response questionnaire is 88%.

4. Conclusion
Based on the understanding of the concept of the ability to understand concepts of students with classical completeness reaching 85%, student learning activities are in the active category 85% and student learning responses in learning are in a positive category which is 88% and the results of the analysis of one sample t-test obtained significance 0.00 < 0.05, it can be concluded that H0 is rejected, and H1 is accepted so that the cooperative learning model with the structure numbered type of head integrated Islamic values towards understanding the concept of Mathematics.

5. Acknowledgments
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