The Effect of Master Model to Students Understanding of Mathematical Concepts

Cania Kastira¹, Irwan¹
¹Faculty of Mathematic and Science Universitas Negeri Padang, Indonesia  
cania181095@gmail.com *

Article Information:
Received October 8, 2022
Revised November 22, 2022
Accepted December 11, 2022

Keywords: Model, MASTER, student, learning, mathematical

Abstract
Understanding of mathematical concepts is one of the abilities that must be possessed by students, because it’s the basic to achieve the aims of further mathematics learning. However, the fact is that the understanding of mathematical concepts of grade 8 students of Junior High School 1 2x11 Enam Lingkung is still low, so it needs to be improved. The learning is still teacher-centered in the classroom with the result that the students were not able to construct their knowledge. One of the learning models that can support students to actively construct their knowledge is MASTER learning model. This kind of research is both descriptive and quasi experiment, with Static Group Design. Based on the results of data analysis it can be concluded as follows: the first is the activities of students who learn with MASTER learning model is better than those who learn with conventional learning. The second is obtained P- values = 0.024 < α = 0.05, so that understanding the mathematical concepts of students who learn with MASTER learning model is better than those who learn with conventional learning.

INTRODUCTION
Understanding of mathematical concepts is one of essential aims that must be known by students in learning, because understanding concepts is a basic to achieve the aim of the next mathematics learning. According to (Sarimah et al., 2019) that first the students must understand the meaning and the derivation of concepts, principles, laws and rules obtained in learning. In contrast, there are still students who have difficulty to understand the mathematical concepts. According to (Surur & Oktavia, 2019) that students generally have intrinsic difficulty in mathematical reasoning, mathematical ideas and understanding basic mathematical concepts.

Understanding concept can be said as a fundamental concept in learning mathematics, which is learned from primary school to university (Akkoç & Tall, 2003). However, the fact is students assume that mathematics is a difficult subject. This is supported by research done by (Agusti et al., 2018; Veloo et al., 2016), students are said to be successful in related to work. learning mathematics when they understand the concept well, while students who cannot understand the concept well state that mathematics is a difficult subject. Some problems of mathematical learning like the author described above, also experienced by various schools in Indonesia like at Junior High School 1 2x11 Enam Lingkung Pariaman West Sumatera (Islamoglu et al., 2022; Nur Insaini et al., 2019).
Based on the beginning observations of author were found that the students who were not able to understand the mathematical concepts well. This is because at the time of learning students have not been facilitated in constructing their own knowledge, learning is still teacher-centered so the students are not active in learning (Brinus et al., 2019; Sari et al., 2018). Furthermore, lack of motivation of students will cause students’ low understanding of mathematical concepts. Because of that, teachers should be able to choose ways, techniques, strategies, approaches, methods, or learning models that can improve the ability of students to understand mathematical concepts, so that students can say that learning mathematics is an easy and fun thing (Bagus. A., 2006; Engkizar et al., 2022; Saeed & Zygier, 2012).

One of solutions in this research to overcome that problem is using one of learning models to construct students’ knowledge, make students active, and follow the learning happily. This is supported by statements (Mustamin, 2010; Zafirah et al., 2018) that is learning model can be applied is the model which makes students actively construct their knowledge by themselves, therefore the learning can be meaningful. One of the learning models which can make students active in constructing their knowledge is MASTER (Motivating your mind, Acquiring the information, Searching out the meaning, Triggering the memory, Exhibiting what you know, Reflecting how you have learned) learning model (Nengsih, 2018; Wardawati et al., 2018) stated that MASTER learning model can be applied as one of alternatives in learning mathematics to improve the students understanding of mathematical concepts. Based on the background described above, so this research used MASTER model both to improve understanding of mathematical concepts and to see the effect of the model at student activities in learning (Kaputra et al., 2022; Ramli et al., 2017).

MASTER learning model is a learning structure that gives students an opportunity to work together in groups of 4-6 heterogenous students. Steps of this model suitable with its name that is created by Jayne Nicholl (Hopewell, 1998; Jeheman et al., 2019). The first, motivating your mind is students are given motivation related to the materials, so students can look the benefits of the materials. This is due to (Bukhary & Bahanshal, 2013) that states motivation is a fundamental factor to result in any functional and effective classroom setting with interest, hope and expressive fruitful teaching experience. According to Sternberg in believes that motivation is very important for school success, in its absence; the student never may make an effort to learn (Aini et al., 2019).

The second, acquiring the information is students are given an opportunity to get informations like reading books, looking for the informations that is relevant to learning on the internet dan collaborating with their groups (Damri et al., 2017; Komarudin et al., 2020). The teacher’s role at step is to provide information with an initial explanatio. Submission of information from teacher is intended to bring student with a new begin of learning positively and interestingly (Muhandaz et al., 2018; Puspiantingrum et al., 2018).

The third, searching out the meaning is students not only remember but also understand materials in depth. In addition, holding interpersonal learning and challenging questions, is students are given challenging questions through worksheet and solve them in their groups. This is supported by the opinon of (Budarsini et al., 2018; Yulianty, 2019) which states that, discussing what is learned is a good way to test understanding of something new.

The fourth, triggering the memory is students are asked to remember the concepts that have been learned already because both repetition is important for learning and memory (Ntjalama et al., 2020; Rismayanti & Puiastuti, 2020). States that repetition and review are very important steps in creating long-term memory. According to (Rahman, 2020) repetition is necessary in learning to get a deeper and broader understanding. The fifth, exhibiting what you know is students are able to present concepts that they understand in order to help students to apply and develop their new knowledge and skills.

The sixth, reflecting how you’ve learned is students are asked to reflect on the knowledge they have obtained (Kasmar et al., 2019; Khoiriyati et al., 2021; Munawaroh et al., 2022). Learners need to reflect on their learning experiences not only on what they have learned,
but also how they learn it. States that reflection is a way of thinking back about what has been done in terms of learning in the past, which aims to evaluate learning methods for future improvement (K, 2019; Muswara & Zalnur, 2019; Novebri & Pratiwi, 2021).

METHODS
This kind of research is both Descriptive Research and Quasi Experiment Research, with the research of design is Static Group Design. This can be seen in Table 1.1:

<table>
<thead>
<tr>
<th>Table 1. Research design “static group design”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Experiment</td>
</tr>
<tr>
<td>Control</td>
</tr>
</tbody>
</table>

Table 1, there are X and T with the following information: X is learning with MASTER model and T is tests given to the experimental class and control class at the end of learning (Rusyda & Sari, 2017). The population in this research was grade 8 students of Junior High School 1 2x11 Enam Lingkung year 2018/2019. Sample of research is both experiment and control class. Class VIII.G as experiment class and VIII.H as control class. Sampling technique with Simple Random Sampling.

This research was conducted in three steps namely; preparation, implementation and final step (Engkizar et al., 2022; Febriani et al., 2022; Rahayu et al., 2022). Research instrument is observation sheet of students' activities and tests of understanding mathematical concepts compiled based on indicators of understanding mathematical concepts as many as seven questions. The indicators used are based on Minister of Education and Culture (Permendikbud) Regulation number 58 of 2014. Data from the final test results were analyzed using the \( t \) test because the data from both classes were normally distributed and had a homogeneous variance (Agusti et al., 2018; Mutathahirin et al., 2022).

RESULT AND DISCUSSION
Student learning activity is very important things to consider in learning. This was supported by Adhani’s opinion in (Ningsih et al., 2017; Sudiarta & Sadra, 2016) that learning activities is very important in learning process because learning is an activity or a process to acquire knowledge, develop skills, improve behavior and attitude and strengthen personality (Engkizar, Muliati, et al., 2018). In addition, according to Kusumaningtyas in activities give maximum opportunities to students to explore their abilities. (Arifin & Herman, 2018) states that “there is no learning if there is no activity”.

Student learning activity in MASTER learning model is grouped into 8 indicators of learning activity (Astriani, 2017; Murniyetti et al., 2016; Panggabean, 2017). The aim of observing activities were to know the impact of MASTER model for student activities to improve understanding mathematical concepts. The data of observation results is served in percentage form of the students who do learning activity based on the observation (Nugraha et al., 2019; Nurul Laili, 2019). The percentage of the students who do learning activity during 6 meetings can be shown in Table 1.2:
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Table 2. Percentage of Students Who Do Activities

<table>
<thead>
<tr>
<th>No</th>
<th>Activities Observed</th>
<th>Number of Students Who Do Activities Each Meeting (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>1</td>
<td>First activity</td>
<td>16 (64%)</td>
</tr>
<tr>
<td>2</td>
<td>Second activity</td>
<td>12 (48%)</td>
</tr>
<tr>
<td>3</td>
<td>Third activity</td>
<td>16 (64%)</td>
</tr>
<tr>
<td>4</td>
<td>Fourth activity</td>
<td>4 (16%)</td>
</tr>
<tr>
<td>5</td>
<td>Fifth activity</td>
<td>3 (12%)</td>
</tr>
<tr>
<td>6</td>
<td>Sixth activity</td>
<td>3 (12%)</td>
</tr>
<tr>
<td>7</td>
<td>Seventh activity</td>
<td>4 (16%)</td>
</tr>
<tr>
<td>8</td>
<td>Eighth activity</td>
<td>15 (60%)</td>
</tr>
<tr>
<td></td>
<td>Students Who Present</td>
<td>25</td>
</tr>
</tbody>
</table>

Based on the results of the analysis as shown in Table 1.2 above, the author can explain as follows: Item 1, there is an indicator that students listen and pay attention to the teacher’s explanation. Item 2 with indicator that students listen and pay attention to the group presentations (Engkizar, Alfurqan, et al., 2018). Item 3 is students discuss the material provided by the teacher and students learn with their groups. Item 4 is students ask questions to the teacher or friends. Item 5 is students give opinions on presentations from other groups. Item 6, students respond to question from other groups. Item 7, students answer questions given by the teacher or friends. Item 8, students work on given worksheet (Amani et al., 2021; Ashidiqi et al., 2019).

Based on Table 1.2, it can be seen that the percentage of students who carry out activities from meetings I to VI varies greatly, namely experiencing fluctuations (increase and decrease) at certain meetings. Lowest percentage obtained on meeting I that students give opinions on presentations from other groups, students respond to question from other groups as many 12% from 25 students. While, highest percentage obtained on meeting VI that students listen and pay attention to the teacher’s explanation, students listen and pay attention to the group presentations, and students work on worksheet given which is about 91.3% of 23 students who present (Fernando et al., 2022; Hulu et al., 2023; Mardiana et al., 2022).

Item 1, there is an indicator that students listen and pay attention to the teacher’s explanation of an increase at each meeting with the percentage being in the range of 64% to 91.3%. It was just that in meeting III and IV had the same percentage. This is because the students who do activities were still the same as the day before (Nurwahidin et al., 2019; Paddiana et al., 2021).

Item 2 with indicator that students listen and pay attention to the group presentations, there was an increase with the percentage between 48% until 91.3%. In his indicator, there has been a positive response from students in respecting others (Peviyatmi et al., 2017; Prasetyo et al., 2020).

Item 3, students discuss the material provided by the teacher and students learn with their groups has fluctuated. During meetings I to IV there was an increase, but meeting V there was a decrease and return back to increase in meeting VI. Percentage of activity in this indicator was in the range 64% to 86.9%.

Item 4, students ask questions to the teacher or friends had an increase in meeting II and had a decrease in meeting III (Pratama & Azhari, 2020). After the students were given
motivations, in meeting IV it increased again (Putri et al., 2020; Rafles et al., 2017). Activities percentage were in range 16% to 39.1%.

Item 5, students give opinions on presentations from other groups has fluctuated. Activities percentage was in range 12% to 33.3%. Item 6, students respond to question from other groups has fluctuated too that was in range 12% to 32%. The occurrence of fluctuations (increase and decrease) in the activities of students, this is because students were not brave enough and were still hesitant in bringing up their ideas (Asmaldi et al., 2022; Asril, 2021).

Item 7, students answer questions given by the teacher or friends had an increase with percentage 16% to 43.5%. Item 8, students worked on worksheet had also an increase every meetings. This is because the students have an awareness already that working on a worksheet will help them in learning (Aulia et al., 2020, 2020; Putra et al., 2020). So it can be concluded that as long the MASTER learning model is applied, the students were active in learning. The data of final test results of understanding mathematical concepts of students in the sample class (experiment class and control) can be seen in Table 1.3:

<table>
<thead>
<tr>
<th>Class</th>
<th>Number of Participants</th>
<th>$X_{\text{max}}$</th>
<th>$X_{\text{min}}$</th>
<th>$\bar{X}$</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eksperiment</td>
<td>23</td>
<td>19</td>
<td>5</td>
<td>12,83</td>
<td>4,064</td>
</tr>
<tr>
<td>Control</td>
<td>25</td>
<td>18</td>
<td>4</td>
<td>10,16</td>
<td>3,793</td>
</tr>
</tbody>
</table>

In Table 1.3, $X_{\text{max}}$ is the highest total score, $X_{\text{min}}$ is the lowest total score, $\bar{X}$ is the average, and S is the standard deviation. In the table it can be shown the average of test score of understanding mathematical concept of students of experimental class is higher than control class, then for standard deviation of experiment class is also higher than control class. This means that the students in experiment class were varied. The average score of sample class can be shown in Figure.1.1:

![Fig 1. The average score of experiment class and control class.](image)

Based on Figure.1.1 it can be shown that for whole indicators of understanding mathematical concepts, average of experiment class is higher than control class. The results of data analysis using t test, obtained $P$-value = 0.024 < $\alpha$ = 0.05, then reject $H_0$. So that, understanding of mathematical concepts of students who learn with the MASTER learning
model was better than those who learn with conventional learning models (Engkizar et al., 2021; Rahayu et al., 2022; Zen et al., 2022). Test data for understanding the concept of sample class students (experimental and control classes) in detail can be seen in Table 1.4:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Number of Questions</th>
<th>Class</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Score 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>E</td>
<td>0</td>
<td>5</td>
<td>18</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>0</td>
<td>11</td>
<td>14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>E</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>0</td>
<td>2</td>
<td>15</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>E</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>E</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>E</td>
<td>11</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>18</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>E</td>
<td>3</td>
<td>13</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>13</td>
<td>8</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>E</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>12</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

In Table 1.4 above, E is experiment class and C is control class. Indicator used namely based on Minister of Education and Culture Regulation number 58 of 2014 namely seven of eight test indicator of understanding mathematical concepts. Based on Figure 1.1 and Table 4, it can be seen that the understanding of mathematical concepts of the students at experiment class was better than control class.

Indicator 1 namely restate of concepts that has been learned namely the students are asked to restate the understanding concepts linear equations of two variables. Both experiment and control class, the students have been able to restate the concepts correctly and completely. However, the number of students of experiment class were more who got maximal score (score 2) namely 18 students compared to control class namely 14 students. While, those who got score 1 at control class were more compare to the experiment class. At this indicator there was no students who got score zero (Rohmah & Wahyudin, 2017; Zen et al., 2022). This is because experiment class applied MASTER learning model in which the model had to step of opportunity of the students in restating the concepts namely at the fourth step triggering the memory and at the sixth step reflecting how you’ve learned. So, it can minimalize misconception.

Indicator 2 namely classifying objects based on wether the requiriments that form the concepts fulfilled or not (Rahawarin et al., 2021; Rahman, 2020). At this indicator there was no sample class that got score 0. But, the maximal score (4) was gained by experiment class only namely as many 3 students. The number of students who got score 1 at the experiment class as many 3 students while the control class as many 2 students. The number of students who got score 2 at experiment class has many 3 students, while control class as many 15 students. The number of students who got score 3 at experiment class namely 14 students while at control class as many 8 students (Novebri & Pratiwi, 2021; Sultanik et al., 2022).

At indicator 2, the students were asked to clarify what open statement that is known at the item belong to linear equation of one variable, linear equations of two variables or neither of them (Rishan et al., 2018; Sabrina et al., 2022; Saputri et al., 2021). The students have been able to clarify both experiment class and control class. However, score average at experiment class was higher than control class. This is because at the step of acquiring the information, the students were given the opportunity to gain the information by clarifying the objects based on wether the requirements that form the concepts fulfilled or not (Sartika et al., 2020; Syafiril & Yaumas, 2017).
At indicator 3 namely identifying of characteristics operation or concepts. The students were asked to identify value of \( k \) at equation \( kx - y - 7 = 0 \), if \( x = 2 \) and \( y = 3 \) as the solutions. At this indicator namely there was no score 0 at experiment class while at control class there was 1 student who got score 0. The number of students who got score 1 at experiment class as many 3 students, while control class as many 1 students. The number of students who got score 2 at experiment class as many 3 students while control class as many 7 students. The maximal score was got more by experiment class than control class namely 17 students. The score average of experiment class at item 3 was higher than control class because at the MASTER model step the students were facilitated to searching out the meaning (Engkizar et al., 2022; Zamzami, 2021; Zulmuqim, 2017).

Indicator 4 namely applying the concepts with the item logically the students were asked to solve the system of linear equations of two variables by using substitution-elimination method. In solving the item, there were still students who calculated wrongly, so it caused solution for value \( x \) and \( y \) was wrong (Ath-Thukhi et al., n.d.; Enri Auni & Hermanto, 2020). The score got by the students at this item varied between score 0 to score 4. The number of students who got score 0 at control class was more than experiment class namely 7 students. The number of students who got score 1 at experiment class as many 4 students, while control class as many 5 students. The number of students who got score 2 at experiment class as many 3 students, while control class as many 2 students. The number of students who got score 3 at experiment class as many 8 students, while control class as many 11 students. The number of students at experiment class who got maximal score (score 4) namely 4 students, while at control class there was no student who got maximal score (score 4). Besides at this indicator the average of experiment class was higher than control class. This shown that the understanding concepts of the students at indicator 4 of experiment class was better than control class. This is because the step of MASTER model namely exhibiting what you know can help the students in applying the concepts (Pratiwi, 2016; Ulia & Sari, 2018).

Indicator 5 namely giving example or contra example of the concepts learned. The students were asked to give example of daily problems related to the system of linear equations of two variables, then the students made the mathematical model from that problem (Azmi & Wardi, 2020; Azzahra et al., 2021). The score average got by the students at experiment class was higher than control class. At this indicator the students at experiment class got more maximal score than control class. At experiment class there were 12 students while at control class there were 7 students. The students who got score 0 at control class was more than experiment class. So, it can be concluded that the understanding of concepts of the students the experiment class at indicator 5 was better than control class. This is because the MASTER model was applied at experiment class namely the students can search the meaning by giving example or contra example of the concepts learned (Efendi et al., 2019; Fatahudin et al., 2019).

Indicator 6 namely presenting the concepts in the various form of mathematical representations (table, graph, diagram, picture, mathematics model, etc). At this indicator the experiment class had higher average than control class. The number of students who got score 2 as many 7 students at experiment class while control class as many 4 students. It means that the number of students who got score 2 at experiment class was more than control class (Ganefri et al., 2017; Hakim, 2019). The number of students at experiment class who got score 1 as many 13 students, while at control class as many 8 students. Score 0 at control class was more than experiment class namely as many 3 students for experiment class and 13 students for control class. So, it be concluded that the ability of the students at experiment class in mastering indicator 6 was better than the students of control class (Syafifullah & Surawardi, 2020; Syamsuddin, 2022; Yuslia et al., 2021). This is because at the fifth step of MASTER model the students were facilitated to show what they know (exhibiting what you know) by presenting the concepts in various mathematics representation (Juniantari et al., 2019; Rahmi et al., 2020; Yuliani et al., 2018).
Indicator 7 namely relating various concepts either in mathematics or out of mathematics. At this indicator, the number of students of at experiment class who got score 4 namely 3 students, while control class as many 2 students. It means the number of students who got score 4 at experiment was more than control class (Irawan et al., 2021; Peviyatmi et al., 2017). At control class there were 12 students who got score 0, while at experiment class there were 4 students. It means the score got by the control class was lower than experiment class. Besides, the average of the experiment class was higher than control class (Budarsini et al., 2018; Tresnawati et al., 2019).

Based on the score average of indicator 1 to indicator 7, it can be concluded that the students at experiment class was better than control class in understanding all indicators of mathematical concepts. This is because at experiment class MASTER model was applied that can make the students active, can construct their own knowledge. So, it can be said that MASTER model can train the students to develop their understanding of mathematical concepts. It is in accordance to research result (Purwanti et al., 2016; Yusuf et al., 2020) namely through the step of MASTER model the students can be more active in learning, construct their own knowledge, be more lively, and also be more brave in giving their opinions. Therefore, the application of MASTER model can train the students to develop their understanding of mathematical concepts. Besides, in research (Asmaldi et al., 2022; Mardiah et al., 2020; Siregar, 2019) states that learning with MASTER model can improve understanding of mathematical concepts of students.

CONCLUSION

Based on the research result, it can be concluded that understanding of mathematical concepts of students who learn by using MASTER model was better than who learn by using conventional learning at grade 8 students of Junior High School 1 Enam Lingkung with \( \alpha = 0.05 \). It means, the application of MASTER model gave the effect to the students understanding of mathematical concepts at grade 8 students of Junior High School 1 Enam Lingkung and can help the students to be active in learning activities.

REFERENCES


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Kastira, C., Irwan, I.


Nur Isnaini, U. K., Nyimasmukti, B. R., Rahawarin, Y., & Asrida, A. (2019). Revitalizing the Mosques Function as a Means of Forming Muslim Scholars and Students in

Ijmurhica: Internasional Journal of Multidisciplinary Research of Higher Education
Vol. 6, No. 1, pp. 19-33, 2023
The Effect of Master Model to Student Understanding of Mathematical Concepts


https://doi.org/10.23969/symmetry.v5i2.3538
The Effect of Master Model to Student Understanding of Mathematical Concepts

Education, 1(1), 68–79. https://doi.org/10.24036/insight.v1i1.110


41. https://doi.org/10.24036/insight.v1i1.112