Encouraging Students’ Active Learning Activities through the Implementation of MASTER Learning Model Based on Mind Mapping Techniques

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Abstract. Students' active learning activities are one indicator of success in a learning process. In fact, students tend to listen to teacher explanations which hamper students learning activities. This point make students not free to develop their potential, so the most students are not interested in mathematics learning. Therefore, there needs to be an effort in this problem, namely by using the steps in the learning model. This study aims to determine the application of MASTER based on mind mapping in increasing the learning activities of students at SMA Pembangunan Laboratorium UNP. This research used non-test techniques in the form of observation sheets and field notes. Based on the results of the study, it was concluded that the learning activities of implementation of the MASTER based on mind mapping experienced an increase in the A4 indicator and experienced fluctuations in indicators A1, A2, A3, A5, and A6. Even so, the overall average of this research succeeded in reaching 87.5% in the very good category. It means that the implementation of a mind mapping-based learning model shows an active learning activity.

1. Introduction

Learning activities are part of students’ responsibilities in learning (including in math learning) because a learning process depends on students’ activities. [1] argues that learning must be done with activities, i.e. physically moving when learning, utilizing human senses as much as possible, and making the whole body/mind involved in the learning process. Those activities are related to the ability to process information physically and the use of human senses in order to carry out activities related to the learning process. Students learning activities include their active learning involvement by using their physical action, thoughts, attention, and other ways in the learning process that aim to support the success of the teaching and learning process and to get the benefits of the activities.

Educators act as facilitators who help students to be actively involved to achieve learning goals. Educators are always required to improve their quality in carrying out teaching and learning process [2]. This can be observed from two aspects, in terms of process and terms of results [3]. In terms of
Students good involvement during the learning process is one of the success indicators of the learning process. It is in line with the implementation of the 2013 curriculum which demands students’ learning engagement. There are several components that become indicators of determining the achievement of learning activities. According to [4], learning activities consist of eight components: visual activities which are related to reading, paying attention to pictures, and experimenting; oral activities which are related to making statements, asking, giving suggestions, expressing opinions and doing discussions; listening activities which are related to listening to lectures, and doing discussions, presentations and speeches; writing activities which are related to writing stories, essays, or reports and copying; drawing activities which are related to drawing, creating graphs, maps and diagrams; motor activities (movement activities), which are related to doing experiments, making construction, repairing, playing, gardening, raising livestock; mental activities (mental activities) which are related to responding, remembering, solving problems, analyzing, seeing relationships and making decisions; and emotional activities which are related to feeling interested, bored, happy, excited and so on toward something. This study observed the following activities; oral activities, writing activities, drawing activities and mental activities.

It is proven that in the teaching and learning process, teachers spend too much time to deliver lectures to students so that it hinders students’ learning activities. The aforementioned data was obtained through observations carried out in class XI SMA Pembangunan Laboratorium UNP on August 7 to 16, 2019. The teacher made various efforts to create a learning process that involves student participation. One of them is the design of a Lesson Plan (Rencana Pelaksanaan Pembelajaran) encompassing a scientific approach which is in line with the demands of the 2013 curriculum. However, in the teaching and learning implementation, the role of the teacher is still dominant so that communication that occurs during learning activities merely tends to be one-way. The situation results in the lack of students’ involvement in the learning process. The teacher tended to give long lectures which kept learning activities from happening. Learning in the form of drawing activities, oral activities, and mental activities did not happen during the learning process. If the situation is not resolved immediately, it might have an impact on students’ learning achievement.

Students’ failure in learning will affect their future. The rapid development of today’s era requires people who are active and creative to know how to deal with situations. In line with [2], students will face tough challenges in the future because the life of the global community always changes every time. To solve this problem, we need a learning model that can facilitate students’ learning activities. [5] suggests that the learning model applied should be the one which requires students to actively construct their own knowledge, so that learning becomes more meaningful. One learning model that can support learners’ knowledge and learning activities is a learning model called MASTER. According to [6] there are six steps of the learning process one should follow in order to implement the MASTER learning model. The steps of the MASTER learning model are motivating your mind, acquiring the information, searching out the meaning, triggering the memory, exhibiting what you know and reflecting how you've learned (reflecting on how you learned). Those steps allow students to be actively involved so that it will have an impact on the stability of student active performance in the learning process. By using the MASTER learning model, teachers can get students to be actively engaged in learning and allow them to develop their own knowledge. In addition, [7] explains that by using the MASTER model students become creative, have high self-esteem due to the given motivation, experience a fun learning atmosphere so that students’ performance can increase in learning.

The strategy of some researchers is not only about choosing the right learning model but also combining mind mapping into the syntax of certain learning models as an aid in sharpening students’ mindset during the learning process. According to [8] there are eight benefits of using mind mapping
in math learning process, including the following; mind mapping helps students organize information; mind mapping allows students’ cognitive to open and develop; mind mapping can help students to memorize things; mind mapping can help students to review and summarize ideas; mind mapping can collect and develop students’ ideas; mind mapping helps to connect new information in a meaningful way to the information learned before; new concepts can be introduced by using mind mapping, and mind mapping is the link connecting mathematics and other sciences. Supported by [9], mind mapping can relate the new concepts obtained by students to concepts that have been obtained before in the learning process, resulting in physical response given by students. Mind maps are one of the creative products created by students in learning activities. The method of using mind mapping can be useful in various teaching and learning processes, especially for developing students’ active response as the purpose to increase students’ performance in their learning activities.

Based on the problems that have been described, it is important to discuss them comprehensively. That way, this topic was raised not only to describe the students’ learning activities during the implementation of MASTER model with Mind Mapping basis but also to see the improvements and characteristics of students' learning activities.

2. Methodology
This research used non-test techniques in the form of observation sheets and field notes. The test technique was carried out to see students’ learning activities during the learning process. In other words, this non-test technique was utilized to find out whether there was an increase or a decrease in students' mathematics learning activities. The observation sheet was used to collect data related to students’ activities in learning [10]. This observation sheet contains indicators of student activity that are expected to appear during the learning with this MASTER learning model. Field notes were used as additional data depicting students’ activities in the learning. Field notes were made after the learning process ended and were filled in by peers who acted as observers. This field note contains things that are found in the classroom during the learning process. The study population was students of class XI SMA Pembangunan Laboratorium UNP for the 2019/2020 school year. Samples were selected using a technique called Simple Random Sampling [11]. The sample of this study was 27 students of Class XI MIA 2. The data analysis in this study was obtained from the observation of learning activities. [12] states that the results of the observations were analyzed using the activity percentage with the following formula.

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P = \frac{F}{N} \times 100\% \tag{1}
\]

Description:
P = percentage of students who carry out activities on certain indicators.
F = frequency of students doing activities on certain indicators.
N = number of students

After the researcher obtained the percentage, then to see the increase in student activity from one meeting to the next, an assessment standard was obtained. The assessment for the conclusion in the form of a percentage in Table 1 was adapted from [13] as follows.
### Table 1. Criteria for the Assessment of Student Activities

| Activity Percentage | Criteria     |
|---------------------|--------------|
| 76-100              | Very Good    |
| 51-75               | Good         |
| 26-50               | Fair         |
| <26                 | Poor         |

### 3. Results

Based on the observation results, data on students' learning activities were obtained through observation sheets during the study. The writer divided the observation sheet into six indicators of learning activities. The percentage of students' learning activities during six meetings was clearly shown in Table 2.

### Table 2. The observation results of students' learning activities of each indicator

| N | Students’ Active Learning Activity |
|---|-----------------------------------|
|   | A1 | A2 | A3 | A4 | A5 | A6 |
|---|----|----|----|----|----|----|
| I | 25 | 25 | 100,0 | 22 | 88,0 | 22 | 88,0 | 22 | 84,0 | 22 | 88,0 | 18 | 72,0 |
| II| 20 | 16 | 80,0 | 18 | 90,0 | 18 | 90,0 | 17 | 85,0 | 18 | 90,0 | 17 | 85,0 |
| III| 24 | 15 | 63,0 | 17 | 70,0 | 21 | 87,5 | 21 | 87,5 | 22 | 91,6 | 22 | 91,6 |
| IV| 24 | 22 | 92,0 | 21 | 88,0 | 23 | 95,8 | 22 | 91,6 | 22 | 91,6 | 21 | 88,0 |
| V | 25 | 18 | 72,0 | 20 | 80,0 | 24 | 96,0 | 23 | 92,0 | 24 | 96,0 | 22 | 88,0 |
| VI| 24 | 20 | 83,0 | 22 | 92,0 | 23 | 95,8 | 22 | 92,0 | 23 | 95,8 | 24 | 100,0 |

| Average of each Indicator | 81,7 | 84,7 | 92,2 | 88,7 | 92,2 | 85,4 |
| Category Total            | Very Good | Very Good | Very Good | Very Good | Very Good | Very Good |

*Students pay attention to the teacher while the teacher is giving learning motivation (visual activities).*

*A2 Students obtain information and seek information needed to solve the problem (oral activities).*

*A3 Students solve problems given in students’ worksheet (oral and writing activities).*

*A4 Students do the exercises in worksheet (writing activities).*

*A5 Students write conclusions from the material being learned (oral, mental, and writing activities).*

*A6 Students work on mind mapping at the end of the meeting (drawing activities).*

Table 2 shows that the percentage of students who carry out learning activities at each meeting varies. Learning activities observed on the A4 indicator have increased by up to 92%. Meanwhile, other indicators fluctuate. The lowest in the A1 indicator is at the third meeting (63%). This is followed by observations on other indicators of 70% to 100%. The percentage of 100 occurs in the A1
indicator at the first meeting and the A6 indicator at the last meeting. Even so, the average total of students’ learning activity in this study reached 87.5% with the very good category.

4. Discussion
Referring to the results of data analysis, it shows that the learning process is centered on students. It is in line with [14] who states that learning must be able to support students to carry out activities. Activities can affect learning outcomes as learning is a mental/psychic activity that takes place in active interaction with the environment and results in changes in knowledge, understanding, and attitude values.

Students’ learning activities examined in this study are those occurred during the teaching and learning process using MASTER learning model. [15] states that MASTER learning model is an effort made so that a concept can be understood quickly and well in a fun way. In addition, in the learning process, students are also invited to be fully involved and the model puts great emphasis on the results obtained. [1] classifies the MASTER model into an independent learning model, where learners begin to realize that learning is not something that is done for them, but it is only learners who can do it. It means that this learning model implements active learning and involves students in every process.

The steps in the aforementioned learning model allow students to be actively involved so that it will have a good impact on their learning activities. When using the MASTER model, students can be more active in learning and can develop their own knowledge. In addition, [7] explains that by using the MASTER model students become creative, have high self-esteem due to the motivation given and experience fun learning atmosphere, so that there is an increase of students’ involvement in the learning activities.

The steps in MASTER learning process are modified by adding mind mapping at the beginning and end of it. This is in line with [16] research which states that mind mapping develops students' knowledge about the circumference and surface area of squares and rectangles. Students are not given a formula, but they find it themselves through understanding the concepts. [17] research suggests that mind mapping can be practiced in groups to support the mathematical abilities of other students in order to gain better and easier understanding. The learning process lasts for six meetings discussing the sequences and series material, where students are divided into five groups.

The learning process begins with the step of motivating your mind which includes visuals and listening activities. At this stage, students pay attention and listen to the teacher while the teacher is giving motivation to students through mind mapping which is based on augmented reality technology in the form of a mind map image to be studied. According to [18], the use of interactive media in the form of augmented reality is able to present learning motivation which can provide positive values for students so that the learning becomes more enjoyable. [19] and [20] states that it requires math teachers to be creative and proficient in using learning tools and media.

Based on the study results, it showed that students felt enthusiastic about new things. The mind mapping was displayed in 3D (three-dimensional) through mind mapping application installed on educators' smartphones. By connecting smartphone to a laptop, students can pay attention to the motivation through a projector. That way, it can give an interesting and new impression for students. This is in line with [21] research proving that the use of augmented reality technology in three-dimensional interactive books for students can present an interesting, interactive, immersive, and realistic learning experience for students. It means that the learning process begins with things that attract students’ attention so that it will get students to be ready to focus on the next learning process. However, there was a decrease in students’ activities in indicator 1 so that it fluctuated at each meeting. It happened because students came late to the class.

Related to that, students are directed to obtain the required information regarding the facts and principles to be studied in the class in accordance with the second stage, namely acquiring the information. Students get information that aims to construct their thinking in solving problems through the given worksheet. Students do oral activities with the teacher by having short questions and answers session to remind them of previous lessons. This activity is included in the very good category because
students pay attention and focus on conveying information from the teacher. Information delivery from educators is intended to introduce students to new learning material to initiate the learning process in a positive and interesting way [22]. Furthermore, students are given the opportunity to discuss in order to solve problems in the third stage, namely searching out the meaning (investigating the meaning).

At this stage, there is fluctuation at each meeting but it is categorized in the very good category because students do oral and writing activities together. These activities are categorized into active learning which involves students in the learning process through activities and/or discussions in class, as opposed to passive listening. It emphasizes higher-order thinking skills and often involves group work [23]. This is supported by research done by [24] that students’ learning activities emphasize students’ contribution to active learning activities so that the learning process can run according to the learning objectives. It means that this thing can give students the experience to understand the learning through contextual problems with the help of student worksheets.

In the fourth stage, triggering the memory (triggering memory), students draw lesson conclusions written on the worksheet. It includes mental activities. Based on the data analysis and description, the number of students who did this activity reached very good category. To improve students’ abilities, students are directed to the next activity to do the exercises that are given on the student worksheets. By doing the exercises given, students have been doing writing activities at the stage of exhibiting what you know. Writing activities at this stage experienced a significant increase of 84% to 92% of the final meeting.

Furthermore, according to the fifth stage, students present the results of the discussion in front of the class. Then they provide suggestions and questions related to the material being discussed and respond to questions and opinions from friends and conclude the material that has been studied. It is an activity of oral and mental. At the end of the learning process specifically in the stage of reflecting how you have learned (reflecting on how you learn), students are asked to draw a mind mapping according to the material being studied at the meeting. Then the educator directs students to write daily learning journals in students’ notebooks. Based on data analysis, this stage shows that drawing and writing activities are classified into very good categories. This is supported by research [25] which states that mind mapping is believed to improve students’ creative thinking abilities. Through the implementation of the learning model, students' minds are stimulated to carry out imagination, express ideas, and to facilitate them in expressing concepts or ideas in their minds. The mind mapping-based MASTER learning model provides opportunities for students to learn based on their abilities, namely by using an interactive process to decide what students want to do. In line with [26] research, mind mapping is a useful technique that helps students learn more effectively, improving the way they record information as they store it in an easy to remember organization so that they can recall it quickly. Because they store them in a simple organization that is easy to remember and be recalled back, supporting and enhancing their problem-solving skill and creativity is valuable in enhancing students' critical thinking characters.

This research is also supported by [27] who found that the mind mapping-based MASTER learning model can improve students' Math learning activities and also does not rule out the possibility of increasing other abilities. In other words, if students' learning activities are good, their math skills will also be good. Likewise with [28] research which states that there are four pieces of evidence for students to achieve good learning activities, namely 1) Learning involves an active construction of the learner's meaning. 2) Facts about learning and learning to do something are two different processes. 3) Some things that are learned are specific to the domain or context (subject matter) studied, while other things are more easily conveyed to other learning. 4) Learners tend to learn more when they learn with others than when they learn on their own. This means that a learning activity can make students as learners who are always learning new things by involving experiences so that it makes it easier for students to achieve learning goals.
5. Conclusion

Students' learning activities are an important component of the learning process. Based on the results of the analysis and research conducted, the learning activities applied through the mind mapping-based MASTER model prove that learning activities are centered on students so that they can make students more actively involved in the learning. With the combination of the MASTER learning model and mind mapping, the learning process becomes more interactive and fun and can improve students' memory and creativity. Observation of student learning activities shows an increase in the A4 indicator. Meanwhile, observations on other indicators have fluctuated. Even so, the overall average of this research succeeded in reaching 87.5% in the very good category. It means that the implementation of a mind mapping-based learning model shows an interactive learning activity.

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