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Research Article

The effectiveness of learning mind maps on Matrix Operations in SMK Darur Rahmah

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ABSTRACT

A mind map is a note-taking method that involves laying out ideas on a sheet of paper and branching out along the lines of one's thought processes. With mind mapping, learning will be easy to describe, and material that is quite difficult can be easily understood or simplified. This study aims to describe the effectiveness of mind mapping learning in matrix operations material in grade 11. Three indicators of learning effectiveness are: 1) teacher management of learning; 2) student involvement in learning activities; and 3) the proportion of students who successfully complete learning objectives. This study uses observation, tests, interviews, and documentation to collect data for a qualitative descriptive analysis. Class XIA SMK students Darur Rahmah was used as the research sample. Based on the findings and discussion of the research, class XIA SMK Darur Rahmah studied matrix operation material effectively using activities in mind mapping. The results showed that three indicators were fulfilled: 1) effectiveness, namely the teacher's ability to determine the very good category; 2) 11 students whose activities were classified as active; 16 students were very active; and 3) individual completeness of 25 students with a learning completeness level of 92.6%.

Keywords: Mind Map; Effectiveness; Matrix Operation

1. INTRODUCTION

In order to accomplish predetermined learning objectives, which take place in a specific environment, learning is basically an interaction between educators, students, and their environment. A change will occur as a result of the process of conveying and channeling information that is pertinent, understandable, sufficient, and simple to obtain. The process of achieving learning objectives will be made simpler by the efficient distribution of information in the communication process. Therefore, in order to accomplish the learning objectives, there must be clear communication between the teacher and the students as well as between them and their environment. This communication must also be based on understanding, so that each student can understand the subject matter presented.

The goal of learning is to assist students in acquiring knowledge, and learning is a process that is supported and influenced by design. To ensure that students do not easily become bored while learning, it is important to make adjustments to the learning environment in order to achieve the desired learning objectives. Many schools still primarily employ the lecture format. When learning through lectures, students only hear what the teacher says; however, some students are unable to learn simply by listening. Therefore, the teacher, as a facilitator, uses strategies that are able to solve problems that exist in the classroom in learning (Agustini, 2019; Ariyanto et al., 2019).

Interaction between people that results in experience from actual situations is learning. Students' thinking abilities are actually lacking and constrained because the current educational system only strengthens and puts to the test their memory. Students who solely rely on memory during the learning process typically forget things easily because, when learning, they only remember without engaging in an activity to comprehend the material being taught. As a result, it is necessary to alter the learning activities so that all students can take part in each one. Students' previous learning experiences and the concepts to be taught in mathematics are actually interconnected. Every concept in mathematics is connected to every other concept and is a requirement for every other concept. Therefore, more opportunities for students to make these connections during the learning process should be provided.

Learning is considered effective when the learning goals set by the participation of the students are met. Effectiveness can be defined as the accomplishment of objectives in accordance with the plans and requirements necessary, both in terms of data, facilities, and time. In Kalisat, Jember Regency, a school named SMK Darur Rahmah strives to make all learning processes more effective. However, based on observational activities, there are several things that need to be developed in the learning system at school, including: 1) Classroom learning still uses the lecture method, so students tend to be passive because the teacher's role is still dominant in learning; 2) Students tend to imitate what the teacher says without giving

feedback; and 3) The mind map method is never used at all in the learning process in class.

Teachers need to be aware of students' needs and traits. Since each student has different characteristics, the teacher must be independent in order to do this. A substitute activity that can be used and is anticipated to aid students in understanding the learning material is mind mapping. This allows the teacher to gauge the extent to which the abilities possessed by the students. One method that teachers can use in place of traditional instruction is mind mapping. This mind map helps to clarify the issue. This is crucial because there are numerous misconceptions among students regarding instruction and learning (Djanette & Fouad, 2014; Ichsan, Dewi, Hermawati, & Iriani, 2018; Keleş & Kefeli, 2010). A mind map is a technique that helps students remember a lot of information because, with this mind map, students simply remember new creative ideas or ideas to be able to stimulate memory easily in the teaching and learning process. Mind mapping is a way that is creative, effective, and will literally map thoughts into visual representations. Mind maps can be used effectively for putting concepts into practice with challenging subject matter (Daghistan, 2016; Polat, Yavuz, & Tunc, 2017). The indicators used in this study to evaluate the effectiveness of Mind Map Learning on the subject matter for this matrix operations are: (1) The teacher's capacity to manage learning is at least in the good category; (2) Student activity in learning is at least in the good category; and (3) Student learning outcomes are completed classically to a minimum of 75%.

2. RESEARCH METHOD

The approach and type of research used are qualitative and descriptive. The research was conducted at SMK Darur Rahmah, class XI, which is located in the Kalisat area of Jember district. The population of this study were students of class XI, which consisted of two classes, namely XI A and XI B. From these two classes, one was taken that had the lowest average classical mastery, with the aim of increasing learning completeness and knowing the effectiveness of that class.

The variables in this study were divided into dependent and independent variables, or learning effectiveness and mind map learning, respectively. The following methods of gathering data were employed in this study: a) Observation, This observation was made during the learning process of researchers who acted as teachers and students as subjects who carried out mind map learning in order to know the ability of teachers and student activities during the learning process; b) tests are used to obtain data on specific student learning outcomes, which can then be calculated classically. Three essay-style test questions make up the total number of questions. At the conclusion of the meeting, the test is administered; c) Interviews, Interviewing students is done to learn more about their emotional activities, which include their interests, feelings, and interest in learning mind maps; d) Documentation, At the time of the research, documentation was used to gather data from the subjects being studied. This included observation sheets, interview results sheets, student mind map results, student test answer sheets, and pictures.

Data analysis in this study includes analysis of teacher and student activities as well as analysis of student learning outcomes.

1) Analysis of student learning outcomes

$$\text{SLO} = \frac{\sum Students\ complete\ individually}{\sum all\ student}\ 100\%$$

SLO = Mastery of classical learning

2) analysis of teacher and student activities

The following is an analysis of the teacher's ability and student activity in learning to use mind maps.

$$A = \frac{\sum x}{n}$$

A   = Average Rating Score

C   = Rating Score

n   = Total Aspects of The Assessment

Table 1. Conversion of teacher ability scores and student activities

Value	Category
1,00-1,49	Not Good
1,50-2,49	Pretty Good
2,50-3,49	Good
3,50-4,00	Very Good

3. RESULTS AND DISCUSSION

3.1. Results

This study examines three indicators: the teacher's capacity to direct mind map learning, the student's participation in mind map learning, and the student's learning outcomes as measured by a classical test in which at least 75% of the

students demonstrate individual completion.

In the first indicator, the teacher's ability to oversee mind map learning was revealed from the results of the analysis, especially from the information obtained from meetings 1 and 2. The teacher's ability to oversee learning activities has an average value of 3.60. This value is in the 3.50–4.00 range, making it very good. thus showing excellent management of learning by the teacher. The first indicator measures the instructor's ability to guide mind mapping learning on matrix operations material that has been determined to meet the effectiveness indicator. **The second indicator** is related to student activity during mind map learning on matrix operations material. From the results of the analysis of student activities in meetings 1 and 2, it was found that 11 students got an average score that was in the interval 2.50–3.49, which was categorized as active, and as many as 16 students got an average score in the interval 3.50–4.00, which was categorized as very active. So the second indicator is student activity during mind mapping learning on matrix operations material.

The third indicator is that the results of student learning are complete; classically, at least 75% experience individual mastery. Judging from the value of student test results, 25 students experienced individual completeness, and 2 got scores below 75 or did not complete individually. Then the results of the classical completeness analysis reached 92.6%. So that the third indicator, namely the classical completion of student learning outcomes, has been fulfilled. Based on the description that discusses the three indicators of the effectiveness of mind mapping learning on matrix operations material, it shows that the three indicators are fulfilled.

3.2. Discussion

The results showed that from the results of observations of the teacher's ability to manage learning, at meeting 1, it got a score of 3.43 in the good category, and at meeting 2, it experienced an increase, namely getting a score of 3.77 in the very good category. In this study, it was found that teachers mastered matrix operations material and delivered subject matter using mind maps fairly well. According to Berlian (2022), teachers, as educators, are required to be able to master competencies so that the learning process runs optimally. As educators, teachers must have qualifications and competencies (Lafendry, 2020; Munawir et al., 2022). With teacher competence, teachers can carry out their duties effectively and efficiently (Baharun, 2017; Caena & Redecker, 2019).

After the teacher divides the class into groups, the students congregate according to their groups to modify the concept they will write about. All groups have the same concept written for them, but each group's mind map is different. Students discuss with their group mates how to make mind maps so that they experience learning together and can exchange ideas for solving existing problems. When students create mind maps, they appear to be very focused on what they are doing, but some students appeared to be unsure of the format they needed to use to create this collection of operation material. Students will also feel happy and excited when learning in their groups. Some students were happy working in a group, and half of them were not fascinated by working with their friends in a group (Situmorang, 2021).

Mind mapping is very effective because students think independently and in groups to solve the problems given. This is supported by Arifah et al (2018) prediction that students will change these habits into effective and meaningful learning. The mind map's results are presented as the next activity. Each group in this activity took turns presenting the mind map's outcomes to the other groups. In addition, questions were posed to other groups after the presentation, and each group's response was given by the presentation group in turn. 15 minutes is the maximum allotted for the presentation and for questions and answers. The teacher invited groups that were prepared to present the results of their mind maps during the first presentation session, but no one dared to speak up out of fear that they would be in error. The teacher then indicates the group that appears to be most prepared to begin the presentation. The teacher quizzed the advanced group after the presentation to determine how well the students had understood the material and whether they had made any changes to their mind maps.

In interviews with seven students who experienced an increase in completeness, of the seven students, one could not draw a better mind map. The student admitted that he could not draw a better mind map because he was not good at drawing. However, these students still experienced an increase in individual completeness. It is suspected that the results of the student's mind map do not affect the completeness of individual students. So that even though the results of the student's mind map are not good, they can still experience an increase in learning outcomes from those that were initially incomplete to complete. Furthermore, the results of student tests showed that after learning mind maps on matrix operations material, students experienced an increase in individual mastery, which was initially only 18 students but increased to 25 students. While those who did not complete individually experienced a decrease from 9 students to 2 students. So that seven students who initially did not complete individually experienced completeness. From the results of student tests, it can also be seen that classical completeness, which initially only reached 66.67%, became 92.6%. In other words, learning mind maps on matrix operations material can improve student learning outcomes.

Based on the all the explanations, the learning mind map is used in the learning process in schools. This is evidenced by the achievement of three indicators of learning effectiveness, which include teacher abilities, student activities, and student learning outcomes. These three indicators are also supported by interviews regarding students' interests, feelings, and interests. The teacher's ability in learning mind maps has proven to be effective because the teacher's ability to get

good and very good categories and student activities are classified as active and very active. Student learning outcomes also achieved classical completeness of up to 92,6%, supported by interview results from seven students stating that they were interested, happy, and interested in learning mind maps on matrix operations material.

4. CONCLUSION

Based on the results of the description and analysis of data in this study, mind map learning on matrix operations material can be said to be effective because it fulfills the three indicators, namely, on the first indicator, the results of observing the teacher's ability in 2 meetings obtained an average of 3.60, and this value was in the interval 3.50–4.00 with a very good category. This value was obtained from the average at meeting 1, which obtained a value of 3.43, and at meeting 2, it increased by 3.77. The second indicator is related to student activity during mind map learning on matrix operations material. From the results of the analysis of student activities in meetings 1 and 2, it was found that 11 students got an average score that was in the interval 2.50–3.49, which was categorized as active, and as many as 16 students got an average score in the interval 3.50–4.00, which was categorized as very active. So the second indicator is student activity during mind mapping learning on matrix operations material. The third indicator is that the results of student learning are complete; classically, at least 75% experience individual mastery. Judging from the value of student test results, 25 students experienced individual completeness, and 2 got scores below 75 or did not complete individually. Then the results of the classical completeness analysis reached 92.6%. So that the third indicator, namely the classical completion of student learning outcomes, has been fulfilled. From the description that discusses the three indicators of the effectiveness of mind mapping learning on matrix operations material, it shows that the three indicators are fulfilled.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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