Research Article

The Application of the Discovery Learning Model to Create Learning Activities for Linear Program Materials for Class XI A-3 Students of SMAN 3 Malang

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Abstract.
Based on the observations of researchers during learning and interviews with tutors, it was found that the activeness of students was still low. The solution to this problem is to apply the discovery learning model. This research is a classroom-action research with the aim of describing the steps of the discovery learning model that can lead to active learning of students. Based on the results of the research that has been carried out, it is known that there is an increase in the value from cycle 1 to cycle 2. Based on observations, the percentage of teacher activity and student learning activity in cycle 2 was better than cycle I. The percentage of teacher activity in cycle 1 was 80% while the percentage of teacher activity in cycle 2 was 90%. The percentage of active learning of students in the first cycle was 72%, while the percentage of student activity in the second cycle was 87%. Based on the results of the first cycle quiz shows the percentage of completion as high as 46%. While in cycle 2, the percentage of completion was 89%. This represents an increase of 43%.

Keywords: learning activity, discovery learning

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1. INTRODUCTION

Based on the observations of researchers during PPL I in the even semester of 2021/2022 at SMAN 3 Malang, it was found that the activeness of students was still lacking. It can be seen that the learning process is still teacher oriented (teacher oriented), namely when the teacher explains the material in the learning process and students only passively listen to the teacher's explanation. Most of the students' activities were just listening and taking notes. During the learning process, students also rarely express opinions. This causes students to feel bored and tend to underestimate when the teacher is explaining, there are even some students who do activities outside of learning mathematics such as doing assignments in other subjects and playing

cellphones that have nothing to do with the topic being discussed. When the teacher asks a question only a few students are willing to give the answer, the other students tend to be silent. In fact, Wardana & Chandra (2017) state that question and answer activities are an important aspect in learning mathematics, because question and answer activities can encourage students to be active in learning. Likewise, during the daily test, some students were still not confident in their abilities because there were still students who asked other friends during the test.

The researcher also conducted interviews with several students of class X and IX of SMAN 3 Malang and one of the mathematics teachers of SMAN 3 Malang. The results of interviews with several students of class X and XI of SMAN 3 Malang obtained facts when in class, the condition of the class tends to be quiet and there is rarely interaction. This is because so far learning has been carried out online, which causes students to rarely greet each other and do not know each other well. While the results of an interview with one of the mathematics teachers of SMAN 3 Malang showed that during class learning, discussion activities between groups were rarely carried out so that interaction and communication between students and teachers were still not established. The lack of student participation causes children to prioritize the ability to memorize and remember so that learning activities become less than optimal.

Learning activities are student activities that involve thoughts and actions during the learning process. Budimansyah (2009) states that learning activities are learning activities where teachers must be able to create a learning atmosphere where students actively ask questions, express ideas, seek data or information to solve problems, and can convey their work. Based on this opinion, it can be seen that students who are active in learning are students who are able to ask questions to the teacher or other students, are able to work together in groups, are able to find information to solve the problems given, convey the results of group discussions, and are able to provide opinions. and respond to the opinions of other groups. Salo (2017) states that the success of a learning can be seen from the activeness of students when participating in the learning process. The higher the active students during the learning process, the higher the learning success rate. However, to achieve successful learning is not an easy thing, it requires support from various parties. In addition, of course, an appropriate learning model is also needed. The learning model is one of the factors that affect the activeness of students in the classroom. By using the right learning model, it can increase student participation in the learning process.

Based on these problems, the researcher believes that there is a need to improve the learning process for students. This is intended so that students are active during

the learning process such as being active in question and answer activities, actively interacting in group activities, and being able to present the results of worksheets from group activities. Students must be directed and guided so that they can think independently and can find concepts that they can understand themselves. Teachers must give students the freedom to solve their own problems and ensure that learning activities arouse curiosity. One of the learning models that can lead students to think independently and be able to find their own concepts is the Discovery Learning model. Hosnan (2014) states that discovery learning is a model for developing active learning by discovering and investigating on their own, so it is hoped that the results obtained will be embedded in the brain. Students do not immediately get an answer to a problem, but must look for themselves through a process and if in finding difficulties, students can reanalyze so that they can determine what steps must be taken so that these difficulties can be overcome. In line with Zaini's (2010) statement explaining that the ability to remember by finding one's own concept can last longer than listening to others.

In applying the discovery learning model, the teacher acts as a guide and directs students' learning activities according to the learning objectives, while students are given the opportunity to learn actively in order to solve their own problems. Kurniasih & Sani (2014) mention the steps in applying the discovery learning model, namely: 1) Stimulation (stimulation / giving stimulation). 2) Problem statement (statement/problem identification). 3) Data collection (data collection). 4) Data processing (data processing). 5) Verification (proof). 6) Generalization (drawing conclusions).

The advantage of the discovery learning model is that it helps students to improve and enhance cognitive processes in the form of efforts to find solutions independently of a problem, so that the knowledge gained through this model is very personal and powerful because it is able to strengthen understanding, memory, and transfer (Hosni , 2014). Therefore, with students who build their own knowledge, it is expected to increase student activity.

Based on the background described above, the researcher will conduct a classroom action research entitled "The Application of the Discovery Learning Model to Generate Learning Activities for the Linear Program Class XI A-3 SMAN 3 Malang"

2. RESEARCH METHODOLOGY

The type of research used in this research is classroom action research (CAR). Classroom action research in this study was carried out in stages according to Arikunto (2010),

namely planning, acting, observing, and reflecting. The stages of classroom action research can be seen through the following figure:

The implementation of this research requires the presence of researchers in the field because the researcher acts as an action provider. Researchers in this case are parties who feel there is a problem, namely the lack of active learning of students. Researchers are directly involved in the research process in the field from the beginning to the end of the study, where researchers are activity planners, learning implementers, data collectors, analyzers and pioneers of research results.

This research was conducted in class XI-A3 of SMAN 3 Malang which is located at Jl. Sultan Agung No.7, Klojen, Kec. Klojen, Malang City. This research was conducted in the odd semester of the 2022/2023 academic year. The subjects of this study were students of class XI-A3 of SMAN 3 Malang in the academic year of 2022/2023.

The data and data sources of this research are: (1) validation results, (2) teacher activity observation sheets, and (3) student learning activity observation sheets. The criteria used to measure success in this study are as follows: (1) The results of the criteria for the implementation of the observation of teacher activities are at least 80%, (2) The results of the criteria for the implementation of the observation of students' learning activities are at least 80% in the very good category, and (3) Completeness student learning at least 80% of the total number of students with a KKM of 70. If at the end of the research cycle does not meet the criteria for the success of the action, the research will be continued in the next cycle by considering the analysis of data results and reflection to improve the implementation of the learning process in the next cycle.

3. RESULTS AND DISCUSSION

3.1. RESULTS

In the implementation of the first cycle of actions, the indicators achieved are (1) determining examples and not examples of a two-variable linear inequality system, (2) compiling a mathematical model of a linear programming problem, (3) determining an example and not an example of a solution area for a two-variable linear inequality system. , and (4) draw a system of two-variable linear inequalities from a linear programming problem.

At the time of meeting 1, 10 students had not implemented the UH so the teacher had to make conditions beforehand which required quite a lot of time. During group activities, the condition of the class is still noisy and there are students who work individually. This is due to the lack of habituation in group learning. In addition, it was found that most of

the students had not concentrated on learning, because they discussed topics outside of learning. During the discussion process, the interaction of students when conducting group discussions was still lacking. Attention and motivation from teachers to students is also still lacking.

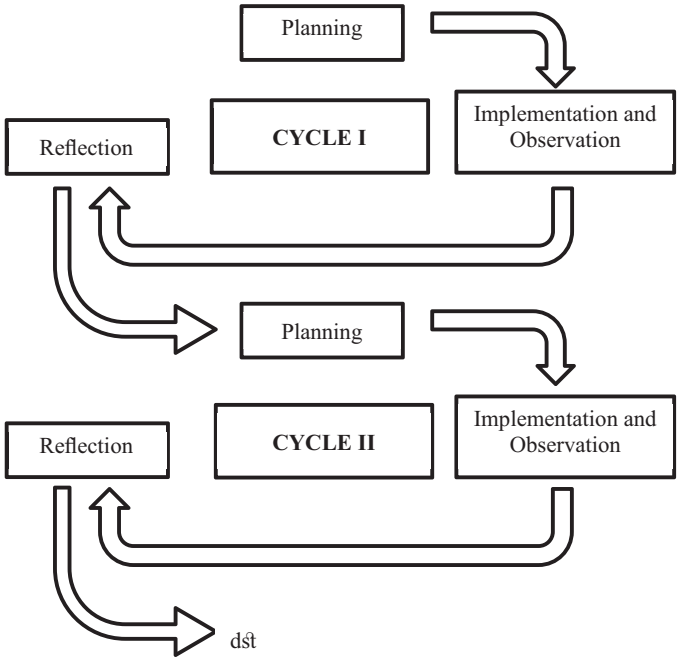

Figure 1: Presentasi hasil diskusi kelompok.

TABLE 1: Summary of the results of the reflection cycle I.

Reflected data	Achievement	Information
Teacher activity observation	80%	Meet the action success criteria
Observation of student learning activity	72%	Does not meet the criteria for the success of the action
Cycle I . quiz results	46%	Does not meet the criteria for the success of the action

Based on the results of the reflection, the research cycle I did not meet the criteria for the success of the action. Therefore, the researcher continued the research in cycle II. The implementation of the second cycle aims to improve the deficiencies in the first cycle of learning so that the second cycle can meet the criteria for the success of the action. Some improvements from cycle I will be presented in Table 4.6 below.

In the implementation of cycle II, the indicators achieved are (1) determining the objective function of the linear programming problem, (2) determining the optimum value of linear programming from a contextual problem, (3) analyzing the mathematical model of the linear programming problem, and (4) determining the solution. linear programming of a contextual problem.

Table 2: Lack of Learning in Cycle I and Plan for Improvement in Cycle II.

No.	Disadvantages of Cycle I Learning	Reason	Cycle II Improvement Plan
1	At the 1st meeting, the time to do the quiz was 5 minutes as a result, the students were in a hurry.	The teacher must condition several students who carry out the follow-up UH at the beginning of the lesson.	The teacher makes clearer time allocations for each learning step.
2	Almost all groups did not finish working on the LKPD	There are too many practice questions in the LKPD.	Reduce and simplify practice questions on LKPD.
3	Some groups have not done the activities on the LKPD well.	Students do not read the workings/instructions.	The teacher reminds students to read how to work/instructions on the LKPD.
4	Class conditions tend to be crowded and noisy during discussion activities.	Teachers pay less attention to students.	The teacher conditions students more so that the discussion process runs smoothly.
		Students discuss outside the learning topic.	The teacher reprimands students who interfere with learning.
5	During the presentation session, it took more time than planned.	Students are not used to presentations.	The teacher reminded not to beat around the bush and convey the important points.
6	Many students do not write down the conditions $x \geq 0$ and $y \geq 0$ when modeling a linear programming problem.	Students are often negligent.	Teachers often remind to be more careful in solving problems,

In the second cycle of learning, the teacher is able to manage the time allocation for each activity and reduce the activities that waste time. Meanwhile, during group activities, students actively discuss and actively seek other learning resources such as from the internet, books and so on. Students are also used to presenting in front of the class and are familiar with linear programming questions.

Besides that. The teacher pays more attention to students and guides more if there are difficulties.

Table 3: Summary of the results of cycle II reflection.

Reflected data	Achievement		Information
	Cycle I	Cycle II	
Teacher activity observation	80%	90%	Meet the action success criteria and improve from cycle I
Observation of student learning activity	72%	87%	Meet the action success criteria and improve from cycle I
Cycle I . quiz results	46%	89%	Meet the action success criteria and improve from cycle I

Presentasi hasil diskusi kelompok

Figure 2: Proses diskusi kelompok.

Based on the summary of the results of the reflection on the second cycle of learning, it can be concluded that the observation of teacher activities, the observation of student learning activities, and the completion of the second cycle of quizzes have met the criteria for success. Therefore, this research stopped until cycle II.

4. DISCUSSION

Based on the data exposure and research findings that have been stated above, this section will describe (a) the application of the discovery learning model that can bring up the learning activities of class XI-A3 students at SMAN 3 Malang, (b) bring up the learning activities of class students XI-A3 SMAN 3 Malang after following the discovery learning model learning, and (c) Supporting and inhibiting factors in the application of discovery learning to bring up the active learning of students in class XI-A3 SMAN 3 Malang.

Before entering the core activity of discovery learning, the teacher conducts preliminary activities first starting by saying greetings then together with students to pray before starting the lesson. Next, the teacher prepares the conditions for students to take part in learning, such as asking how they are and checking the attendance of students. In the first cycle of learning, especially the second meeting, many students did not enter because the previous day there were activities at school so that many students were not fit that day. While in the second cycle of learning, almost all students participated in learning activities. Next, the teacher asks students about the prerequisite material by presenting contextual problems. This is in accordance with Ningsih (2014) which states that contextual problems serve as the initial motivation of students in learning. Then

the teacher conveys the learning objectives and conveys the scope of the material and an explanation of the description of the learning activities, namely group discussions, presentations, and evaluations. The teacher forms groups of 3-4 heterogeneous people. This is in accordance with Hutagaol (2013) which states that in small group learning and grouped heterogeneously, namely based on students' mathematical abilities. The benefit of forming heterogeneous groups is to train students to accept differences and cooperate with other students who have different backgrounds. In addition, Slavin (in Lestari, et al., 2017) states that by studying in groups, students can share ideas with other members and practice a responsible attitude towards other members in the group so that they are able to make themselves learn as well as other members of the group. other. In the first cycle, the teacher divided the groups based on the mathematics scores in the previous material where in each group there were students with high ability, medium ability, and low ability. In the second cycle, the teacher divides the groups based on the quiz scores in the first cycle, where in each group there are students with high ability, medium ability, and low ability. Then the teacher asked the students to gather according to their respective groups. In the first cycle, the class conditions tended to be noisy because the participants were not used to studying in groups. Some students are reluctant to gather with the groups that have been determined because they feel they do not fit in with the members of the group so the teacher must provide direction so that students gather with the groups that have been determined. In cycle II, class conditions were more conducive because students were getting used to studying in groups. Then the teacher distributes LKPD to students.

Discovery learning core activities that can lead to student learning activities consist of 6 steps, namely: (1) Stimulation, (2) Problem identification, (3) Data collection, (4) Data processing, (5) Verification, and (6) Interesting. conclusion.

Supporting and Inhibiting Factors in the Application of Discovery Learning to Increase Students' Active Learning. Faktor Pendukung

1. Students in the research class have a submissive character to the teacher so that the teacher becomes easier in conveying information and directions.
2. Students in the research class are quite adaptable so they are quite easy to adapt to the new learning system that is applied, namely in groups and learning to use LKPD.

TPACK conditions in the classroom are very supportive such as LCD, internet, sound, and cellphones. This makes it easier to use learning media.

4.1. Obstacle factor

Discovery learning is carried out according to lesson plans, but there are still obstacles experienced by researchers during learning such as time allocation that is not according to plan.

5. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusions

Discovery learning steps that can lead to student learning activities are divided into 3 stages, namely introduction, core activity, and closing. Beginning with the teacher saying greetings then together with the students to pray before starting the lesson. Next, the teacher prepares the conditions for students to take part in learning, such as asking how they are and checking the attendance of students. Then the teacher asks the students about the prerequisite material and then conveys the learning objectives. After that, the teacher conveyed the scope of the material and explained the description of the learning activities, namely group discussions, presentations, and evaluations. Next, the teacher forms groups of 3-4 heterogeneous people, then distributes LKPD to students.

The core activity begins with the stimulation stage, which is showing a problem in the LKPD. Next, at the problem identification stage, students write down the information obtained at the stimulation stage. Students can also ask questions based on the problems observed in the LKPD. Next is the data collection stage, the teacher gives directions on what students should do and the teacher asks students to listen and fill out the LKPD. Students are also asked to carry out literacy activities by searching and reading from various references such as materials from the internet, student textbooks and so on. In addition, the teacher encourages students to collect appropriate information to solve the problems given. The teacher monitors and guides the data collection process carried out by students. The next stage of data processing, students work on and discuss the contents of the LKPD. The teacher observes the discussion process and checks the students' work. In addition, the teacher provides assistance in the form of extracting the information needed or contained in the problem. Next is the verification stage, the teacher assists students in planning and preparing the results of the discussion. Students communicate the results of their answers. The non-presenting group gave a response to the presenting group. The teacher gives appreciation to students who have presented the results of their answers. The teacher also provides clarification and

confirmation of answers. The next stage is drawing conclusions, the teacher evaluates the results of student investigations with classical discussions to be given input by the whole class. The teacher also provides reinforcement to the results of the discussion. Then with the teacher's guidance, each student concludes the results of the discussion and takes notes in their respective notebooks.

In the closing stage, it starts with the teacher giving a quiz. The teacher continued to give homework and inform the material to be studied at the next meeting and ask students to read the material. The lesson ended with praying and saying greetings.

There were several improvements to the learning cycle I carried out in the learning cycle II, including making clear time allocations for each step of learning, teachers paying more attention and conditioning students, and improving some instructions and contents of LKPD.

The application of discovery learning can bring up student learning activities, based on observations of student activity. At the end of the first cycle showed completeness as much as 72%. While in the second cycle showed completeness as much as 87%. The results of teacher activities during the problem posing learning process were in the good category in the first cycle and very good in the second cycle. The quiz results during the first cycle were in the poor category while the second cycle was very good.

5.2. Suggestions

Based on data exposure, research findings, and discussions obtained from the application of discovery learning that can lead to student learning activities, the researcher provides suggestions to other researchers, including:

1. Teachers can use discovery learning as an alternative to learning in the classroom to bring up student learning activities.
2. For further researchers, it is recommended to conduct research related to the application of discovery learning that can increase student learning activities with other indicators and materials.

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