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Implementation of Discovery Learning to Improve Student Learning Outcomes in Class XI Database Lesson

Salamah*, Anne Herliany

SMK Negeri 1 Takengon Aceh*, SMK Negeri 4 Bandung, Indonesia
*Correspondence: E-mail: Salamahmelala5@gmail.com

A B S T R A C T

This study aims to determine the increase in student learning outcomes in class XI SMK using the discovery learning model at SMKN 4 Bandung. This research is a classroom action research model by Kemmis and Mc Taggart. The research subjects were students of class XI RPL Semester 2020-2021 with a total of 25 students. The study consisted of two cycles with one meeting in each cycle. The data collected in this study used observation, learning outcomes tests, and documentation. The data analysis used descriptive-qualitative analysis. The results of implementing the discovery model can improve learning outcomes in class XI RPL student database lessons at SMKN 4 Bandung. The first cycle of student learning outcomes was 40% in the incomplete category, 60% in the complete category. Whereas in Cycle II student learning outcomes were 20% in the incomplete category and 80% in the complete category. In the first cycle the class average value of student learning outcomes was 74.52, in the second cycle increased to 84.64.

A R T I C L E   I N F O

1. INTRODUCTION

2013 curriculum is a scientific approach that places more emphasis on student's activeness during the learning process (Mustaming et al, 2015). Scientific Approach itself consists of five main learning experiences, namely observing, asking, gathering information, associating, and communicating. (Rhosalia, 2017). The ability to enact this activeness, however is needed by the teacher. One of the demands of an educator is for the teacher to be able to choose and use an appropriate learning approach, maximizing the material to be delivered, and must consider the level of student development. The old use of the lecture model in the 2013 learning process is proven to be less effective for students because the students only listen and being passive (Annury, 2019). The teacher must switch to a learning model that gives more active roles for the students, making them less passive.

A new problem arises because in a state of the COVID -19 pandemic. The PPB organization in charge of education which deals with education, science and culture UNESCO stated that more than 1.5 billion students in the world cannot study at school due to the Covid-19 virus (UNESCO, 2020). This problem certainly requires educational institutions and educators (teachers and lecturers) to become the vanguard to apply the right learning process. Regulations implemented by the government by studying at home, working at home and implementing physical distancing so that Covid-19 does not spread quickly are required to study from home. The learning system which was originally based on face-to-face directly in class was replaced with a learning system that is integrated through the internet network (online learning). The process of teaching and learning activities is carried out from home so that teaching is less effective for both teachers and students.

Until now, database subjects are still considered difficult subjects for students. It is undeniable that learning databases during WFH is even less encouraging. Based on research in class XI SMK N 4 Bandung, it was found that learning databases still experienced many weaknesses and obstacles. Therefore, to create a more effective learning process, teacher must devise a teaching method to increase the interactions within students and can improve student learning outcomes. It is necessary to apply a variety of teaching models in the learning process.

There are problems that require solving and boredom in database subjects, some of which are as follows:

1) The current learning component, which uses the learning method from home, especially for students whose grades are low, because the learning process is less suitable for online class, causing the student to become less motivated. Therefore, the teacher must create a suitable model to improve student' motivation.

2) The facilities and infrastructure used do not support online learning. On the teacher's side for example, the obstacle is that it is difficult to explain and convey clearly to students because of the difference in infrastructure (such as internet connection strength that differ in each teacher and student) and other problems the student tend not to participate in online class discussion.

Based on these facts, researchers are interested in designing a learning model that can increase self-confidence, care, responsibility and student learning outcomes, with the Discovery Learning model. The discovery learning model is defined as a learning process that occurs when the teacher presents learning material not in its final form, but students are required to carry out activities such as gathering information, comparing, categorizing, analyzing, integrating materials and making conclusions. Discovery Learning according to Hosnan (2014) is a model for developing active student learning methods in which the

activities of finding and investigating are done by the students. The lesson obtained last longer in the student's memory. Students are encouraged to learn through their own active engagement with concepts and teachers encourage students to have experiences that allow them to discover the concepts for themselves (Kadri & Rahmawati, 2015). From the past research, the use of the Discovery Learning model greatly supports the improvement of student learning outcomes in Vocational High Schools. Thus, the Discovery Learning model can be used as a learning model to be applied in learning activities.

2. METHODS

This research is a type of classroom action research. According to (Yuliana & Arikunto, 2008) class action research is an examination of learning activities in the form of actions that are deliberately raised and occur in a class together. Classroom action research (CAR) is carried out as a problem-solving strategy by utilizing concrete actions and then reflecting on the results of the actions.

The subjects of this study were students of class XI RPL at SMK Negeri 4 Bandung for the 2020/2021 academic year. The number of students in this class is 25 students. The research was conducted from August to October 2020.

3. RESULTS AND DISCUSSION
3.1 Implementation of Cycle I
The steps taken to implement Cycle I are as follows:
3.1.1. Planning Stage of Cycle I
Learning outcomes in pre-cycle become the basis for planning appropriate actions to ensure student learning outcomes increase. The learning model that will be used is the Discovery Learning model. In this stage, the author prepares learning tools in the form of:
(i) Syllabus of the Database subject with Data Type materials.
(ii) Learning media. The media used are PowerPoint and Google Classroom
(iii) Student Worksheets as a means to do assignments regarding the results of investigations carried out by students
(iv) Teacher and student observation sheets to find out the activities of teachers and students during learning takes place.
(v) Evaluation questions that will be given after learning is complete.

3.1.2. Implementation of Actions and Observations in Cycle I

The first meeting was held on Thursday, 08 October 2020 with an allocated time each. The activities carried out at the first meeting were Learning outcomes in pre-cycle become the basis for planning appropriate actions so that student learning outcomes increase. The learning model that will be used is the Discovery Learning model. At the beginning of the class, the teacher conducts provide an explanation of the data types in the database. The teacher also conveys the learning objectives to be achieved, namely knowing the types of data types in the database.

In the main activity, after all students know the learning objectives and activities to be carried out during class, each student receives a student worksheet to conduct exercise regarding data types. Furthermore, the teacher facilitates students by conducting Discovery learning model during learning activities:
(i) Stimulation: The students listen to the presentation of problems presented by the teacher about data types where the teacher asks questions to students about data types in databases in everyday life. The learning activities are done google classroom.

(ii) Problem Statement/Problem Identification: students submit hypotheses about the problems presented by the teacher. The students are given the opportunity to collect information and problems on data types. At this stage students also prove their answers are right or wrong.

(iii) Data Collection: After each student understands the experimental steps carried out by students, they make simple data type queries.

(iv) Data Processing: The teacher asks each student to demonstrate the results of a simple query in mariaDB related to the simple data type that the student wants. The teacher guides each student to start experimenting with simple queries in mariaDB.

(v) Verification: The teacher gives the opportunity for students to demonstrate the results of simple data type queries on mariaDB. The students demonstrate the results of simple data type queries using share screen feature, while other students and the teacher provide feedback.

(vi) Conclusions: The teacher and students classically make conclusions on the results of learning activities that have been carried out on data type material.

3.1.3. Cycle I Result

Based on student learning outcomes obtained by researchers in the cycle I, that there are still some students who get low scores. Out of 25 students, ten students had gained scores ≥78 or has reached the passing grade. Another 15 students had gained score below 78, thus has not reached the passing grade.

Tabel 3.1 Student Database Learning Outcomes Cycle I

Score	THE NUMBER OF STUDENTS	PERCENTATION	INFORMATION
<78	15	60%	Has not reached passing grade
≥78	10	40%	Has reached passing grade
Amount	25	100%	
Average value		74,52%	
Lowest Value		60	
Highest Value		90	

Based on **table 3.1**, a bar chart of the percentage of learning outcomes in the Database is presented in cycle 1 which can be seen in **Figure 3.1**
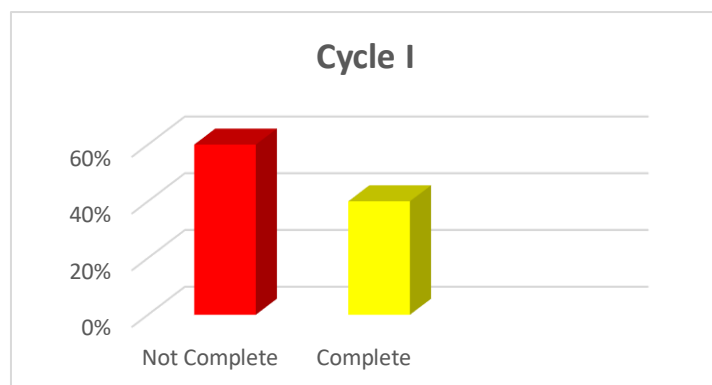
Figure 3.1 Bar Chart of Percentage of Learning Outcomes Database in Cycle 1

3.1.4 Cycle I Reflection

After carrying out the learning activities in the first cycle from the first meeting, then a reflection is held on all activities in the learning process. The results of reflection are taken from student' scores and also the results of observations of teacher in meeting I. This reflection is used as material for improvement by comparing whether the results of actions in the learning process are appropriate with indicators of success to be achieved by researchers.

3.2 Implementation of Cycle II

The steps taken to implement Cycle I are as follows:

3.2.1. Planning Stage of Cycle II

After seeing the shortcomings and successes in cycle I which consisted of meeting I, learning planning in cycle II is a refinement and follow-up of the deficiencies that occurred in cycle I. At the planning stage in cycle II, researchers are still collaborating with class XI RPL teachers at SMK Negeri 4 Bandung. Researchers made improvements to the lesson plans to be used in cycle II and are still in accordance with the steps of the discovery learning model. Cycle II was carried out in 1 meeting, namely the meeting time was 1 x 35 minutes. Researchers also observed how student activities during learning using the discovery learning model in the Database subject took place.

3.1.2. Implementation of Actions and Observations in Cycle II

The implementation of these actions and observations was carried out during the second meeting, which was held on Thursday 15 October 2020. The teacher also conveys the learning objectives to be achieved, namely tied data in the database. In the core activity, after all students know the learning objectives and activities to be carried out during learning, then each student receives student worksheets or evaluation questions to do an experiment namely to make simple queries in mariaDB. The teacher facilitates students by carrying out learning according to the steps of the Discovery Learning model.

(i) Stimulation: students listen to the presentation of the problems presented by the teacher, namely the teacher asks questions to students about data types in databases in everyday life

(ii) Problem Statement/Problem Identification: students submit hypotheses about the problems presented by the teacher and write their answers into student worksheets. To prove their answer is right or wrong the teacher guides each student to start doing a simple dimariaDB query experiment.

(iii) Data Collection: After each group understands the experiment steps they have carried out, they start experimenting with making a simple periscope.

(iv) Data Processing: The teacher asks each individual group to write down the results of their observations and fill in tables or questions related to the experiment they are doing.

(v) Verification: The teacher gives each group the opportunity to present the results of their experiment to the front of the class while other groups provide responses and the teacher gives awards in the form of applause to each group that presents the results of their discussion

(vi) Conclusions: the teacher and students classically make conclusions on the results of the learning activities that have been carried out.

3.2.3. Cycle II Result

Based on student learning outcomes obtained by researchers in the cycle II, there is an increase in student' completion rates. Out of 25 students, 20 students had gained scores ≥78 or has reached the passing grade. Another 5 students had gained score below 78, thus has not reached the passing grade.

Tabel 3.2 Student Database Learning Outcomes Cycle II

SCORE	THE NUMBER OF STUDENTS	PERSENTAGE	INFORMATION
<78	5	20 %	Has not reached passing grade
≥78	20	80%	Has reached passing grade
Amount	25	100%	
Average Score		84,64	
Lowest Value		70	
Highest Value		95	

Based on **table 3.2**, a bar chart of the percentage of learning outcomes in the Database in cycle II is presented, which can be seen in **Figure 3.2.**
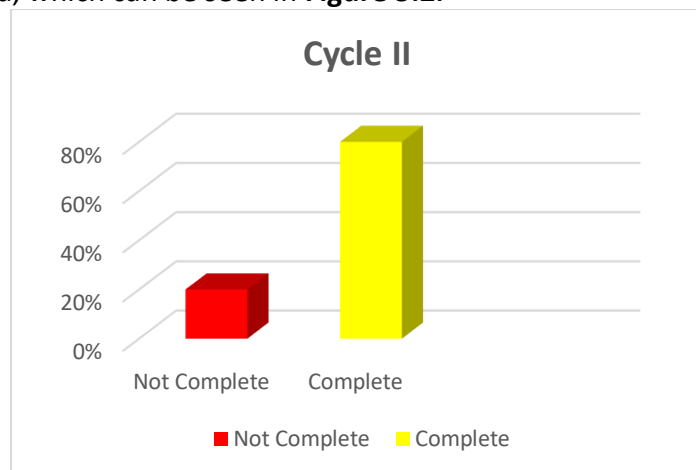
Figure 3.2 Bar Chart of Percentage of Learning Outcomes Database Cycle 1

3.2.4 Cycle II Reflection

After carrying out the learning activities in the second cycle from the first meeting as a strengthening of the second cycle, then a reflection is held on all activities in the learning process. The results of reflection are taken from the results of student learning scores carried out in cycle II. This reflection is used as material for stabilization by comparing whether the results of actions in the learning process are in accordance with the indicators of success to be achieved by researchers.

3.3.   Comparison of Student Learning Outcomes Cycle I and Cycle II

Based from the result obtained in cycle I and cycle II, the student learning outcomes have increased. In Cycle I, there are 15 student scores below 78 with percentage of 60% and 10

student scores above 78 with percentage of 40%. In cycle II, the ratio was changed. In Cycle II, there are 15 student scores below 78 with percentage of 60% and 10 student scores above 78 with percentage of 40%. The comparison can be seen in **table 3.3.**

Table 4.3 Comparison of student learning outcomes from cycle I and cycle II

NO	CATEGORY	CYCLE I		CYCLE II	
		THE NUMBER OF STUDENT	PERSENTAGE %	THE NUMBER OF STUDENT	PERSENTAGE %
1	Has not reached passing grade	15	60%	5	20%
2	Has reached passing grade	10	40%	20	80%

4. CONCLUSION

Classroom action research was carried out at SMK Negeri 4 Bandung, especially in the database subjects in class XI, resulted an increase in student learning outcomes. This proves that the discovery learning model is able to improve student learning outcomes. From cycle I and cycle II it can be seen the results of student learning from the evaluation or student worksheets. In cycle I, the average student gets a score of 74.52 in the complete grade category with the highest score of 90 and the percentage of student learning outcomes in Cycle I is 40% in the incomplete category, and 60% in the complete category. Meanwhile, in cycle II, the average score is 84.64 with the complete score category, with the highest score of 95, the percentage in Cycle II of student learning outcomes was 20% in the incomplete category and 80% in the complete category.

It can be concluded that the application of the Discovery model to database learning has succeeded in increasing student learning outcomes for class XI RPL SMK Negeri 4 Bandung. This is seen from the results of the acquisition of values about student learning outcomes.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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