

Increased Assessment for Discrete Mathematics Course with Small Group Discussion

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Keywords: Student Centered Learning, Assessment, Small Group Discussion.

Abstract: Student Centered Learning is a learning method whereby students are the center the learning process. It means that students must be active in the learning process under the lecturer's supervision. One of the Student Centered Learning methods is Small Group Discussion. Small Group Discussion is a discussion method consisting of 3-4 students. In each group, every student actively discuss the subject. This paper determines the increased assessment for Discrete Mathematics course which uses Small Group Discussion as a learning method.

1 INTRODUCTION

Discrete Mathematics is a course given to mathematics students of level II (two) in the fourth semester. This Discrete Mathematics is one of the compulsory subjects which are part of the field of study in combinatorial Mathematics interests. Students can take this course if they have taken the Introduction to Mathematics course which is a prerequisite for Discrete Mathematics courses. In addition, Discrete Mathematics courses also relates to one of the subjects in the field of combinatorial Mathematics interest studies, namely the Number Theory course. Introduction to Mathematics and Number Theory courses are given to mathematics students of the first level, namely in the first and second semester.

In Discrete Mathematics, the emphasis is on understanding the logic of proof and some basic principles of proof in mathematics (Robert, 2001). After taking this course, students are expected to be able to think logically, systematically and structurally in reasoning and solving a problem in the field of mathematics (Meng et.al., 2018; Garcia et.al., 2011).

The learning objectives of Discrete Mathematics are to allow students to build strong understanding of logic and ways of proof, use the principle of mathematical induction, understand the basic principles of counting, the principle of nesting pigeons, permutations and combinations, binomial coefficients, basic concepts in discrete opportunities,

recurrent relations, generating functions, the principle of inclusion-exclusion and the concept of relation.

Furthermore, the learning outcomes of Discrete Mathematics are:

Students are expected to be able to:

- a. Construct evidence inductively.
- b. Understand the basic principles of mathematical induction and some proof techniques, and apply them to relevant cases.
- c. Identify the relationship between problems in discrete mathematics with other branches of mathematics and science.
- d. Have critical, analytical and innovative thinking to reason logically and structurally.
- e. Communicate their thoughts systematically, work together and adapt with other students in the group, and conduct good discussions.

The contribution of Discrete Mathematics for the learning achievement of the Mathematics study program is that students have a strong understanding of logic and way of proof. They master the basic principles of mathematical induction and some verification techniques and can apply them to relevant cases, and understand the basic principles of counting (Robert, 2001; Kularbphettong, 2015).

The teaching materials that have been used in Discrete Mathematics are presentation slides made with Microsoft power point and a textbook in the form of handouts. Furthermore, the learning method that is commonly applied to discrete courses is Teacher Centered Learning (TCL), which means that

classroom learning is centered on the lecturer as a source of learning material.

The Following is the assessments made so far. Assessment criteria consist of evaluating results and processes:

Table 1: Component of Assessment.

No	Component Assessment	Weight (%)
Assessment of Results		
1	Midterm Examination	30 %
2	Final Examination	30 %
3	Quiz	20 %
4	Excersises+Home Work	20 %
TOTAL		100 %

Furthermore, the distribution of the final grades of Discrete Mathematics courses for Class B in the academic year of 2016/2017 is as follows:

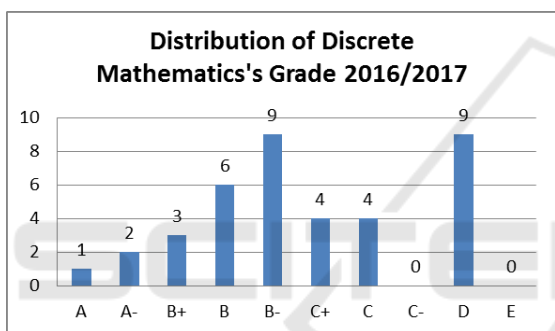


Figure 1: Distribution of Discrete mathematics's Grade 2016/2017.

From the Distribution, the above values are obtained as follows:

Table 2: Final grades of Discrete Mathematics courses for Class B in the academic year of 2016/2017.

Final Grade	Number of Students
A	1
A-	2
B+	3
B	6
B-	9
C+	4
C	4
C-	0
D	9
E	0
Number of Students	38

The problem that arises during this time is the low learning ability of students in working the exercises given. Exercises can be work done either at home or in class during in the lecture.

2 RESEARCH METHODOLOGY

This research was conducted in the classroom within one semester, namely even semester in the academic years 2017/2018 and involves students in Discrete Mathematics courses (courses in the fourth semester). The research stages are as follows.

2.1 Research Design

The method that will be carried out in the Classroom Action Research in Discrete Mathematics in Class B for the academic years of 2017/2018 is Small Group Discussion method. In this method, the lecturer will form small groups consisting of three or four students (Eden, 2005).

Before discussing a subject or an exercises, the lecturer explains in advance the related subject. Furthermore, students will be given individual assignments done at home. The task is related to the subject or exercises that will be discussed in the group in the next meeting. Every student must be able to explain and discuss the material or training in the group that has been formed. At the end of the discussion, the lecturer will randomly appoint students who will explain the results of the group discussion. It means that each student must be able to explain what has been discussed in the group. If there are students who cannot explain the results of the group discussion, the group scores will be reduced.

Student's understanding and activeness in the discussions held are assessed. This is is a group assessment not an individual assessment. It means that each student must be responsible for what has been discussed in the group. Assessment is also done by giving individual assignments, quizzes, Midterm Examinations, and Final Examinations.

For evaluation, students respond to development learning methods are carried out by asking students for suggestions and criticisms of the learning method that has been done for one semester.

2.2 Limitation of Research

The limitation of this research is the effect of Student Centered Learning (SCL) methods on assessment of Discrete Mathematics courses, especially small group discussion method. The subjects of this study are

students who took the Discrete Mathematics course for the Academic Year 2017/2018. Especially students in the fourth level or students who repeated discrete mathematics in class B.

2.3 Data Analysis and Collecting Methods

This method consists of collecting the values obtained from students who take Discrete Mathematics in the Academic Year 2017/ 2018. These values are personal assignments, group assignments, quizzes, Midterm and Final Examinations. Furthermore, this these values will be compared with the values of students who took the Discrete Mathematics course in the Academic Year 2016/2017.

3 RESULTS AND DISCUSSION

Classroom Action Research that has been carried out is applying SCL (Student Centered Learning) Method. SCL Method is a method whereby students are required to understand the subject under the guidance of the lecturer. The SCL Method applied in this research is the Small Group Discussion method. Classroom Action Research conducted has several parameters.

3.1 The Results of Student Learning Achievements

Students' activities and understanding during learning or discussion becomes one of the parameters of the results of the learning outcomes. In addition, independent assignments, Midterm and Final Examinations are also used as parameters for learning outcomes. In Classroom Action Research, the activeness and understanding of students at the time of learning increased compared to those of students in the previous school year. It is directly proportional to the assessment of students in independent assignments, questions about Midterm and Final Examinations.

The distribution of students' final grades at the end of learning is also a parameter in this Classroom Action Research. In Classroom Action Research, we get an increase in the distribution of students' final grades. The final distribution of Discrete Mathematics courses for Class B in the academic year 2016/2017.

Furthermore, distribution of the final grades of the Discrete Mathematics course for Class B of the academic year 2017/2018 is as follows:

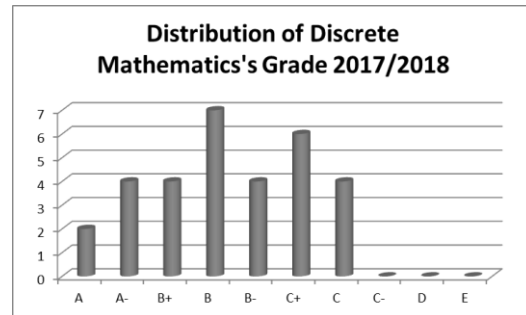


Figure 2: Distribution of Discrete Mathematics's Grades in 2017/2018.

From the above distribution values are obtained are as follows:

Table 3: Final grades of Discrete Mathematics courses for Class B in the academic year 2016/2017.

Final Value	Number of Students
A	2
A-	4
B+	4
B	7
B-	4
C+	6
C	4
C-	0
D	0
E	0
Number of Students	31

On both distributions, the value of students in Discrete Mathematics of Class B increased in the Academic Year 2017/2018. In Discrete Mathematics of Class B of the Academic Year 2017/2018, there were no students with a final grade D. Meanwhile, in the Academic Year 2016/2017, there were nine students with a final grade D. Then, at the final exam, there is also an increase in the number of students in Discrete Mathematics courses of Class B in the Academic Year 2017/2018. Students with final grades A, A-, B+ and B were as many as two, four, four and seven students respectively. Meanwhile, in the Academic Year 2016/2017 there was one student with a final grade A, two students with a final grade

A-, three students with a final grade B +, and six students with a final grade B.

3.2 Student Response

Student Responded to the development of learning methods by asking for suggestions and criticism on the learning method that has been done for one semester. In the middle of the semester and the end of the semester, students were asked to give suggestions and criticisms on the learning methods carried out. It is an evaluation for lecturers in the learning method that is carried out during one semester.

4 CONCLUSION

In the Class Action Research, it was found that students' understanding of Discrete Mathematics became has a significantly increased after using SCL (Student Centered Learning) Methods, especially Small Group Discussion.

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