

# The Implementation of Small Group Discussion and Cooperative Learning in Real Analysis 2

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**Abstract:** This Classroom Action Research is done to repair and improve the teaching method that is done by Lecturers that is to combine Small Group Discussion (SGD) Method and Cooperative Learning (CL) Method on subject Real Analysis 2. The concept in this subject has a very high level on abstraction so that Simple Jigsaw model in the CL method can be applied to specific topics that are considered easy to understand. We will show that this research can be implemented well even though has not provided a significant change in the final student grades compared to the previous year.

## 1 INTRODUCTION

Real Analysis 2 is one of compulsory course in the 4th term in the Department of Mathematics of Andalas University. Based on the position of the Real Analysis 2 course in the curriculum structure of the Indonesian Mathematics study program and from the learning achievement, it can be seen that this course has a significant role in the competence or performance of learning in the study program curriculum. Students who take this course are expected to have the ability to think critically and analyze, which is an ideal achievement for a mathematics scholar so that they can quickly adapt to different environments.

In recent years, the team teaching applied the Teacher Centered Learning and combined with small group discussions conducted in tutorial classes. Based on an evaluation of the learning process and results in the previous year, there are several disadvantages; namely the final grade of assessment showed that most students could not answer well and could not answer in their language because they only memorized what the lecturer gave, the division of the discussion group is not well managed yet.

Based on the problem above, it is necessary to revise and develop the learning method used so far. This method accomplished by choosing or combining the effective learning method.

The purpose of this research is to apply the Small Group Discussion (SGD) Method and Cooperative Learning (CL) Method on subject Real Analysis 2.

There are several strategies in the student-centered learning approach, one of which is Cooperative Learning (CL). This CL method is part of learning techniques where students interact with others to obtain and practice elements of lecture material and find general learning outcomes (Saborit et.al., 2016; Azizan et.al., 2018; López-Mondéjar, 2017).

Elliot Ariston originally introduced the jigsaw instructional procedure and first used in 1971 in Austin, Texas (Aronson, 2008). With this approach, the content of the lesson is classified into several parts of information, just like in a jigsaw puzzle (Evcim and Ipek, 2013; Şengül and Katranci, 2014; Pozzi, 2010). The students are divided into small and heterogeneous 'home' groups, where they are each given a specific subtopic in the group. In the next step, students break out of their 'home' groups and form the 'expert' groups. In this group, students focus on one subtopic, researching and discussing it and become an expert on the subtopic that they have been assigned. Then, the students from all of the 'expert' groups return to their 'home' groups and teach their peers based on their discussions in the expert group. Eventually, all the members of the 'home' groups will have learned from each expert group discussion and will have benefitted from each other. In this method, lecturer acts as a motivator, facilitator and assess students activity.

Small group discussion allows presenters to announce a topic or idea for group discussion among participants. A small group discussion follows democratic guidelines and allows everyone to contribute many ideas for others to discuss and reflect upon. Discussion also allows for an interchange of ideas within the context of a group under the direction of a presenter.

In cooperative learning, a small group of participants works together to achieve a common goal. Cooperative learning operators are based on the premise that participants achieve more when they work together. The goals of cooperative learning are positive interdependence, face-to-face interaction among participants, individuals.

## 2 METHOD

The classroom action research is conducted in this study (Afriza et.al., 2014; Kunandar, 2012). Learning strategy used is a combination of a teacher-centered learning approach and one of the cooperative learning approach, i.e., jigsaw strategy.

### 2.1 Population, Sample, and Participant

Population in this study is all student that took Real Analysis 2 course in academic year 2017/2018. The students are grouped into three classes A, B, and C, consisting 33, 34 and 30 students respectively. All population member is included as a participant in this study.

### 2.2 Study Design

This classroom action research is carried out during the even semester of 2017/2018 school year. This classroom action research was done through two cycles. Each cycle consists of four steps, i.e

#### *Step 1 Planning*

At this stage, a strategy is designed to achieve the learning objectives, starting from identifying the problems that arise in learning Real Analysis 2, analyzing the causes and then developing an action plan through the development of the Semester Learning Plan, student worksheets for lectures and tutorials. In this activity, an indicator of the success of the action was also determined, and the instrument used to measure the success rate of the action. This step is conducted through week 1-5.

#### *Step 2: Implementation*

At this stage, actions that have been planned are implemented. The learning approach used is cooperative learning using the Jigsaw strategy. This strategy is applied to some specific topics, i.e., Properties of Expectation, Special Discrete Distribution and in tutorial class. This step is conducted through week 6-10.

#### *Step 3. Observation*

At this stage, observations of the events encountered in the implementation of the action included obstacles faced and activities carried out by students during the learning process. This activity is carried out in conjunction with the implementation of the action.

#### *Step 4. Reflection*

The last stage of this class action research is an evaluation of the results of actions taken based on predetermined indicators.

### 2.3 Data collection and analysis

Data were collected during the implementation step. The assessment of the student responses is held by distributing questionnaires to all students participating in the Real Analysis 2 course. The response measured is the students' perception of the effect of this learning method on the active involvement of students, motivation to learn material independently, improve teamwork, questionnaires using a Likert scale. Data were analyzed by descriptive statistics (central tendency and variability measures) as well as statistical table and graph.

### 2.4 Performance Indicators

The indicator used to assess the success of teaching methods and assessments developed in this Class Action Research activity, that are:

- a. Learning Outcomes. Learning outcomes will be measured from independent assignments, quizzes and exams, UTS and UAS. This activity is considered successful if the percentage of students who get a score below B is reduced from the previous teaching year. Student responses to the development of learning methods and assessments applied.
- b. This learning method is concluded successfully if more than 75% of students give a good perception of this learning method.

### 3 RESULT AND DISCUSSION

Here we will describe the development of a learning method and assessment method as a solution of problems faced in Real Analysis 2 course. We will also discuss the result of the action done.

As mentioned before, it is necessary to make various efforts towards improving quality and the learning process that has been carried out. Some of the material in the Real Analysis 2 course still requires an explanation from the subject lecturer because of its position as an advanced course that still requires assistance from the lecturer as a source in explaining the material. For this reason, the learning method applied to some of the material in this course is a combination of student-centered learning (SCL) in the form of small group discussions and cooperative learning and lecture methods for other materials.

The following are activities conducted at the first and second meetings of the lecture: 1) explanation of the description of the course, the relevance of the material with the material in the previous course, Real Analysis 1. This description can be seen in the RPS (also available on the Department of Mathematics Unand). 2) question and answer/discussion about functions (definition of functions, rational functions, polynomials, operations on functions, limited functions) by the way the lecturer gives questions and the students give responses where the answers can be responded again by other students, 3) Pre-test about the function of 41 students. The result is 14.6% of the value 70 and above, 48.8% of the value from 55 to 70, and 36.6% less than 55 down (Figure 1), 4). Based on the pre-test results students are divided into seven discussion groups consisting of 5 -6 students. Each group has a person who is considered an expert who is responsible for helping other group members in understanding the material/topic given. This "expert" student previously discussed with the lecturer on the subject.



Figure 1: Distribution of Initial Grade

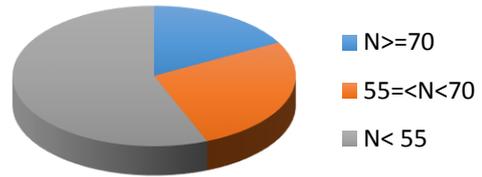


Figure 2: Distribution of UTS Grade



Figure 3: Distribution of Quiz Grade



Figure 4: Distribution of Final Grade

From the distribution of grades obtained by students, it can be seen that students' understanding of real analysis two-course material has not increased. There are 24% of students whose grades are above C +, 50% of students only have enough value (C +, C) and the rest are D. This is consistent with the results of the questionnaire data distributed to students after the UTS ends. The results are obtained that the level of satisfaction, activity, seriousness, and understanding of students from week to week on the method of the lecture is not so high. They admit that they are less serious in group discussions both in the lectures and outside the lectures. This undoubtedly results in their lack of understanding of lecture material, which has an impact on their low grades. Students who get grades above C + are indeed students who are categorized as diligent and willing to learn a lot. From

the supervision of lecturers in the class, they have tried to share knowledge and explain to their friends who are not good at the value of group assignments. However, because other students lack self-learning to master the concept of Real Analysis 2, yet the way their friends explain they will be difficult to understand.

## 4 CONCLUSIONS

Application of Small Group Discussion Learning Methods and Cooperative Learning in Real Analysis Course 2 in even 2017/2018 semester it turned out that it had not provided satisfactory results. This is seen from the final score obtained by students, which is the acquisition of C + and C is 50% while the acquisition of scores above is 24%. This unsatisfactory result might be because they are not familiar with the SCL method. Some students who are considered "experts" have tried to help their friends who do not understand the material or are unable to learn independently but some are still not used to explaining what they have understood to their friends. Other conditions are that in some groups discussions have not been well established because there are still group members who have not been motivated to learn in groups even though their ability to learn independently is still lacking. In addition to the factors that have been explained, the weak value may also be due to the selection of topics that are inappropriate for the application of the SCL method. Based on the results of this evaluation, it will need to be further developed and appropriately conditioned the implementation of the SCL method that is more appropriate for the Real Analysis 2 course.

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