EFFECTS OF COOPERATIVE LEARNING ON MULTIPLE INTEGRALS

Komon Paisal*

Faculty of Sciences and Technology, Suan Sunandha Rajabhat University,
1 U-tong Nok Road, Dusit District, Bangkok, Thailand. 10300
E-mail address: *komon.pi@ssru.ac.th

ABSTRACT

The purposes of this study were to compare students' achievements on multiple integrals comparing to 70 % criteria and to study students' attitudes toward cooperative learning plans on multiple integrals. The sample group was 12 students who enrolled in the Calculus and Applied 3 over the first semester academic year 2018. The instruments used including first, the cooperative learning plans on multiple integrals were combined with 5 steps as 1) introduction, 2) teaching, 3) conclusion, 4) expansion of ideas, and 5) evaluation. The second an achievement test which was subjective confidence in 0.79. The third was an attitude questionnaire for students toward cooperative learning plans on multiple integrals.

The results were concluded with the two main ideals that first, the students' achievement on multiple integrals as 70 percentages. The second the mean of students' attitudes toward cooperative learning plans on multiple integrals was at a good level.

Keywords: Cooperative Learning, Multiple Integrals

1. INTRODUCTION

In the education system, it must behold to the principle that all learners have their own abilities and capabilities to study and all learners are most significant. Education procedures must promote the learners to naturally develop to their full potential [1]. It must have aimed for the learners to develop and explore to acquire their knowledge according to each individual differences.

The content of multiple integrals is briefly detailed, including double integral on a closed rectangular area, iteration integrals, double integrals on any closed area, double integrals in polar coordinate systems, triple integral in rectangular coordinate systems. Most of content is about 3 dimensions. Students have to imagine about the 3 dimensions which are the weakest of the students in drawing graphs including looking at 3 dimensions. In addition, students do not have tools to help them write graphs and lack of interest in school hours.

In general, the teaching is a lecture style, teacher centered. On the other hand, students are not allowed to practice themselves in class according to their own abilities. Causing most students do not understand the content as they should. It causes the student's lack of interest in student learning, resulting in low achievement. From the research report about mathematics learning achievement on probability by cooperative learning STAD techniques of Mathayom Suksa 5 students preparatory school Suwinthawong, it showed that learning achievement after studying higher than before with statistical significance at the level of .05 [2, 3]. Development of the STAS cooperative learning in conjunction with the mathematical modelling affects mathematical problem solving abilities, teamwork behaviors, and attitudes toward Mathematics of Mathayom Suksa 4 students. It found that Mathayom Suksa 4 students who received STAS cooperative learning in conjunction with the mathematical modelling affecting mathematical problem solving abilities have the ability to solve mathematics problems through the criteria of 65 percent or more with statistical significance at the level of .05 [4].

The students 'effect on cooperative learning by achievement division with meta-cognition strategies on mathematics achievement and problem solving abilities of Mathayom Suksa 2 students found that students who learned by using cooperative learning as a group of supplementary achievement with metacognitive strategies have an average score after studying at least 75 percent. The average score after studying is higher than before studying [5].

From the above study, the researcher interested in studying cooperative learning as a method of teaching and learning focusing on students' performance as a small group with different abilities. It is to enhance the learning capacity of each person, to help each other to achieve the goals. In addition, it also promotes working together as a group. It is also developing emotional intelligence to be able to live with others happily.

2. OBJECTIVES

The objectives of this research are to:

(1) Compare students ' achievements on multiple integrals comparing to 70 % criteria

(2) Study students' attitudes toward cooperative learning plans on multiple integrals

The scope of this research is as follows:

(1) Scope on population

Populations were students who enrolled in the calculus and applied 3 over the first semester academic year 2018 in Suan Sunandha Rajabhat University.

(2) Scope on Content

This research used the content in multiple integrals.

(3) Scope on Variables

The researcher defined the variables as follows:

3.1) The independent variable was the cooperative learning plans.

3.2) The dependent variable was achievement score of multiple integrals, and attitude of the learners towards the cooperative learning t plans on multiple integrals.

(4) Scope on Time

The duration of this research was in the first semester of teaching.

3. METHODOLOGY

This research was designed as quasi – experimental with the sequence of steps in the research operations as follows;

1. Populations and Samplings

Populations were students who enrolled in calculus and applied 3 of Suan Sunandha Rajabhat University. The samplings were 12 students.

2. Tools and the Quality of the Tools

In this research the researcher created and tested the tools as follows:

2.1 The steps in developing cooperative learning plans:

(1) Educational theories about activities cooperative learning.

(2) Study concepts, principles, theories of learning and documentation related to cooperative learning.

(3) Create cooperative learning plans

(4) Three experts will examine the appropriateness of activities the content validity and choose activities that had IOC value greater than or equal to 0.6.

(5) Modified the cooperative learning plans as recommended by the experts.

(6) Take cooperative learning plans updated to experiment with sample.

2.2 The steps in developing achievement test:

(1) Studies the contents of multiple integrals, technical testing and evaluation.

(2) Create a table of content analysis to determine the question.

(3) Taken the question from section (2) together as a subjective test 8 items, the 3 experts will examine the content validity.

(4) To select items with the IOC greater than or equal to 0.6 with 5 items.

(5) The test form had the reliability value at 0.79 which was the value appropriate for the test to be with the sampling group.

2.3 The steps in developing attitude test:

(1) Studied the theories about the attitude.

(2) Built test questions showing the attitude towards plan activities learning that the form of 5 Likert's scale had 25 test questions.

(3) The written test questions were examined by 3 experts for content validity and also their recommendations.

(4) The test questions from section (3) which had the IOC greater than or equal to 0.6 passing the set criteria of 20 questions were modified according to the recommendation of the experts.

(5) Take attitude scales from section (4) ask students to the sample 12 people.

3. Data Collection

The research was conducted to collect data as follows.

3.1 Take cooperative learning plans was tried out with the sample.

3.2 Test of learning achievement on multiple integrals was placed to the sample.

3.3 Test the attitude with the samples after studying all the cooperative learning plans.

4. Data Analysis

The research was conducted to analyze the data as follows.

4.1 Compared with the 70 percent achievement test using a t- test.

4.2 Calculate the score of the student's attitude measurement test towards the cooperative learning plans.

4. RESULT OF THE STUDY

1. The mean value of student achievement was no significantly different at 70 % .

2. Students' attitudes towards the cooperative learning plans were at good level.

5. DISSCUSSION

The results of this research had classified into two main ideal as described at below.

First, the mean value of student achievement was no significantly different at 70 %, which meant that the students who were trained with the cooperative learning plans had the mean score on the achievement of the same score of the set value of 70 %.Due to the cooperative learning plans were arranged from easy to difficult respectively. Besides that, students are helping each other within the group. There is a clear five-step process, such as 1) introduction, 2) teaching, 3) conclusion, 4) expansion of ideas and, 5) evaluation. Besides that, students are helping each other within the group. There is a clear five-step process, such as 1) introduction, 2) teaching, 3) conclusion, 4) expansion of ideas and, 5) evaluation. Besides, there were exercises at the end of hours of each topic [6].

The second, the students' attitudes towards the cooperative learning plans were at a good level with the mean of 4.38 and the standard deviation of 0.36. However, if individual item found that students were helping each other within the group were very good ($\bar{x}$ = 4. 57, S. D. = 3. 4) and encourage students to learn by themselves were very good ($\bar{x}$ = 4. 56, S. D. = 3. 3). Bruner said that providing appropriate learning content mathematics that relates to students' lives are able to stimulate students' learning and thinking [7, 8].

6. ACKNOWLEDGEMENTS

This research was supported by Suan Sunandha Rajabhat University. Special thanks also extended to the student of SSRU who helped and support this research.

7. REFERENCES

[1] Office of Education Council. (1997). *National education*. The Prime Minister: Bangkok.

[2] Srichompoo, P. (2015). *Development of the STAS cooperative learning in conjunction with the mathematical modelling*. Retrieved from http://www.edujournal.ru.ac.th/AbstractPdf/2559-1-1_1475643705_23.pdf.

[3] Paisal, K. (2015). The Cooperative Learning Management in the Course of Principles of Mathematics for Graduate Level. *World Academy of Science, Engineering and Technology, International Journal*. n.p., n.p.p.

[4] Chinno, B. (2014). *Journal of Graduate Studies*. 11 (52), n.p.p.

[5] Boonchan, P. (2015). *Journal of Graduate Studies*. 12 (58), n.p., n.p.p.

[6] Paisal, K. (2016). *Result of active learning in elementary number theory*. Research and Development. Suan Sunandha Rajabhat University

[7] Seymour, B. J. (1966). *The Process of Education*. Cambridge: Harvard University Press.

[8] Pimthong, N. (2016). *Master of Education Curriculum and Instruction*, College of Education Dhurakij Pundit University.