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Recreational Mathematics Activities to Enhance Students' Mathematics Achievement and Learning Motivation

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Abstract. Recreational mathematics is an activity designed to make students happy to learn and understand mathematical concepts. This study aimed to determine the effect of the implementation of recreational mathematics on learning achievement and learning motivation by implementing recreational mathematics, and to find out how the application of recreational mathematics by grade 5 teachers of SD Negeri Bhayangkara Yogyakarta to foster a sense of joy in learning among their students. This research is one group pretest-posttest design. The research instrument used was a questionnaire, observation sheet, and test. This research shows the effect of the implementation of recreational mathematics on learning achievement and learning motivation significantly. This is based on the paired sample t-test for pretest and posttest data; it can be seen that the sig value is 0.000, and the average posttest score is 97.8571, and the pretest is 82.8571. The paired sample t-test on the motivation value also shows the sig value of 0.043, and the average final motivation value is 52.21, while the average initial motivation value is 49.07. Furthermore, there are efforts from the teacher to be able to implement recreational mathematics activities, namely the desire to develop other card games through materials from researchers.

Keywords: Recreational Mathematics, Learning Outcome, Learning Motivation

1. Introduction

By some students, mathematics as an unpleasant subject. Usually, considering mathematics as a challenging and boring subject, students' motivation to learn mathematics is low. The lack of motivation to learn mathematics occurs in grade 5 students at SD Negeri Bhayangkara Yogyakarta. This lack of motivation is indicated by the achievement of many mathematics scores that have not fulfilled the KKM. The assumption about the difficulty of learning mathematics often dominates students' thinking so that many of them are less interested in learning mathematics, and students are less motivated in learning mathematics.

The teacher's role is crucial in increasing student motivation. Learning will attract students' interest if the teacher presents material through various methods and activities. The use of the right approach will also determine the effectiveness and efficiency of learning. Mathematics learning needs to be done with a little lecture and use student-centered methods and emphasize student interaction. The use of various approaches will assist students in achieving mathematics learning goals.

Recreational mathematics is a fun activity that arouses students' interest in learning and understanding mathematical concepts [1]. Recreational mathematics is carried out for recreation (entertainment) rather than rigorous research and application-based professional activity. Although it is not necessarily limited to being an endeavor for amateurs, many topics in this field require no knowledge of advanced mathematics.

This study aims to determine the effect of the implementation of recreational mathematics on the learning outcomes of 5th-grade students of SD Negeri Bhayangkara Yogyakarta, to know the increase in learning motivation of 5th-grade students of SD Negeri Bhayangkara Yogyakarta towards mathematics, and to find out the efforts of the 5th-grade teachers of SD Negeri Bhayangkara Yogyakarta to apply recreational mathematics for can foster a sense of pleasure learning mathematics among students.

2. Method

This study uses an experimental research approach or experimental research. Kerlinger states the definition of an experiment as a scientific study in which the researcher manipulates and controls one or more independent variables and makes observations on the dependent variables to find variations that appear along with manipulating these independent variables [2]. Further explained, the manipulated variable is called the independent variable, and the variable whose effect will be seen is called the dependent variable.

The researcher chose to use an experimental research approach because it intends to examine the effect of a particular treatment on the symptoms of a specific group. The researcher will also see the group results whether there are differences in results after the treatment. The research design was a one-group pretest-posttest design using a sample of 5th-grade students at SD Negeri Bhayangkara.

6 Result and Discussion

The pretest and posttest data were analyzed through the paired sample t-test, namely, to obtain the results of the differences for each class. The results of the paired sample t-test analysis can be seen in Table 1 below:

Table 1. Paired Sample T-test Pre and Posttest Results

Paired Sample t-test	
t	Sig
5,140	0,000

Based on table 1 above, it is found that the test for differences in learning outcomes between obtained a significance value of 0.000, because the Sig. <0.05, it can be concluded that there is a difference, meaning that there is a difference. This is also evidenced by the results of the acquisition of the mean pretest score of 82.86 and the posttest score of 97.86, which means an increase in the value of learning outcomes.

The student learning motivation is also analyzed through descriptive statistics to see the average increase and the paired sample t-test. The results of the analysis are as follows:

Table 2. Categorization of Early and Late Motivations

Interval	Criteria	Number of Criteria Interval	
		Early	Late
$X \geq 52$	Very High	4	9
$40 \leq X < 52$	High	10	5
$28 \leq X < 40$	Moderate	0	0
$X < 28$	Low	0	0

In the initial conditions, most learning motivation levels were obtained in the high category, as many as ten students, and the very high category as many as four students. It is different when students have

implemented recreational mathematics learning, where the level of student motivation has increased. It is evident from the motivation level assessment results, where the majority have a very high category, as many as 10 students and others in the high category. It can be concluded that the existence of recreational mathematics learning can increase the level of student motivation to learn. Descriptive analysis of the pretest and posttest for the control class and the experimental class as listed below:

Table 3. Descriptive Statistics of Learning Motivation

Descriptive Value			
Early Motivation		Late Motivation	
Mean	SD	Mean	SD
49,07	4,57	52,21	3,58

Based on table 3 above, it is obtained that the initial student learning motivation assessment is 49.07 then after implementing recreational mathematics learning it increases to 52.21. It can be concluded that the level of student motivation after participating in recreational mathematics learning has increased, as evidenced by the acquisition of greater mean value when compared to conventional learning. Furthermore, the learning motivation data were also analyzed using the Paired Sample Test. The results of the Paired Test are as follows:

Table 4. Results of Paired Sample t-test Pretest and Posttest

Paired Sample t-test	
t	Sig
2,248	0,043

Based on table 4 above, it is obtained a test of the difference in learning motivation between before treatment and after implementing recreational mathematics. From table 4, it can be seen that the Sig value is obtained. 0.043, because the Sig value > 0.05, it can be concluded that there is a difference. This means that there is a significant difference between final motivation and initial motivation. So it can be concluded that learning motivation increases after participating in recreational mathematics learning.

4. Conclusion

4.1 *The influence of recreational mathematics approach to student learning outcomes.*

Through the paired sample test, the results of the pretest and posttest analysis showed a difference. This result explains that there is an effect of recreational mathematics learning methods using game cards.

4.2. *Increasing Student Motivation with Recreational Mathematics Approach.*

In terms of student learning motivation as measured through the form of learning motivation through the paired sample test, it appears that there is a real difference between initial motivation and final motivation, indicating an increase in student learning motivation. This definition is following the understanding of motivation, according to Purwanto [3], which states that learning motivation is the whole driving force in children that can generate enthusiasm or excitement in learning. By applying interesting mathematics learning methods will have an impact on the motivation of students to learn. Students who have high motivation will have an increased desire and desire to learn, as well.

4.3. *The teacher's efforts to foster a sense of joy in learning mathematics in students.*

Based on the teacher's observation form, it is stated that students enjoy learning to use recreational mathematics activities, namely through the addition of the denominated fraction card game. During the learning took place at home using a scenario prepared by the researcher and accompanied by the teacher and observer, the results showed that they were seen to be more active and enthusiastic in participating in mathematics learning. The recreational mathematics learning method uses card games. Students are

engaged in playing games and discussions in solving ongoing games. Students can learn mathematics in a fun way through the game method, and students can move freely during the game. This situation is following Ahmad Saefudin [4], opinion that the game method is a method used by teachers to present lessons by creating a fun, serious, but relaxed atmosphere without neglecting the lesson objectives to be achieved. The use of game card media in mathematics learning, according to the teacher, is interesting to use in education, students are very enthusiastic about participating in each learning process. Learning by using playing cards is a new experience for students because they can be used to study at home and their family members.

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