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Effect of Quantum Learning Model on Mathematics Learning Outcomes of Elementary School Students

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Abstract

The background of this research is the low learning outcomes on the content of learning mathematics in fourth grade elementary school students. The purpose of this study was to determine the differences in learning outcomes of the quantum learning model and the conventional learning model. This type of research is a quasi-experimental nonequivalent control group design. The population of this research is the fourth grade students of SD Negeri 2 Mowila and SD Negeri 5 Mowila as many as 83 students. The sample of this research is the fourth grade students of SD Negeri 2 Mowila (57 students) as the experimental group and the fourth graders of SD Negeri 5 Mowila (26 students) as the control group. The research findings indicate that the quantum learning model has an effect on students' mathematics learning outcomes. This is indicated by the results of the one sample t-test with sig. (2-tailed) of 0.00 (p 0.05). The effect of quantum learning model on mathematics learning outcomes with independent sample t-test test with sig value. (2-tailed) of 0.008 0.05.

Keywords: Quantum Learning Model, learning outcomes, mathematics.

A. Introduction

A learning process can be said to take place effectively if the learning members or students have experienced changes. Changes that occur in students can be seen through learning outcomes. To get maximum learning outcomes for students, it takes a teacher who is not only a transfer of knowledge, but can give meaning to students and also has the ability to carry out the learning process appropriately. Problems that are often found in learning in schools are allegations of low levels of student learning outcomes in learning. The essence of school activities is the teaching and learning process that will affect student learning outcomes. One of the successes of students in the learning process is learning outcomes that increase optimally along with the development of the curriculum set by the school (Yanuarti & Sobandi, 2016)

The low achievement in learning mathematics is also experienced by elementary school students in South Konawe Regency. This can be seen from the results of an interview with one of the principals in Mowila District, South Konawe Regency which shows that during the mathematics learning process students tend to be busy alone, not paying attention to the teacher in front, so that effectiveness is not visible in the learning process. In addition to problems that come from students, it turns out that there are also problems from the teaching staff, it can be seen that during the learning process the teacher is less effective in using the learning model, so that it does not attract the attention of students in following the lesson. Many factors affect student learning motivation, among others: student personality, learning environment and learning models applied by teachers. To improve the quality of the teaching and learning process, teachers need to understand the material, characteristics, students and modern learning models. Thus teaching and learning activities will be more varied, innovative and fun so that they can foster student learning motivation and a clear understanding of concepts will help students to be more enthusiastic in following the lessons delivered by the teacher (Fauzi & Noviatati, 2018)

So in this case the researcher applies the quantum learning model to mathematics subjects. The reason the researchers chose to apply the quantum learning model is because quantum is a learning model that changes the various interactions that exist in and around the learning moment. These interactions include elements for effective learning that influence student success (Deporter, Reardon, & Singer-Nourie, 2014).

Quantum learning is a set of methods and philosophies in which students learn like an electron in an atom, moving from one orbit to another on its skin trajectory (Hamzah & Muhlisrarini, 2014). Quantum learning is interactions that convert energy into light. All life is energy. And the purpose of learning is to get as much light as possible, interactions, relationships, and inspiration to produce light energy (Kosasih & Sumarna, 2013). Through quantum learning students will be invited to learn in a more comfortable and pleasant atmosphere, so that students will be more free to find new experiences in their learning. The results of observations on elementary school students have low mathematical abilities. This may be due to the learning process or learning model that is not appropriate by the teacher.

B. Methodology

The approach used in this research is a quantitative approach with a quasi-experimental type of research. The experimental research design used is the nonequivalent control group design. The two groups respectively applied the quantum learning model and conventional learning with the following design.

O_1	X	O_2
O_3	-	O_4

Keterangan :
O_1 : Pre-test kelas eksperimen
O_2 : Experimental class post-test
O_3 : Pre-test control class

O_4 : Control class post-test
X : The treatment in the experimental class is the quantum learning model
- : The learning model in the control class is the conventional learning model

The research population consisted of two schools, namely SD Negeri 1 Mowila and SD Negeri 5 Mowila. Sampling was taken from both schools, namely 1 class each, namely class IV with the assumption that statistically the ability variance was homogeneous, so that it was obtained that the fourth grade students at SD Negeri 1 Mowila consisted of 57 people and students at SD Negeri 5 Mowila consisted of 26 people.

The type of data analyzed is student learning outcomes data in the form of interval data. The data collection technique in this study used a written test consisting of pretest and posttest. Analysis of research data, namely descriptive statistics, N-Gain analysis, and inferential statistics using a different test (t-test).

C. Findings and Discussion

Findings

Descriptive Analysis

Before being given treatment, students were first given a pretest to determine their initial abilities and a posttest to find out the results of the meeting using the model, in the test 10 numbers were given about each.

Tabel 1. Hasil pretest dan postest

Statistics	Experiment Class			Control Class		
	pre	*post*	*N-Gain*	*pre*	*post*	*N-Gain*
Total	3460	4740	-	1720	1920	-
Mean	60.70	83.16	0,47	66.15	73.85	0.20
Standard deviation	23.51	13.64	-	18.12	14.44	-
Maximum value	100	100	-	100	100	-
Minimum Value	10	50	-	20	40	-

Based on the data in table 1, the data obtained the average N-Gain value of Mathematics learning outcomes for Experimental class students, which is 0.47. While the data on the average value of N-Gain in Mathematics learning outcomes for control class students is 0.20.

Statistics Prerequisite Test

Normality test of research data based on the results of the analysis of the Kolmogorov-Smirnov Z value of 1.103 and the Asymp value. Sig. (2-tailed) of 0.176 is greater than the value of = 0.05, which means that the research sample comes from a normally distributed population.

Homogeneity test of variance based on the results of the analysis of the Levene statistic value of 3.158 and the value of Sig. =0.079 is greater than = 0.05, thus both experimental and control class data have homogeneity of variance.

Hypothesis testing

Test the research hypothesis using the help of SPSS program calculation analysis which is described in the following table,

Table 2. The results of the different N-Gain tests between the Experiment and Control classes

No.	t-test	df	Sig. (2-tailed)
1	2.728	81	0.008

Based on the results of the SPSS output using the independent sample t-test on the N-Gain value in the experimental class and control class, a significance value of Sig. is 0.008 0.05, it can be concluded that the quantum learning model is better than the conventional learning model. This shows that there is an influence of the quantum learning model on the mathematics learning outcomes of fourth grade elementary school students.

Discussion

This research was conducted in 2 (two) schools involving an experimental class (SD Negeri 2 Mowila) and a control class (SD Negeri 5 Mowila) in class IV. The number of samples from the two schools was 83 students, consisting of 57 students at SD Negeri 2 Mowila in class IV (experimental class) and SD Negeri 5 Mowila in class IV with 26 students (control class). The learning given in the experimental class uses a quantum learning model and in the control class uses conventional learning or what is usually done by the teacher in the class.

Quantum learning is learning that is able to change the learning atmosphere to be lively, with all its nuances. Quantum learning also includes all the linkages, interactions, and differences that maximize learning moments (Deporter, 2014). Therefore, quantum learning is a set of learning methods where the learning atmosphere is designed as comfortable as possible so that students can learn with enthusiasm so that students are able to understand the learning materials that must be achieved optimally.

Based on the calculation of the N-Gain value of the experimental class and the control class, the average value of the experimental class is greater than that of the control class. The average N-Gain value in the experimental class is 0.47 which is included in the medium category and the average value in the control class is 0.20 which is included in the less category. The difference in the improvement of learning outcomes based on the average value of N-Gain between the experimental class and the control class is very much around 0.27. This is because the experimental learning class uses quantum learning, where in learning students learn individually where they can move to the next module if they understand scientifically and practically.

This study shows differences in student learning outcomes taught by the quantum learning model and conventional learning. Based on the results of the research that the quantum learning model is more influential than conventional learning, it is clear from the difference in the average N-Gain value of student learning outcomes taught by the quantum learning model and conventional learning.

This is because the quantum learning model is a set of learning methods where the learning atmosphere is designed as comfortable as possible so that students can learn with enthusiasm, so that students are able to understand the learning materials that must be achieved optimally. In this case, quantum learning is a learning activity that involves maximally from observing students to solve the problems they face during learning, and being able to understand learning materials with maximum enthusiasm.

Research conducted by Andini (2018) the quantum teaching learning model has a significant effect on student learning outcomes. The results showed that the research conducted by Andini gave the expected results in science subjects. A similar study was also conducted by Sitanggang (2019), the influence of the quantum teaching learning model on student learning outcomes on the theme of the area where I live in class IV SD Negeri 050600 Kuala in 2018/2019. And the results of the study showed an increase in learning outcomes that were satisfactory and met the target. From the two studies, it can be concluded that the quantum learning model can significantly improve student learning outcomes in the subjects or themes being taught.

D. Conclusion

Based on the results of the study, it can be concluded that there is an effect of the quantum learning model in improving mathematics learning outcomes for fourth grade elementary school students. This can be seen from the posttest average value of fourth grade students' mathematics learning outcomes at SD Negeri 2 Mowila in the experimental class and the posttest average value of fourth grade students' mathematics learning outcomes at SD Negeri 5 Mowila in the control class. applying the quantum learning model is higher than the average test of students' mathematics learning outcomes with conventional learning models. Thus the influence of the quantum learning model is very helpful for students in improving students' mathematics learning outcomes in the fourth grade elementary school mathematics learning process.

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