Quantum teaching learning model as solution to improve learning activity and mathematics learning outcome

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Abstract. Most of students at X class MIA 1 Senior High School PGRI 4 Denpasar can not reach the minimum requirements criteria. It’s caused of lack of attention of students on the learning process, and lack of collaboration of subject matter with student’s reality life. One effort can be taken to improve learning activity and Mathematics learning outcome was by apply Quantum Teaching Learning Model. This study aims to improve learning activity and Mathematics learning outcome students. This study was a classroom action research conducted in 2 cycles with the subject of research was all of students at X class MIA 1 Senior High School PGRI 4 Denpasar Lesson 2017/2018 which consists of 46 students. The objects in this study was learning activity and Mathematics learning outcome. Learning activity data obtained by observation sheet while data of Mathematics learning outcome obtained by test technique. The result of this study concluded that quantum teaching learning model is a solution to improve learning activity and Mathematics learning outcome of students especially at X class MIA 1 Senior High School PGRI 4 Denpasar. Other school which have similar problem can apply this model to solve the problem.

1. Introduction

Yurniawati stated that education can be interpreted as a conscious and planned to realize the atmosphere and learning to learner are actively developing personality, intelligence, morals and skills which required himself community of the nation and state [1].

Learning is a process of interaction with educators and learners learning resources in a learning environment. A learning environment is a system that consists of the elements of the purpose, materials, strategies, tools, learners, and teachers.

On the learning process, each student is expected to achieve results in accordance with the purpose of learning, such as the students able to understand and apply these concepts in daily life. In order to make the learning outcomes achieved, surely the students should have the interest and attention to the learning process. This allows the students takes part actively in learning, which will improve concept understanding of students towards the material and can apply them to daily life. On learning in senior high school in particular subjects of mathematics it is very important because the mathematics is universal underlying all fields of science as well as having an important role in the life.. Mathematics should be linked with the reality that is human activity and can be studied properly when accompanied by way of working on it.

Based on the results of the initial observations in class X MIA 1 senior high school PGRI 4 Denpasar retrieved that learning mathematics in the classroom and learning on the learning results is
also low. Teachers are still using conventional methods are monotone in the activities of the learning in the classroom so teachers dominate upon teaching and learning activities. The learning process is done on the target material achievements tend to curriculum, and more concerned with on memorization rather than understanding the concept. The lack of real learning media use when performing learning caused the learning is becoming less conducive. Another cause of the situation is less conducive classroom teachers have not managed to associate learning material to everyday life so that learners feel the subject matter of mathematics is less important in daily life.

With a less conducive learning conditions, the results of the analysis of daily test students at class X MIA 1 senior high school PGRI 4 Denpasar has not reached Minimum Criterion defined that is 70. Low level processes and students mathematics learning outcome is caused by several factors. As for these factors, namely the lack of attention the students while the teacher explained, the students are less active in the process of teaching and learning, the lack of collaboration of the subject matter with the realities of daily life of students, students working on the practice while joking around, and the students ignored the task given by the teacher.

One of the efforts to tackle it is by applying the right learning model. As for the learning model that can be used i.e. Quantum teaching learning model. Quantum teaching learning model applied in the process of Teaching-Learning of mathematics provides a fun learning activities for students and can activate the students in the classroom, it also has the benefits of coaching social ability learners so as to establish good cooperation with friends. The purpose of this research is to improve the learning activities the students learn math and results through the application of quantum teaching learning model.

2. Methods
This research is a classroom action research. The main objective of the research action class is to solve the problems that occur in the real class and increase the activities of real teachers in the development of his profession. All Wright and Bailey explain that classroom action research is a research centers on the classroom, and simply tries to investigate what actually happens inside the classroom [2].

The subject of this research is the students of class X MIA 1 senior high school PGRI 4 Denpasar with the object of research is the learning activities and the mathematics learning outcome. This research was conducted in two cycles, like the diagram below.

![Diagram of the classroom action research](image)

**Figure 1.** Diagram of the classroom action research [3]
The data collected in this research is data about the learning activity and the mathematics learning outcome. The data collected with learning activities observation sheet and mathematics learning outcome essay test. Further data were analyzed by calculating an average of the two data.

3. Result and Discussion

3.1 Learning Activity
The results of the data analysis of learning activity for the initial observation, first cycle and second cycle presented in the following table.

| Table 1. Summary of data analysis learning activity |
|---------------------------------------------------|
| Initial Observation | First Cycle | Second Cycle |
| Average score learning activities | 12.61 | 13.63 | 15.1 |
| An increase (%) | - | 8.1 | 10.79 |

From the table 1 above, seen that there is an increase of 8.1% in first cycle and amounted to 10.79% in second cycle. This result shows that there is a change in the learning activity to students after application of quantum teaching learning model. To see an increase in a more clear, the results in table 1 above can be presented on the figure 2 below.

![Learning Activity](image)

**Figure 2.** Diagram data learning activities

From the diagram above to see that first cycle happen to repair learning activities demonstrated by the increase in average score learning activities students. First cycle is the initial phase to apply quantum teaching learning model. On the learning process in the classroom, the students formed into heterogeneous groups. Some things be improved from an initial observation phase to first cycle is seen more enthusiastic students in the process of discussion groups. Especially for the students who have better cognitive ability, they tend to be active in exploring the concept being discussed. However there are a number of things still haven't been fullest in first cycle. For students with low cognitive abilities tend to be passive in discussion. They still assumed that the tasks that should be discussed fairly carried out by students who are just smart. This assumption is the reason less maximum learning activity the students on first cycle though it has improved from an initial observation. In addition on first cycle there is still a timid students to deliver the results of its discussions. They tend to fear if the results of the discussion they are wrong. In addition teachers are still not optimally maximize daily life concepts in learning.
Based on reflection of first cycle, some of the things done in second cycle, including with the addition of the concept of the daily life on the learning in the classroom. Some of the concepts most associated with daily life of students. The task given to the discussed in each group also made by incorporating daily life concepts students. It turns out that the addition of the concept of the daily life is capable of increasing the interest of students to join the discussions in the group. Students on the first cycle still looks reluctant to engage in discussion, on second cycle has already started to be attracted to join the discussion. In addition, in second cycle teacher always provide motivation and support in order that students have the courage to deliver the results of its discussions. Teachers also gave a positive reward for students who dare to present the results of its discussions even though their results there is still inappropriate. Some of these additions turned out to be able to maximize the learning activity of students. Learning activity are very closely related to the learning environment. This was confirm by the opinion of Djalil in 2015 which stated quantum learning models can explore students’ abilities freely and increase student responsibility [4]. In line with this result, Bahaddin in 2014 concluded that Quantum Learning Approach affected students’ academic achievement, retention and attitude mark in a positive way [5].

3.2. Mathematics Learning Outcome
The results of the data analysis of mathematics learning outcome for the initial observation, the first cycle and second cycle presented in the table 2 below.

| Table 2. Summary of data analysis the results of learning mathematics |
|---------------------------------------------------------------|
| Initial observation | First cycle | Second cycle |
| Average score learning activities | 60.65 | 63.58 | 68.91 |
| An increase (%) | - | 4.83 | 8.38 |

From the table above, it is seen that an increase in the students mathematics learning outcome of 4.83% in first cycle and 8.38% in second cycle. This result shows that there is a change on the students mathematics learning outcome after application of quantum teaching learning model. To see an increase in a more clearly, the results in table 2 above can be presented on the figure 2 below.

![Mathematics Learning Outcome](image)

**Figure 2.** Diagram of the data the results of learning mathematics
From the picture above looks obviously an increase in the mathematics learning outcome. On first cycle happen an increase of 4.83% of the initial observations. This was due to changes in the process of learning is done in the classroom. The model of learning which was done on first cycle is a Quantum teaching learning model. DePorter cited that the main concept of Quantum teaching learning models to "bring their world into our world, and drive our world into their world" [6]. This suggests that the learning in the classroom is done by hooking up with daily life of students. It was able to attract interest students. But in the first cycle, students mathematics learning outcome still do not meet the indicator of success. Constraints that occur on first cycle, namely (1) suboptimal daily life application in mathematical concepts, (2) the cultivation of the mathematical concepts in the process of discussion groups are not yet in full swing, (3) confidence of students has not been fullest so they still feel unsure at the moment given the end of the test cycle.

Constraints on first cycle was reflected and carried out improvements and additions in the learning process. Several improvements were made to the second cycle, namely, (1) disseminating more daily life concepts related to the teacher so that daily life application on mathematical concepts can be maximum, (2) Pack the learning process more interesting again, and (3) provide the motivation and confidence to students so that when the test is able to get maximum results. The effort – this fact is that efforts are being made to increase the students mathematics learning outcome of 8.38%. In addition, the mathematics learning outcome on second cycle has met success indicators so that research does not continue to the third cycle. This result is in accordance with the research conducted by Kusno. The research conducted by Kusno concluded that the learning achievement of student taught with quantum method is better than that of conventional method [7]. In line with that, research that conducted by Goman concluded that the application of the model Quantum Teaching can improve student learning outcomes on the fraction matter in class V SD PAB 8 Saentis Percut Sei Tuan in 2009/2010 [8].

4. Conclusion

Based on the results obtained, it can be drawn in the important thing, namely (1) the application of Quantum teaching learning model can improve students learning activities, which occur an increase of 8.1% in first cycle and 10.79% in second cycle, (2) the application of Quantum teaching learning model can improve students mathematics learning model, which occur an increase of 4.83% in first cycle and the second cycle at 8.38%.

From these results it can be concluded that the Quantum teaching learning model is one of the solutions to improve students learning activities and mathematics learning outcome. Other schools that have problems of the same or almost the same can apply this model to solve the problem.

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