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THE INFLUENCE OF QUANTUM TEACHING ON STUDENT'S LEARNING OUTCOMES ON THE THEME OF THE UNIVERSE

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ABSTRACT

This study aims to determine the influence of the Quantum teaching-learning model on the learning outcomes of class VII students on the theme of the Universe. The type of this research is Quasy Experiment with Nonequivalent Control Group Design. The research population is all students of class VII SMPN 13 Serang city. The sampling technique used was purposive sampling, which selected class VII G as the control class with Discovery learning and VII H as the experimental class with the Quantum teaching-learning model. Data was collected using a test technique in the form of pretest-posttest to measure cognitive learning outcomes and non-test in a questionnaire to measure affective learning outcomes and observation sheets to measure psychomotor learning outcomes. The collected data were analyzed using a t-test at a significance level of 0.05. The results showed an influence of the Quantum teaching-learning model on the learning outcomes of class VII students at SMPN 13 Serang city. In the control class, the average value of students' cognitive learning outcomes is 45 in the significantly less category, the percentage value of students' effective learning outcomes is 71% in the excellent category, and the percentage value of students' psychomotor learning outcomes is 56% in the less category. In experiment class, the average value of students' cognitive learning outcomes is 55 in the less category, the percentage value of students' effective learning outcomes is 79% in the excellent category, and the percentage value of students' psychomotor learning outcomes is 82% in the perfect category. Finally, the Quantum teaching-learning model influences the learning outcomes of class VII students.

Keywords: ***Quantum Teaching; Learning Outcomes; Cognitive; Affective; Psychomotor; The Universe***

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Introduction

The learning model is a structured framework that is used as a guide in learning activities because, in the learning process, some steps or procedures must be understood by every educator, so the teacher must make a learning plan that can support the learning process. It is based on (Huda, 2014) that the learning model must be considered a structural framework that can also be used as a guide to developing a conducive learning environment and activities. Aspects in each model can be used to design the curriculum. The choice should depend on the school environment, available resources, and desired outcomes.

Learning models that teachers have developed make it easy for students to understand and master specific knowledge or lessons. The development of learning models is very dependent on the characteristics of the subjects or material that will be given to students, so no particular learning model is believed to be the best learning model. It all depends on the situation and conditions (Shoimin, 2014). One learning model that can support students in understanding and mastering knowledge in the learning process is the Quantum teaching model. Quantum teaching is a learning model that prioritizes the convenience of students when following the learning process so that it can foster the meaning of learning. Quantum teaching is a set of learning methods and philosophies applicable to all ages (De Porter and M. Hernacki, 2015). Quantum teaching is an approach or learning strategy that can sharpen understanding and memory and make learning fun and helpful (Mulyasa, 2015). Based on this opinion, the Quantum teaching model can be used as an alternative to help students learn comfortably and pleasantly. In the process, students play an active role in learning so that it can foster the meaning of learning. A sense of comfort in learning is expected to encourage students' willingness to learn and improve learning outcomes.

Learning outcomes result from learning in skills, knowledge, values, and attitudes. Learning outcomes are abilities possessed by students after receiving their learning experience. Thus, learning outcomes are the potentials (mental and physical) formed in students and the education and teaching process (Kompri, 2017). Based on the author's observations at SMPN 13 Serang city, the average science subject scores have not yet reached the minimum completeness criteria (KKM), so many students still have to repair or remedy their scores. In addition, the willingness of students to learn is still lacking, which results in constrained teachers to condition the class while learning. This information shows that students' learning outcomes still lack the indicators of essential competencies as learning objectives. It makes students unable to focus on the learning process and find the meaning of learning, resulting in the studied material.

Based on (Susiani et al., 2013), students who participate in learning with Quantum teaching can learn in their way. Meanwhile, students who apply conventional learning in the control class look passive. Only a few are active and interact with other students and teachers. According to (Kusno and Joko, 2011), Quantum teaching is effective for teaching mathematics on linear program topics. Students' learning achievement prepared by the Quantum method is better than the conventional method. According to (Yahya, 2017), applying the Quantum teaching model significantly influences students' learning outcomes in biology subjects. The results of learning biology with the Quantum teaching model are better than those of learning biology with the direct learning model. Based on the description above, this research applies the Quantum teaching model as an alternative in learning to improve student's learning outcomes in VII grade on the theme of the Universe at SMPN 13 Serang city, and the control class used the Discovery learning because the teacher used that model in education before. The problem in this study is whether the Quantum teaching-learning model influences the learning outcomes of class VII students on the theme of the Universe at SMPN 13 Serang city. The study aims to determine the influence of the Quantum teaching-learning model on the learning outcomes (cognitive, affective, and psychomotor) of class VII students on the theme of the Universe.

Research Methods

The method used in this research is the quantitative method, and the type of research is Quasy Experiment and used Nonequivalent Control Group Design. The experimental and control groups were not chosen randomly (Sugiyono, 2010).

Table 1. Nonequivalent control group design

Class	Pretest	Treatment	Posttest
Experiment	O_1	X	O_2
Control	O_3	Y	O_4

(Sugiyono, 2010)

Note :

O1: Giving pretest to experiment class before treatment

O3: Giving pretest to control class before treatment

X: Giving treatment using the Quantum teaching model
Y: Giving treatment using the Discovery learning model
O2: Giving posttest to experiment class after treatment
O4: Giving posttest to control class after treatment

The research subjects consisted of 60 students, and this research was conducted in July-August 2019 at SMPN 13 Serang city. The instrument used in the study was a cognitive ability test instrument in the form of a pretest and posttest with as many as 15 questions (10 multiple choice questions and five description questions). Non-test (questionnaires, affective questionnaires, and psychomotor assessment observation sheets) were validated and suitable for use. In more detail, the research flow can see in Figure 1.

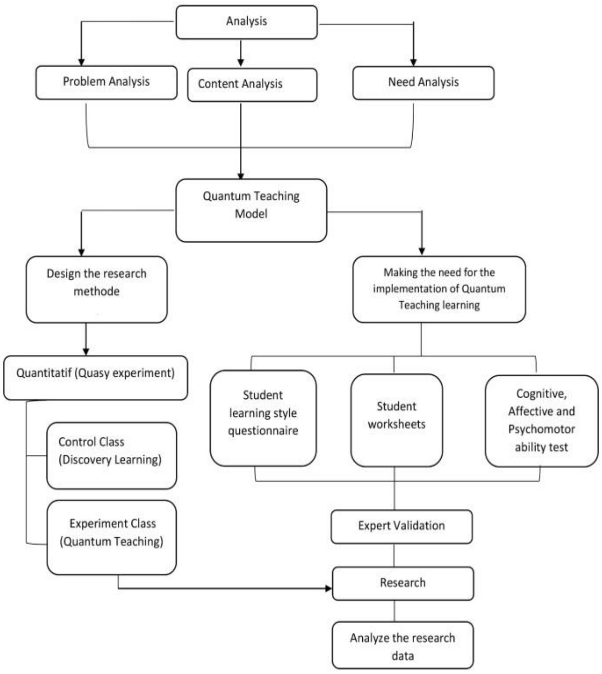

Figure 1. Research flow

Results and Discussion

The effect of quantum teaching models on cognitive learning outcomes

Assessment of cognitive learning outcomes for students of class VII H as an experimental class and class VII G as a control class is carried out individually and measured using a written test in the form of 10 multiple choice questions and five essay questions conducted at the beginning of learning (pretest) and after learning material (posttest). The difference in the average value of pretest-posttest cognitive abilities in the experimental class and the control class can see in Figure 2.

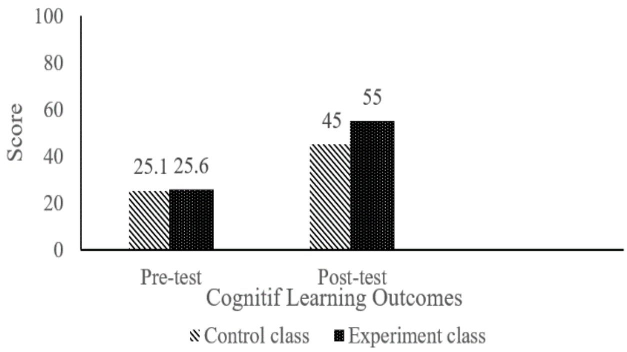

Figure 2. Average of pretest-posttest cognitive skill

Figure 2 shows that the average value of pretest-posttest students in the experimental and control classes has increased, but both values do not reach the KKM and are categorized as less. The experimental class obtained a pretest value of 25.6 with a posttest score of 55, while the control class obtained a pretest value of 25.1 with a posttest value of 45. There was an increase in cognitive ability in the experimental class. Students did a series of activities according to their learning style in the Quantum teaching process, forming an exciting and enjoyable learning process.

The results of post-test data processing after the prerequisite analysis was carried out showed that the data obtained did not meet the requirements because the data were not normally distributed. Furthermore, nonparametric statistics were used, namely the Man-Whitney U Test, and received a significance value (2-tailed) of 0.004 (<0.05). It can be concluded that there is a significant difference in the cognitive learning outcomes of experimental class students using the Quantum teaching model. with the control class using the Discovery learning model.

At the beginning of the learning activity, namely the growth stage, students read stories about the myths and facts about eclipses. Students look enthusiastic when reading the story, thus motivating students to study the theme of the universe. In the natural stage, the activity is continued by making the orbits of the planets. In the naming stage, they were compiling the puzzle of the characteristics of the solar system members. When assembling puzzles, each group member is actively involved in solving them to do puzzle activities, namely so that students can enjoy a fun learning process and can understand the material quickly. Still, the involvement of students in doing these activities makes students not focus on better understanding the material learning but rather consider these activities only as games in education.

This explanation is in line with the research of (Khatimah et al., 2018), which states that the Quantum teaching model allows all students to be directly and actively involved. Make them feel that the learning process is exciting and fun. According to (Shoimin, 2014), one of the steps in learning Quantum teaching is that the teacher must create a pleasant or encouraging learning atmosphere. Joy here means the rise of interest, full involvement, and the creation of meaning, understanding, and values that make students happy.

According to (Rohman et al., 2017), learning outcomes have not been maximally achieved in the implementation of Quantum teaching-learning. One of them is that many students are complacent in a pleasant learning environment, so they only play a lot. According to (Musnidar, 2014), the results of his research show no difference in student learning outcomes using the Quantum teaching model with the direct teaching model. According to (Rusmanto et al., 2014), the characteristics of the Quantum teaching model will be more suitable for processing the skills of students.

In the learning process in the control class, students did not play an active role in working together to answer questions in discussion activities. It causes the results of the cognitive abilities of the experimental class and the control class not to reach the excellent category. However, the cognitive learning outcomes significantly differed between the experimental and control classes. This explanation is proven based on the results of data processing using SPSS version 24 and the results of the Man-Whitney U Test.

Obtained a significance value (2-tailed) of 0.004 (<0.05). It can be concluded that there are significant differences in the cognitive learning outcomes of experimental class students using the Quantum teaching model and the control class using the Discovery learning model. The percentage of posttest scores based on cognitive ability levels is summarized in Figure 3.

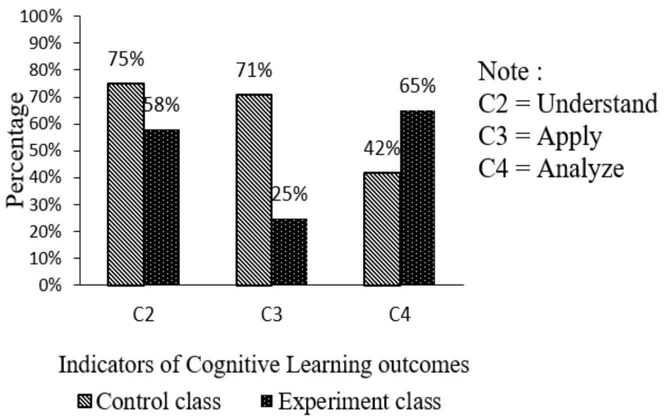

Figure 3. Percentages average of cognitive skills each indicator

Figure 3 shows the percentage of students at the cognitive ability level of understanding. The control class reached 75%, while the experimental class reached 58%. Based on the percentages, the level of knowledge of the control class achieved better results than the experimental class. The learning indicators at the level of understanding are "describe the characteristics of members of the solar system." To achieve these indicators, students in the experimental class in the naming stage carry out activities to compose a puzzle about the characteristics of the solar system members.

Each group gets a different puzzle arrangement followed by discussion and presentation activities. Each group listens to the results of discussions from other groups to understand the characteristics of the solar system members as a whole. Compiling puzzles can attract students' attention and create a comfortable and fun learning atmosphere. Students are expected to understand the characteristics of the solar system members more easily. However, these activities make students not focus on better understanding the learning material and assess the activity as nothing more than a game to be completed in the learning process.

Based on the opinion of (Wena, 2011), Quantum learning is a positive learning change with all its nuances. Include all the connections, interactions, and differences that maximize learning moments. According to (Rohman et al., 2017), learning outcomes have not been maximally achieved in the implementation of Quantum teaching-learning. One of them is that many students are complacent in a pleasant learning environment, so they only play a lot.

In the control class that uses the Discovery learning model, each group is assigned to discuss the answers to questions about the characteristics of the solar system members as a whole. Then the results are presented, and discussions and conclusions are made. In practice, students can understand the sub-material characteristics of solar system members. Because in the control class, there is cooperation in answering discussion questions from available sources and after hearing the discussion from the teacher.

Based on Figure 3, the percentage of experimental class students at the cognitive ability level at the applying level gets a percentage of 25%. The control class receives a percentage of 71%. The percentage result shows that the control class that uses the Discovery learning model has a more excellent value than the experimental class that uses the Quantum teaching model. Applying cognitive abilities can show students can use an existing procedure or method to carry out experiments or solve problems (Parwati et al., 2018).

The learning indicator at the applying level is "making planetary orbits." Students in the experimental class at the natural stage carried out simple, practical activities to make planetary orbits to achieve these indicators. The control class conducts discussion activities to answer questions about planetary orbits and describe them on student worksheets. Experimental class students have reached the indicator of making planetary orbits because they practice directly how planetary orbits can be formed. Still, students do not understand how to calculate eccentricity values correctly.

Making planetary orbits is done at the beginning of the study. Each group tends to focus on making orbits correctly rather than calculating the eccentricity value of the orbits that have been formed. In addition, the numbers specified in the questions are different from those at the time of learning, so only a few students can answer the questions on the cognitive level of applying (C3) correctly. This explanation is in line with the opinion of (Kuswana, 2012) that the context of "application" requires more understanding because students are faced with new situations by applying a summary of the results of previous thinking directly, without having to be told how to use it in that situation. The research illustrates that understanding an overview of a review does not guarantee that individuals apply it correctly.

In general, the control class can describe the shape of the planet's orbit. Some groups can calculate the exact value of the specified eccentricity. The control class focuses more on calculating the eccentricity of an orbit than on the correct shape of the orbit. It allows students to answer questions on the cognitive level of applying.

Based on Figure 3, the percentage of students at the cognitive ability level at the analyzing level (C4). The experimental class got a percentage of 65%, while the control class got 42%. The percentage results indicate that the level of cognitive ability to analyze in the experimental class is higher than in the control class. At the second meeting, the learning activities carried out by students in the experimental class were in the naming stage, namely listening to animated videos about eclipse events, then discussing the results on student worksheets.

At the demonstration stage, each group demonstrates the material they understand about the eclipse process. The activities of students in the experimental class using learning animation video media and demonstration methods can improve cognitive abilities at the level of analysis. It aligns with (Munadi, 2008), whose animated video media is included in audio-visual learning media. Videos can clarify abstract things and provide a realistic picture, develop the mind, develop imagination, and influence one's emotions.

According to (Parwati et al., 2018), demonstration learning is a practice or effort by using demonstrations. They were shown to students to make it easier to understand and practice what has been obtained and obtained. Modeling is also helpful in providing a clear picture of what material is being taught. The most important thing about this demonstration is that students are directly involved or can participate in activities because the experience will be stored in the students' long-term memory.

According to (Noviyanto et al., 2015), their research showed that after being treated with animated video media, experimental class students experienced a relatively high increase in biology learning outcomes. Learning activities carried out in the control class at the second meeting were conducting discussion activities. Discussion is a scientific conversation by several group members to exchange opinions about a problem and look for solutions to answers and the truth of a situation (Parwati et al., 2018).

Students in the control class discuss questions about the phases of the moon and eclipses. Then one of the groups presents the results in front of the class. The results of the presentation are concluded together. In the process, the discussion stage of the second meeting did not go well because several groups did not cooperate in answering questions.

The effect of the quantum teaching model on affective learning outcomes

Assessment of students' affective learning outcomes was measured using a Likert scale questionnaire which was arranged based on indicators of affective ability. The filling of the questionnaire was carried out after the learning activities. The difference in the average value of the effective ability questionnaire in the experimental and control class can be seen in Figure 4.

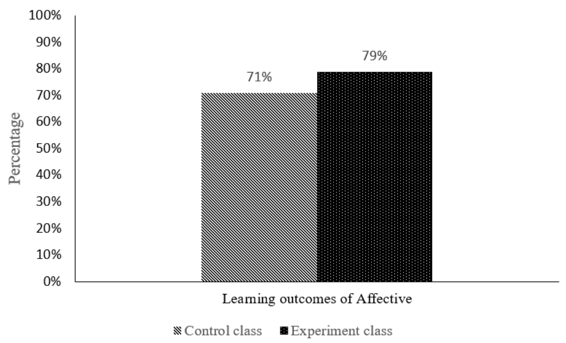

Figure 4. Average of affective skill percentages

Figure 4 shows that the average percentage of students in the experimental class is 79% which is included in the strong criteria. In comparison, the average percentage in the control class is 71% which is included in the strong category. The experimental and control classes occupy the strong category based on these compelling results. However, the average value of the experimental class's affective ability is greater than the control class. Different learning activities cause these differences. The experimental class that uses the Quantum teaching model is more active and can follow the learning in a conducive manner. It is because the stages of learning can attract the attention of students. Require students to collaborate not only to answer questions but also to complete activities based on learning styles. This explanation is based on the opinion of (Kosasih and Sumarna, 2013) that quantum learning emphasizes several strategies, one of which is teaching techniques.

The results of affective data processing after the prerequisite analysis showed that the data obtained were normally distributed but not homogeneous. The independent t-test for affective students was based on the significance value contained in the "Equal Variances Not Assumed" table and obtained a significance value (2-tailed), namely 0.005 (<0.05). It can be concluded that there is a significant difference in the effective learning outcomes of experimental class students using the Quantum teaching model with affective learning outcomes for control class students using the Discovery learning model.

(Acat and Ay, 2014), stated that there was a significant difference between pre-attitude and post-attitude scores in the group treated with Quantum learning. Hence, the Quantum teaching model positively affected students' attitudes. Students in the control class can play an active role in discussion activities but only at the beginning of learning. Students begin to feel bored discussing questions that affect their affective abilities of students. This explanation is proven based on the data processing results for the experimental and control classes, which are normally distributed but not homogeneous or not the same. Based on the results of hypothesis testing (t-test) at a significance level of 0.05. A significance value of 0.005 (0.005 <0.05) or equal to H_0 is rejected, and H_1 is accepted. It means that there is an effect of using the Quantum teaching model on the affective abilities of class VII students at SMPN 13 Serang city on the theme of the universe. These results are based on the main objectives of Quantum teaching-learning. Namely, increasing student participation through changing circumstances, motivation and interest in learning, memory, a sense of togetherness, listening power, and subtle behavior (Kosasih and Sumarna, 2013). The results of the percentage of affective abilities based on levels can be seen in Figure 5.

In Figure 5, the percentage of students at the level of affective ability received in the experimental class reached 78%, and the control class reached 74%, both of which included strong criteria. However, the percentage value of the experimental class achieved higher results because students in the experimental class showed a positive response to learning. Students can participate in learning activities in a conducive manner. It can be seen when the learning process of students is disciplined. They can also listen to the teacher's explanation well.

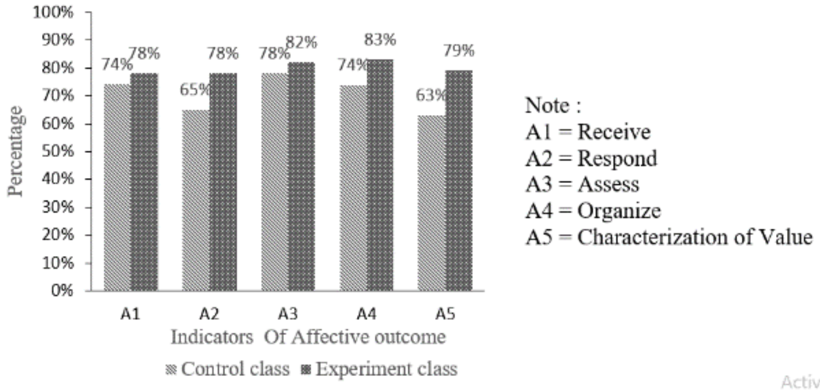

Figure 5. Average of affective skill percentages

This explanation is in line with (Khatimah et al., 2018). After students apply the Quantum Teaching model, they show an excellent response to learning physics after using it. The percentage achieved is 77%. Some students could participate in learning activities in the control class, but it was not conducive. Some students do not respond well during the learning process, especially during class hours after a break, and some students are not disciplined in entering class.

The percentage of students at the level of affective ability to respond to the experimental class reached 78%, while the control class reached 65%. Both are included in the strong criteria, but the percentage value of the experimental class achieves higher results. The experimental class and the control class carry out activities that require cooperation so that students can respond to learning activities well. In the experimental class, the activities are packaged as attractively as possible so that students can work well together, namely by doing puzzles.

In compiling puzzles, students are indirectly encouraged to be able to work well together and compete for cohesiveness among other groups, as well as discuss questions from the puzzles they get. This explanation is in line with (Izzati et al., 2017) using a puzzle-assisted learning model in their research. In the experimental class, puzzle media made students more active, enthusiastic, and enthusiastic in participating in learning. Students are also interested in participating in the learning process. Students are willing to observe and try puzzle media, conduct discussions, and work with their group friends. Students only focused on working together to solve the questions contained in the student worksheets in the control class. Only some members of the group took part in the discussion activities.

The percentage of students at the level of affective ability assessed that the experimental class reached 82%, while the control class reached 78%. Both belong to strong criteria. The difference in the percentage obtained by the experimental and control classes can be seen in students' attitudes toward working together on each learning activity. The experimental class shows that there is individual responsibility for each learning activity in the group, especially in making planetary orbits.

In the control class, individual responsibility when carrying out learning activities at the discussion stage is still not good. It is because some students tend not to help in solving questions. According to (Suparmanto, 2017), the activities of students during the implementation of the Quantum Teaching model got a good category. The percentage achieved is 81.7%. It means that the learning process is effective.

The percentage of students at the level of affective ability to organize the experimental class reached 83%, including very strong criteria. The control class reached 74%, including strong criteria—the difference in the percentage obtained by the experimental class. Overall, the students in the group carry out making planetary orbits according to the procedures on the student worksheets. In addition, the group average can complete the results of making planetary orbits in the allotted time.

In the control class, some students did not carry out discussion activities with their groups, so several groups could not complete the results of their discussions. In addition, some groups only have discussions with some of their group members. The achievement of this affective ability is in line with (Korniyati P. A. S et al., 2015) that the Quantum teaching model can make a good response during the learning process. Students can feel happy when learning. There is attention to the learning process and a better understanding of the work steps in practicum. It is easier to understand the material, and students are not bored during the learning process.

The percentage of students at the level of affective ability to characterize values or a complex set of values in the experimental class reached 79%, and the control class reached 63%. Both include strong criteria. In the experimental class, students can listen to their friends' opinions when presenting the results of the puzzle arrangement. The presentations delivered by each group are different, so it indirectly requires students to hear well the explanations of other groups.

In the control class, some students were not conducive to listening well. Because they already know the results of other group discussions that are not much different from the effects of their group discussions. The presentation time in the control class took place in the last hour of class, so it was difficult for students to be conditioned. The percentage level of characterization of affective ability values in the experimental class is in line with (Hermawan, 2017); students can focus their attention on the Quantum teaching-learning process and experience an increase in each cycle.

The influence of the quantum teaching model on psychomotor learning outcomes

The psychomotor assessment was measured using an observation sheet arranged based on indicators. Filling in the observation sheet is carried out during the learning process until the learning is complete and is carried out by the observer. The difference in the average value of psychomotor abilities in the experimental class and control class can be seen in Figure 6.

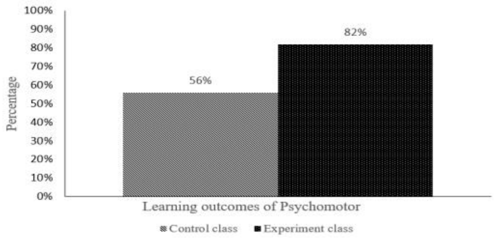

Figure 6. Average psychomotor skill percentage

In Figure 6, it is known that the average psychomotor percentage of students in the experimental class is 82%, including the very strong criteria. In contrast, the average percentage in the control class is 56%, including the excellent category. Based on the percentage value, it can be seen that the difference is caused by learning activities in the experimental class using the Quantum teaching model. The stages of the Quantum teaching model make students more active in learning. The activities carried out by the experimental class involve more physics, such as making planetary orbits, compiling puzzles, discussions, and demonstrations. In the learning process, good psychomotor abilities are formed.

The results of psychomotor data processing after the prerequisite analysis showed that the data obtained met the requirements; namely, the data were normally distributed and homogeneous. There is a significant difference between the psychomotor of the experimental class implementing the Quantum teaching model and the control class with the Discovery learning model.

In the opinion of (Said and Budimanjaya, 2015), in the demonstration strategy, students can experience the process of an event. Students demonstrate following the procedure, observing an object, analyzing, proving, and drawing conclusions about what they are studying. According to (Suparmanto, 2017), student activities during the implementation of the Quantum teaching model got an excellent category with 81.7%. It shows that the learning activities take place effectively. According to (Rohman et al., 2017), the average psychomotor value of students using the Quantum teaching model has increased from cycle one by 70% to 84% in cycle two.

In the control class, physical activity activities are carried out; students can be actively engaged through discussion activities to answer questions. However, in practice, the psychomotor abilities in the control class did not achieve good results because some students did not play an active role in discussion activities. This explanation is proven based on processing the psychomotor observation sheet data for the experimental and control classes with a normal and homogeneous distribution. Furthermore, the results of hypothesis testing (t-test) at a significance level of 0.05 showed a significance value of 0.000 (0.000 <0.05), which means that H_0 is rejected and H_1 is accepted. There is an effect of using the Quantum teaching model on the ability of psychomotor class VII students at SMPN 13 Serang city on the theme of the universe. The results of the percentage of psychomotor abilities based on levels are shown in Figure 7.

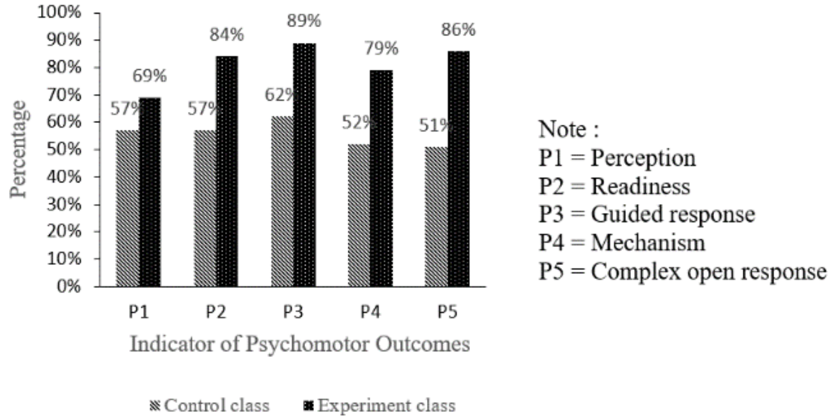

Figure 7. Average psychomotor skill percentages

Based on Figure 7, the percentage of students at the level of perceptual psychomotor ability in the experimental class reached 69% in the strong category. In comparison, the control class reached 57% in the moderate category. The perception level of the experimental class is at the growth stage in the Quantum teaching model. Students can read stories about myths and facts about eclipses so that they are motivated to learn more about the universe's material. Students can also listen to animated videos of eclipse events at the naming stage to express their understanding at the demonstration stage.

This explanation is in line with (Mikaningsih, 2014) that most of the students seemed enthusiastic during the initial learning activities using the stages of the Quantum teaching model. The level of perception in the control class reaches the good category. At the perception stage in the control class, some students could find the question's meaning well. In addition, students can also find the correct answers to questions during group discussions.

Based on Figure 7, the percentage of students at the level of psychomotor readiness in the experimental class reached 84%, with a very strong category. Meanwhile, the control class got 57% in the good category. There is a difference in the percentage of psychomotor readiness levels in the experimental class because some groups can prepare material tools before making planetary orbits and demonstrations of eclipses neatly. When explaining the discussion results, each student has a turn to present the results of their discussion.

Experimental class students can also show the results of making planetary orbits neatly. This explanation is in line with (Hermawan, 2017) that students who use the Quantum teaching model can improve the learning aspects of each cycle. In the second cycle of the second meeting, 92.9% of students could prepare writing instruments, and 78.5% of students could present the results of group work. The level of readiness of students in the control class reached sufficient criteria because some members in the group did not cooperate in discussion activities, especially in sketching planetary orbits.

Based on Figure 7, the percentage of guided-response psychomotor ability level students in the experimental class reached 89% in the very strong category. In comparison, the control class reached 62% in the strong category. The difference in the percentage is because, in the experimental class, students can manage learning activities very well. Students can complete the puzzle arrangement promptly, and during demonstration activities, each group can imitate the eclipse process correctly. It is in line with those (Hermawan, 2017), students who applied to the Quantum teaching model and can use teaching aids well, achieving an increase of 78.57% and can complete assignments on time with a rise of 82.14%.

In the control class, students can organize learning activities well. Each group can correctly answer questions and sketch the earth's rotation and revolution movement. However, the activities carried out exceeded the allotted time. And only some of the group members took an active role in the discussion activities. It makes the discussion activities not carried out optimally.

Based on Figure 7, the percentage of students at the level of psychomotor ability in the experimental class reached 79% in the strong category. In comparison, the control class reached 52% in the moderate category. The mechanism's ability in the experimental class is that students can convey the results of compiling the puzzle of the characteristics of the solar system members clearly and thoroughly. When demonstrating an eclipse event, students can show the umbra and penumbra regions correctly. This explanation is in line with (Khatimah et al., 2018), the application of the Quantum teaching model makes students interested and active when the learning process occurs. In the control class, some groups were able to present the results of their discussions compactly. Still, several groups' sketches or pictures of eclipse events looked incomplete and neat.

Based on Figure 7, the percentage of students at the open-response complex psychomotor ability level in the experimental class reached 86% in the very strong category. In contrast, the control class reached 51% in the moderate category. The difference in the percentage since, in the experimental class, students can arrange the puzzle arrangement correctly and neatly. They can adjust the position of the moon, sun, and earth props accurately and quickly. According to (Rusmanto et al., 2014), the Quantum teaching model is more likely to explore the psychomotor elements of students. In the control class, some groups sketched the movement of the earth and the moon but could not place the earth and moon correctly or on time.

Implementation of the quantum teaching model

Based on observations of the feasibility of learning Quantum teaching conducted by two observers, a percentage value of 100% was obtained with 14 indicators of the Quantum teaching stage. It shows that learning activities follow the lesson plan that has been made by researchers and influence student learning outcomes. The explanations for each stage of the Quantum teaching model are:

Grow

At the growth stage, activities are carried out to read mythical stories about eclipses in everyday life. From these activities, students can understand that what is learned in the universe's material is closely related to everyday life. Indirectly, teachers can enter their lives so that students are motivated to learn the material with high curiosity and full of enthusiasm for learning. It is easier for a teacher to guide students to understand science. In line with (De Porter and M. Hernacki, 2015) that everything is done within the framework of Quantum teaching. Every interaction, curriculum design, and instructional method is built on bringing their world into our world and delivering our world into their world. The point is the importance of entering students' world as the first step to getting the right to teach. Such action will allow teachers to lead, guide, and facilitate their greater awareness and knowledge journey. The trick is to relate what will be conducted with an event, thought, or feeling obtained from their home, social, music, artistic, recreational, or academic life.

Experience

In the experience stage, activities are carried out to form a planetary orbit in each group. This activity allows students to experience firsthand how a planetary orbit can be constructed so that they can understand abstract material into concrete. Students also get hands-on experience before studying the material further, making it easier for students to collect early learning information. In line with (De Porter and M. Hernacki, 2015), experience creates emotional bonds, and experience also makes mental questions that must be answered, such as why, how, and what. So the experience of building student curiosity creates these questions in their minds.

Naming

At the naming stage, puzzles were arranged, and presentation discussions and animated videos of the moon and eclipse phases were observed. From these activities, students can get the material content of the universe in a fun and meaningful way. Through the exercise of compiling puzzles, students do not feel bored in studying learning material. When observing learning videos, students can clearly understand the picture of the movement of the earth, moon, and sun that can cause an eclipse. According to (De Porter and M. Hernacki, 2015), naming is information, facts, formulas, thoughts, places, etc. Naming satisfies the brain's natural desire to identify, obey, and define. Naming is the time to teach concepts, thinking skills, and learning strategies.

Demonstrate

In the demonstration stage, demonstration activities of solar and lunar eclipses were carried out using small plastic balls, medium-sized bekel balls, and flashlights. Each group is required to be able to apply what has been understood from the naming stage. Students must be able to adjust the position of the earth, moon, and sun appropriately according to the concept of eclipse events. According to (De Porter and M. Hernacki, 2015), demonstrating allows students to translate and apply their knowledge to other learning.

Repeat

A question and answer activity from the universe material quiz was carried out at the repeat stage. Each group competes to answer ten questions from the material studied previously. The group that answers the most questions correctly gets a prize. This question and answer activity indirectly reminds them of what they have understood so that they repeat the previous material. According to (De Porter and M. Hernacki, 2015), repetition strengthens neural connections and fosters a sense of "I know that I know this."

Celebrate

At the celebration stage, it is carried out at every learning meeting and during certain activities, such as when students finish the discussion. Then each group must give an appreciation in the form of "cool pats" by clapping their hands twice and then putting their thumbs up. After ending the learning, a joint appreciation activity was carried out in the form of lively applause, and after the repeat stage, the group that could answer the most questions received a prize. According to (De Porter and M. Hernacki, 2015), celebration gives a sense of completion by respecting effort, perseverance, and success. If it is worth learning, it is also worth celebrating.

A supportive learning environment also assists the stages of the Quantum teaching-learning model. Environmental aspects that support the implementation of the Quantum teaching model are by installing pictures of the material being studied, namely images of the inner planets, outer planets, other celestial bodies, solar and lunar eclipses, moon phases, and so on. According to (De Porter and M. Hernacki, 2015), the classroom environment can affect students' ability to focus and absorb information. According to (Mulyaningsih et al., 2014), using the Quantum teaching model, which is carried out by the steps to grow, experience, name, demonstrate, repeat and celebrate, can improve science learning in third-grade students of SD Negeri Poncowarno.

The stages of Quantum teaching-learning that are applied to the universe theme can provide a pleasant learning experience—encouraging the willingness of students to learn with enthusiasm without coercion. It indirectly makes students show discipline in the classroom. The teacher controls the classroom atmosphere more easily to guide students to achieve good learning outcomes, which is incredibly effective.

A series of activities with the help of puzzle media, simple tools for making planetary orbits, learning videos, and demonstrations are activities that use a lot of physics. Students can be actively involved in learning from these activities, and the psychomotor results students become better. It is easier for students to learn the material presented because the learning process is fun. However, it is necessary to affirm the role of students in following each stage of Quantum teaching. It can make students more focused on understanding learning well.

Conclusion

The Quantum teaching model on the theme of the Universe influences the cognitive, affective, and psychomotor learning outcomes of grade VII students at SMPN 13 Serang city. The average value of students' cognitive learning outcomes in experiment class is 55 fewer categories. The value of the percentage of affective learning outcomes of students is 79% good category, and the value of the percentage of psychomotor learning outcomes of students is 82% very good category.

This research suggests that there is a need to affirm the role of students at the beginning of the Quantum Teaching model activities. Learning activities can be organized in a pleasant atmosphere but still focused on better understanding learning material and getting maximum learning outcomes, especially cognitive learning outcomes. The Quantum Teaching model should be carried out using research methods. That is more specific to the problem of learning in the classroom, such as classroom action research, so that the improvement in student learning outcomes can be more clearly observed from each cycle.

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