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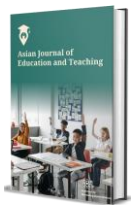

Improving Student Activities and Learning Outcomes in Mathematics Learning with the Quantum Learning Model at MI Mambaul Ulum Ranuwurung

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ABSTRACT

This study aims to improve student learning outcomes in mathematics learning using the quantum learning model. This study is a classroom action research that uses four steps, namely planning, action, observation and reflection. The subjects of this study were elementary school students. The data for this study were obtained using test and observation techniques. Tests are used to measure learning outcomes and observations are used to analyze teacher and student learning activities. The data analysis technique used in this study is descriptive statistics by comparing the results obtained with indicators of research success. The results of the study indicate that the quantum learning model can improve student learning outcomes in Islamic religious education learning. This can be seen from the increase in the percentage of student learning completion in each cycle with details of the pre-cycle 48.71%, the first cycle 66.39% and in the second cycle it increased to 89.66%. Thus, the use of the quantum learning model can be used as an alternative to improve student learning outcomes in mathematics learning.

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Introduction

By looking at the reality in the field that mathematics is one of the subjects taught from elementary school until children enter college. One of the discussions in mathematics learning so far is about the real world which is used as a place to apply a mathematical concept. As a result, students are less able to appreciate or understand mathematical concepts, and students have difficulty in applying the true meaning of mathematics in everyday life. This is because in mathematics learning there is a lot of number material that discusses recognizing numbers, place values and operations, and is often felt as a difficult and scary subject. This is possible because they are just learning about the concepts and symbols in numbers. Understanding the concept is the first step taken to move on to the next stage, namely about applications in mathematical calculations. So

understanding the concept is important to do before we move on to the application stage. Mastery of numbers for elementary school students is very important for the provision of studying other sciences at the next level. This is the task of a teacher who not only teaches but also has to instill the real concept of the material. By mastering solid basic concepts, it is hoped that this knowledge can last a long time in students' memories. Failure of education at the elementary level will lead to low quality education at the next level. Cultivating good and positive attitudes such as enjoying the mathematics subjects that will be taught in schools, will create enthusiasm for learning. Learning is a process that is marked by changes in a person. Learning is an active and purposeful process, not a passive process. Regular learning begins to be improved effectively.

Quantum Learning is a dynamic and innovative teaching model that focuses on maximizing student engagement and enhancing learning outcomes. It is based on the understanding that learning is most effective when students are actively involved in the process and when the learning environment is stimulating, supportive, and enjoyable. The model emphasizes the use of various strategies and techniques that promote deep engagement, critical thinking, and collaboration. By making learning fun and interactive, Quantum Learning aims to create a more impactful and memorable educational experience for students. One of the key principles of Quantum Learning is that the brain learns best when it is engaged through multiple sensory channels. This means that teachers are encouraged to use a variety of teaching methods, such as visual aids, hands-on activities, storytelling, music, and movement, to keep students actively engaged. By appealing to different learning styles, the model ensures that all students have an opportunity to connect with the material in a way that suits their unique preferences.

Another important aspect of Quantum Learning is the creation of a positive and motivating classroom environment. The model emphasizes the importance of building strong relationships between students and teachers, as well as fostering a sense of community within the classroom. When students feel supported, respected, and valued, they are more likely to take risks, ask questions, and participate actively in class activities. This positive atmosphere also helps reduce anxiety and stress, allowing students to focus more effectively on their learning. Quantum Learning also encourages teachers to be facilitators rather than traditional lecturers. In this model, the teacher’s role is to guide students through the learning process, providing them with opportunities to explore, inquire, and discover concepts on their own. Instead of simply delivering information, teachers create opportunities for students to engage in problem-solving, critical thinking, and group discussions. This approach fosters a deeper understanding of the material and encourages students to take ownership of their learning.

In addition to fostering student engagement and active learning, Quantum Learning also emphasizes the importance of reflection and self-assessment. Students are encouraged to regularly reflect on their learning, identify areas where they need improvement, and set personal goals for growth. This reflective process not only helps students consolidate their understanding but also promotes a mindset of continuous improvement. By regularly assessing their progress, students develop greater self-awareness and take responsibility for their own learning. Collaboration and teamwork are also central components of Quantum Learning. Students are encouraged to work together in pairs or small groups to solve problems, discuss ideas, and share their insights. This collaborative approach not only helps students deepen their understanding of the material but also promotes the development of social and communication skills. Through teamwork, students learn how to negotiate, share perspectives, and support one another's learning, which fosters a sense of community and enhances the overall classroom dynamic.

The model also incorporates the use of positive reinforcement to motivate students and celebrate their achievements. Teachers are encouraged to recognize students' efforts and progress, providing praise and encouragement throughout the learning process. This positive reinforcement helps build students' confidence and reinforces the idea that learning is a rewarding and enjoyable experience. As a result, students feel more motivated to continue working hard and striving for success. Finally, Quantum Learning is a flexible model that can be adapted to a wide range of subjects and age groups. Whether in elementary schools, high schools, or even adult education settings, the principles of Quantum Learning can be applied to create a more engaging and effective learning environment. By combining innovative teaching techniques, positive reinforcement, and a focus on student-centered learning, Quantum Learning helps students not only improve academically but also develop essential life skills such as critical thinking, problem-solving, and collaboration.

Mathematics teaching in elementary schools is very important, the goal is to grow and develop numeracy skills as a tool that can be used in daily activities and to develop students' abilities that can be transferred through mathematical activities. Based on the results of the daily test of Mathematics subjects with indicators of addition and subtraction of integers on August 4, 2019, the average score was 5.38 and there were 3 students who got scores above the average. Therefore, the author reflected on himself, discussed with colleagues and finally agreed on this problem to be studied. In addition, this problem is a real problem faced by researchers in learning tasks in the classroom, so it should be done corrective action through Classroom Action Research. The researcher chose the Quantum Learning learning model because the researcher considered this learning model the most effective for improving learning quantitatively and qualitatively. The researcher took the title "Improving the Activities and Learning Outcomes of Grade VI Students in Number Arithmetic Operations Through the Quantum

Learning Learning Model at MI Mambaul Ulum Ranuwurung, Randuagung District, 2019/2020 Academic Year"

Methods

This study uses Classroom Action Research (CAR). According to the PGSM Project Coaching Team, CAR is a form of reflective study by the perpetrators of the action carried out to improve the rational stability of their actions in carrying out tasks, deepen understanding of the actions taken, and improve the conditions in which the learning practice is carried out (in Mukhlis, 2000: 3). In accordance with the type of research chosen, namely action research, this study uses the action research model from Kemmis and Taggart (in Titik Sugiarti, 1997: 6), which is in the form of a spiral from one cycle to the next. Each cycle includes planning, action, observation, and reflection. The steps in the next cycle are revised planning, action, observation, and reflection. Before entering cycle 1, preliminary actions are carried out in the form of problem identification. Research instruments are tools or facilities used by researchers in collecting data to make their work easier and obtain better results, in the sense that they are more complete and systematic so that they are easier to process Suharsini Arikunto (2002:136) The instruments used in this study include: 1) Syllabus. Namely a set of plans and arrangements regarding classroom management learning activities, and assessment of learning outcomes; 2) Learning Implementation Plan (RPP). Namely a learning tool used as a guideline for teachers in teaching and is compiled for each round. Each RPP contains competency standards, basic competencies, indicators of learning achievement and teaching and learning activities; 3) Student Activity Sheet.

This activity sheet is used by students to assist in the process of collecting experimental data. This test is compiled based on the learning objectives to be achieved, used to measure the ability to understand science concepts on the subject of human blood circulation. This formative test is given at the end of each round. The form of questions given is descriptive (subjective). Observation, which is commonly referred to as observation in the psychological sense, includes the activity of paying attention to an object using all the senses. According to Arikunto (2006:29) the most effective observation is to complete it with an observation format or form. As an instrument containing items about events or behaviors that are described as happening. For example, observers want to know the students' activeness in the teaching and learning process in class VI MI Mambaul Ulum Ranuwurung, then the observation in this study contains notes on observations of students' behavior while carrying out the learning process.

Quantum Learning is a learning model based on empirical experience that everything forms the learning event including the teacher, the psychological condition of the "learner", the environment, the atmosphere of the learning process determines the success of the learning process. Learning activities are a series of learning activities

carried out in the classroom, the teacher acts as an educator and students as learners. A series of learning activities include various activities ranging from planning, implementing actions, observation, reflection and evaluation. The emphasis of the learning process is based on the experience of students, where learning is a continuous process and has continuous implications. The experiences that students have are brilliant ideas, but the teacher's job is not only to convey new ideas but also to eliminate or renew existing student ideas. Learning outcomes are the abilities that students have after carrying out the learning process which are marked by changes in behavior and can be measured through tests and the results can be shown in the form of grades. The tool used in assessing student learning outcomes is a written test. The level of success of this learning can be achieved if the completeness of the learning outcomes meets the predetermined criteria. To determine the effectiveness of a method in learning activities, data analysis needs to be conducted.

This study used a qualitative descriptive analysis technique, which is a research method that describes reality or facts according to the data obtained with the aim of determining the learning achievements achieved by students and also to obtain student responses to learning activities. There are two categories of learning completeness, namely individually and classically. Based on the instructions for implementing the 1994 curriculum (Depdikbud, 1994), a student has completed learning if he has achieved a score of 65% or a value of 65, and a class is said to have completed learning if in the class there are 85% who have achieved an absorption capacity of more than or equal to 65%. With this recapitulation, the author knows the increase in students' abilities in the subject of mathematics, the main topic of integers. From the learning plan that is carried out, it is hoped that students will have the abilities as expected. Furthermore, conclusions are drawn after the learning process is carried out and learning is repeated by paying attention to reflection (analysis, synthesis and assessment of observation results) to carry out further plans and actions).

The research on improving student activity and learning outcomes in class VI for arithmetic operations through the Quantum Learning model at MI Mambaul Ulum Ranuwurung follows a methodical approach designed to assess the impact of this teaching strategy. The study adopts a quasi-experimental research design, which is commonly used in educational research to investigate the effects of an intervention while maintaining a degree of control over variables that might influence the results. In this case, the intervention is the application of the Quantum Learning model in teaching arithmetic operations.

The study involves two groups of students: an experimental group and a control group. The experimental group receives lessons on arithmetic operations using the Quantum Learning model, while the control group is taught using traditional teaching methods. Both groups are pre-assessed before the intervention to determine their baseline knowledge of arithmetic operations, and then they undergo post-assessment

after the intervention period to measure any changes in their activity levels and learning outcomes. The assessment tools include written tests, quizzes, and observational checklists to measure student engagement and the accuracy of their arithmetic calculations. To ensure the validity and reliability of the results, the study collects data through multiple sources. Observations of classroom activities are conducted to monitor the level of student engagement and participation during lessons. Teachers note the extent to which students are actively involved in the learning process, such as asking questions, working collaboratively in groups, and applying arithmetic operations during problem-solving activities. Additionally, students' performance on assignments, quizzes, and tests are analyzed to determine the impact of the Quantum Learning model on their academic achievement.

The data collected is then analyzed using both qualitative and quantitative methods. Quantitative data, such as test scores and quiz results, are analyzed using statistical techniques to determine whether there is a significant difference in the learning outcomes between the experimental and control groups. Qualitative data, such as observations of student engagement and feedback from both teachers and students, are analyzed to gain insights into how the Quantum Learning model influences student behavior, motivation, and interaction during lessons. To further enrich the study, interviews with teachers and focus group discussions with students are conducted. Teachers provide feedback on how the Quantum Learning model affects their teaching practices and their perceptions of student learning. Students share their experiences with the new teaching methods, discussing how the interactive and engaging nature of Quantum Learning impacted their learning process. These qualitative insights complement the quantitative findings and offer a more comprehensive understanding of the model’s effectiveness.

The research also includes a pre- and post-intervention comparison to measure changes in students' motivation, engagement, and academic performance. Surveys and questionnaires are distributed to students to assess their attitudes toward mathematics before and after the intervention. The analysis of these surveys helps identify whether the Quantum Learning model has a positive effect on students' motivation to learn arithmetic and their overall attitudes toward mathematics as a subject. Finally, the study concludes with a set of recommendations for educators and school administrators. The findings provide valuable insights into the benefits of incorporating the Quantum Learning model into the teaching of arithmetic operations. By analyzing both the academic results and the behavioral changes in students, the research offers evidence-based suggestions on how to improve teaching practices and enhance student learning outcomes in mathematics classrooms. This research method allows for a detailed examination of the effectiveness of the Quantum Learning model, focusing not only on the measurable academic improvements but also on the deeper, more qualitative changes in student engagement and motivation. The results contribute to the growing

body of knowledge about innovative teaching methods and provide practical recommendations for enhancing learning in elementary school settings.

Result

The research data obtained were in the form of test results of test items, observation data in the form of observations of learning management with experimental methods and observations of student and teacher activities at the end of learning, and student formative test data in each cycle. Cycle 1 was carried out on Wednesday, August 13, 2019. The planning and implementation of PTK learning cycle 1 are described in the Learning Implementation Plan 1 (RPP-1) attached to this report. In accordance with the rules of PTK, the procedure for implementing PTK cycle 1 starts from planning, action, observation and analysis and ends with reflection. Based on the data obtained in the implementation of Mathematics learning about the previous chapter, PTK needs to be implemented because the student success rate is only 26%. Only 3 students have results above the KKM (Minimum Completion Criteria) or above 70, while 14 other students are below the KKM. Together with the supervising teacher as an observer, the researcher observed the implementation of learning using an observation sheet and documented and discussed the shortcomings and weaknesses that existed to be improved so that the next learning achieved maximum results and learning objectives could be achieved. The observation steps carried out are as follows: 1) Observing student behavior during experiments; 2) Observing teacher behavior in learning; 3) Observing student activities in learning.

From the table above, it can be explained that by applying the Quantum learning model, the average value of student learning achievement was 57 and learning completeness reached 41% or 7 out of 17 students had completed learning. These results indicate that in the first cycle, classically, students had not completed learning, because students who obtained a score of ≥ 65 were only 41% smaller than the desired completion percentage of 85%. This is because students still feel new and do not understand what the teacher means and uses by applying the Quantum Learning model. At this stage, the researcher prepared learning devices consisting of RPP 2, LKS, 2, formative questions 2 and supporting teaching tools.

The implementation of teaching and learning activities for cycle II was carried out on August 20, 2019 in Class VI with 17 students. In this case, the researcher acted as a teacher. The teaching and learning process refers to the lesson plan by paying attention to revisions in cycle I, so that errors or deficiencies in cycle I are not repeated in cycle II. Observations are carried out simultaneously with the implementation of teaching and learning. From the data presentation above, it can be explained that by implementing the Quantum Learning learning model, student learning activities have increased rapidly, students feel happy because learning is like playing, not always seriously reading books or just listening to teacher lectures. At the end of the teaching and learning

process, students are given formative test 2 with the aim of determining the level of student success in the teaching and learning process that has been carried out. From the table above, the average value of student learning achievement is 78 and learning completeness reaches 88% or there are 15 students out of 17 students who have completed learning. These results indicate that in cycle II, classical learning completeness has experienced a significant increase from cycle I. There is an increase in student learning outcomes because after the teacher informs that at the end of each lesson there will always be a test so that at the next meeting students are actively learning. In addition, students have also begun to understand what the teacher means and wants by implementing the Quantum Learning learning model. From the summary of the Mathematics test results, it shows that before the classroom action was carried out using the Quantum Learning learning model, the average score was 61. However, after conducting classroom action research using the Quantum Learning learning model in Mathematics lessons, students at SDN Wonogriyo 01 experienced a significant increase.

In a Grade 6 mathematics lesson on the addition and subtraction of fractions, the teacher uses the Quantum Learning model to engage students in an active and interactive learning experience. To start, the teacher energizes the class with a fun, upbeat math song that gets the students moving and excited about the lesson. The teacher then connects the topic to a real-life scenario by asking, "Have you ever shared a pizza with friends? How do you divide it into equal slices?" This question gets the students thinking about fractions in a context they can relate to. The teacher then introduces the lesson by showing fraction circles and asks students to work in pairs to manipulate the pieces, adding and subtracting fractions. Instead of simply explaining the steps, the students actively participate by physically moving the fraction pieces to find solutions. This hands-on approach helps students grasp the concept better. Throughout the lesson, the teacher encourages collaboration, allowing students to discuss their strategies with one another. At the end of the lesson, students reflect on what they've learned by answering questions like, "How is adding fractions with the same denominator different from adding fractions with different denominators?" The teacher wraps up the lesson by praising the students for their efforts, reinforcing positive behaviors, and providing feedback to help solidify their understanding. This approach keeps students engaged, makes the learning process more enjoyable, and helps them better retain the knowledge of adding and subtracting fractions.

Based on data analysis, it was obtained that student activity in the learning process in each cycle increased. This has a positive impact on student learning achievement, which can be shown by the increase in the average value of students in each cycle which continues to increase. Based on data analysis, it was obtained that student activity in the Mathematics learning process on the subject of integers with the Quantum Learning learning model, the most dominant is paying attention to teacher

explanations, doing activities with instructions in the Worksheet and discussions between students/between students and teachers. So it can be said that student activity can be categorized as active. Meanwhile, teacher activity during learning has carried out learning steps with the Quantum Learning learning model well. This can be seen from the teacher's activities that appear, including guiding and observing students in working on LKS activities/finding concepts, explaining, giving feedback/evaluation/questions and answers where the percentage for the above activities is quite large.

Discussion

Improving student activity and learning outcomes in class VI for arithmetic operations through the Quantum Learning model at MI Mambaul Ulum Ranuwurung has been an area of focus in enhancing educational practices. Quantum Learning is an innovative and dynamic approach to teaching and learning that emphasizes student engagement, active participation, and creating an enjoyable and supportive environment for students. By utilizing this model, teachers aim to improve both the motivation and academic achievements of students, particularly in mastering mathematical concepts like arithmetic operations. The Quantum Learning model operates on several key principles that help to increase the activity and enthusiasm of students. The first principle of Quantum Learning is that learning should be an exciting and stimulating process. In this regard, teachers at MI Mambaul Ulum Ranuwurung use various strategies to create a learning environment that is interactive, fun, and full of energy. By making lessons engaging, students are more likely to actively participate in class and develop a deeper understanding of arithmetic operations.

In addition to creating an exciting learning atmosphere, the Quantum Learning model places emphasis on connecting lessons to real-life contexts. For students to grasp the importance and relevance of arithmetic operations, teachers provide them with practical examples from daily life. For example, students might learn how to calculate change while shopping or solve problems related to dividing food portions. This real-world connection helps students understand how arithmetic skills are useful beyond the classroom and increases their motivation to learn. The role of the teacher in Quantum Learning is not merely as a lecturer but as a facilitator who guides students through the learning process. Teachers in this approach encourage active involvement from the students by asking open-ended questions, providing opportunities for group work, and encouraging critical thinking. Instead of simply delivering information, teachers in this model create opportunities for students to explore, experiment, and discover concepts for themselves, which leads to a deeper and more meaningful understanding of arithmetic operations. One of the key aspects of Quantum Learning is the use of varied teaching methods to cater to different learning styles. Not all students learn in the same way, so it is important for teachers to incorporate diverse strategies to meet the needs of all students. In this case, teachers at MI Mambaul Ulum Ranuwurung may use visual aids, hands-on activities, and interactive lessons to help students better understand arithmetic operations. Some students may grasp the concept more easily through visual representation, while others may benefit from working with physical objects to solve problems.

Another strategy employed in Quantum Learning is the use of positive reinforcement to motivate students. When students demonstrate progress in their learning, teachers offer praise and recognition to celebrate their success. This positive reinforcement not only boosts students' confidence but also encourages them to continue striving for success. As a result, students feel more empowered to take risks in their learning and are motivated to keep improving their arithmetic skills. Group work and collaboration also play an essential role in the Quantum Learning model. In this model, students are encouraged to work together in pairs or small groups to solve problems and complete tasks. Group work fosters teamwork and communication skills while allowing students to learn from each other. For instance, when solving arithmetic problems, students might discuss different strategies for performing calculations, which helps them learn multiple methods for approaching a problem. Working in groups also creates a sense of community within the classroom, where students support each other's learning.

In addition to group work, the Quantum Learning model emphasizes the importance of movement and physical activity in the classroom. Research has shown that physical movement can help improve focus and retention. Teachers may incorporate activities such as "brain breaks," where students engage in short physical exercises or games to refresh their minds and bodies. These activities help maintain students' energy levels and improve their concentration, leading to better performance in arithmetic tasks. To ensure that students are making progress in their learning, formative assessments are an integral part of the Quantum Learning model. Teachers use ongoing assessments, such as quizzes, group discussions, and problem-solving activities, to gauge students' understanding and provide immediate feedback. These assessments help identify areas where students are struggling and allow teachers to provide targeted support to help them overcome difficulties. The use of formative assessments also enables teachers to adjust their teaching strategies as needed to meet the needs of the students. Another important element of Quantum Learning is creating a positive and supportive classroom environment. When students feel safe, respected, and encouraged, they are more likely to take risks in their learning and engage actively in lessons. Teachers in this approach work to build strong relationships with their students and create an atmosphere where mistakes are seen as opportunities for growth rather than failures. This nurturing environment helps students develop confidence in their abilities, leading to improved academic outcomes in arithmetic. The integration of technology is another aspect of Quantum Learning that can enhance students' learning experiences. By incorporating digital tools such as interactive whiteboards, educational apps, or online math games, teachers can make lessons more engaging and accessible. These technologies provide students with interactive ways to practice arithmetic operations and receive instant feedback, which can help reinforce learning and improve their understanding of mathematical concepts.

Furthermore, the Quantum Learning model emphasizes the importance of student reflection in the learning process. After completing an activity or lesson, students are encouraged to reflect on what they have learned and how they can apply the new knowledge in the future. This reflection helps students consolidate their understanding and internalize the material, making it easier to recall and apply the information in the future. Teachers also encourage students to set personal learning

goals and track their progress, which fosters a sense of ownership over their learning. In the context of arithmetic operations, Quantum Learning has proven to be effective in helping students grasp mathematical concepts more effectively. Through engaging activities, real-world applications, and collaborative learning, students are better able to understand and apply the principles of arithmetic. They also become more confident in solving problems and more motivated to continue improving their skills.

Moreover, the active learning techniques used in Quantum Learning help students retain information more effectively. When students actively participate in the learning process through activities such as problem-solving, peer discussions, and hands-on experiences, they are more likely to remember the concepts and apply them in different contexts. This leads to improved learning outcomes in arithmetic operations and other areas of study. As a result of using Quantum Learning, students at MI Mambaul Ulum Ranuwurung have shown noticeable improvements in both their engagement and academic performance in arithmetic. Teachers have observed that students are more enthusiastic about learning and are better able to solve arithmetic problems with greater accuracy and confidence. This improvement is a direct outcome of the engaging, interactive, and student-centered approach of Quantum Learning. The effectiveness of Quantum Learning in improving student activity and learning outcomes can also be seen in the increased participation of students in class discussions and activities. Students who were once passive learners have become more active participants in the learning process, asking questions, sharing ideas, and collaborating with their peers. This increased engagement has not only helped them improve their arithmetic skills but also developed their critical thinking and problem-solving abilities.

In addition to academic achievements, the social and emotional growth of students has also been enhanced through the use of Quantum Learning. By fostering collaboration, communication, and positive reinforcement, students have developed stronger relationships with their peers and a greater sense of belonging within the classroom. This positive classroom environment has helped to reduce anxiety and stress related to learning, creating a more conducive atmosphere for academic success.

Another significant result of using Quantum Learning is the improvement in students' self-regulation and motivation. By incorporating reflective practices and goal-setting, students have become more aware of their strengths and areas for improvement. They are more likely to take initiative in their learning and set realistic goals to enhance their skills. This self-directed learning approach promotes independence and encourages students to take responsibility for their academic progress. Through continuous professional development and training in Quantum Learning, teachers at MI Mambaul Ulum Ranuwurung have also seen their teaching practices evolve. They have become more adept at designing lessons that are student-centered and focused on active learning. Teachers are now better equipped to facilitate engaging and interactive lessons that cater to the diverse needs of their students, resulting in more effective teaching and improved learning outcomes. Overall, Quantum Learning has proven to be a highly effective model for enhancing student activity and improving learning outcomes in arithmetic at MI Mambaul Ulum Ranuwurung. The engaging, interactive, and student-centered nature of the approach has helped students develop a deeper understanding of arithmetic operations, as well as improve their critical thinking, collaboration, and problem-solving skills. By continuing to implement

Quantum Learning, the school can further enhance the quality of education and foster a more engaging and supportive learning environment for all students.

Conclusion

The results of classroom action research conducted collaboratively between the principal, grade VI teachers, and researchers in order to improve understanding of mathematical concepts on the topic of addition and subtraction of integers through the Quantum Learning Model approach can be concluded as follows: 1) Understanding the concept of integer arithmetic operations. Students' ability to express opinions or ideas has increased, Students' ability to ask questions has increased, Students' ability to work on practice questions has increased. 2) Learning outcomes in the learning process have increased, namely those who completed learning in the initial study were 3 students or 17%, in the first cycle it became 7 students or 41%, in the second cycle it increased to 15 students or 88%.

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