

The Impact of Multiple Intelligences Approach through Quantum Teaching Model toward The Scientific Attitude and Science Learning Outcomes in The Fourth Grade Students

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Abstract

The background of this research is less optimal learning of science grade IV of elementary school in Tugu subdistrict semester I of academic year 2017/2018. Students have not shown a good scientific attitude so that science learning achievement is not optimal yet. The classical passing grade of science is still less than 85%. For the same case, other researchers have applied a quantum teaching model with multiple intelligences to improve learning outcomes. The aim of this research is to know the impact of multiple intelligences approach through quantum teaching model to scientific attitude and science learning outcomes in the fourth grade student on plant part structure material. This research was conducted at the SDN Tugurejo 01 and the SDN Tugurejo 03 Semarang academic year 2016/2017. This research method is true experimental design with pretest-posttest control group design model. The sampling technique chosen is probability sampling with simple random sampling model. The result on scientific attitude of experimental class is 78,4% belongs to a good category while the passing grade of science learning is 87,9% with average score 81. Result on scientific attitude of control class 70,97% belongs to medium category while passing grade of science learning 81.3% with an average of 76. The conclusion of this study is learning by multiple intelligences approach through quantum teaching model more effective to improve scientific attitudes and science learning outcomes than learning by quantum teaching model.

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INTRODUCTION

The limitation of teachers awareness about learning process is one of problems facing our education. Teachers should pay attention to the learning process in education so that more colored student learning center of the teacher center. In performing this function, the government organizes a national education system as stated law of on National Education all System number 20 of 2003, Article 1 paragraph 1 stating that education is a conscious and planned effort to create an atmosphere of learning and learning process so that the learner actively develops his or her potential to have spiritual spiritual power, self-control, personality, intelligence, good character, as well as the skills needed by his self society, nation, and state.

Scientific attitude in the learning process requires students to actively perform a number of activities that can build knowledge independently. The learning process can be achieved if educators and educational system are able to create a meaningful educational atmosphere, fun, creative, dynamic, and dialogical. The existing learning process is managed in earnest through careful planning by utilizing all existing resources and taking into account the level of brain development of children so that students are expected to achieve the standar competencies (SC) and basic competencies (BC) according to minimum standards that nationally become the reference in curriculum development in each education units. The achievement of CS and BC is based on the empowerment of learners to build their own skills, scientific work, and knowledge facilitated by teachers (Depdiknas, 2016). Achievement of SC and BC is understood as a result of learning that is expected to result in behavioral changes after experiencing learning activities.

The results showed that most of the learning process of natural sciences still not show satisfactory result. Teacher's efforts toward improving the quality of teaching and learning process have not been optimal, that is learning methods, approaches, and evaluations that are mastered by teachers have not used the new

techniques so that the negative impact on students' mastery is not optimal in learning (Depdiknas, 2007). Achievement of competencies as contained in the SC and BC requires various methods and active learning approaches in order to improve the ability of students to master a competence.

Based on the results of interviews with five elementary school teachers in Tugu subdistrict that among the fourteen existing SD Negeri, only two state primary schools are implementing innovative learning so that the learning process in Tugu subdistrict is less optimal. This is due to several factors, namely the factors of teachers, students, and learning tool. In the teacher factor, among others: teachers have not used innovative learning model, while teaching media used is still less varied so that learning tend to boring for some students. In addition, the learning activities carried out by following the teacher's learning style, not from the learning style of each student so that students can not be assisted properly. This is due to the lack of processing of multiple intelligences on student learning. The result of observation on curiosity, respect for data/facts and also open minded and cooperation attitude shows that the indicator has not appeared in the learning process so that the students' scientific attitude on the science learning are not optimal yet, which impact on students' learning outcomes that are still below the MSC.

At the time of learning, teachers generally take advantage of logical-mathematical intelligence of students when not every student has the same capacity in understand the learning. As a result, learners have difficulty understanding about the material described; the learning objectives are not achieved; and the impact on the low learning outcomes of learners. This is evident from the results of science study on the previous material that has not reached the MSC standard of 75 and the classical completeness does not reach the standard set by the school by 85%.

The results of the study by Trends International Mathematics and Sciences Study (TIMSS) also reported that Indonesia was ranked 67 out of 137 countries. It becomes a reflection of the world of education in Indonesia, especially at

the elementary level schools to create active learning and innovative role in the development of student's multiple intelligences (Widiana & Jampel, 2016). Thus, educators need a learning theory that is able to accommodate student's multiple intelligences in learning so that learning becomes easier to follow. One theory could be applied to solve these problems, namely the multiple intelligences approach.

Multiple intelligences approach is a very wide variety of intelligences description, present to each individual and used in very personal ways so that it can be developed in different ways in each individual according to their cultural background and character (Tarwiyah, 2010). This multiple intelligences approach believes that gifted students can drop their learning achievement if they do not have a supportive environment (Calik & Cargill, 2013; Sholeh, 2015). This is in accordance with the statement of Izzati, *et al.*, (2017) that the environment, interests, proper guidance, teachers, communication, learning facilities and teacher's ability are the main factors of student achievement. Thus, the use of the multiple intelligences approach promotes learning work effectively (Candrawan, *et al.*, 2017, Alae, 2015). The dominant learning types that have been found are then developed in the form of learning activities through science based work sheet of multiple intelligences. The worksheet is oriented towards student's dominant intelligence that is adapted to the needs of learning materials (Wijayanti & Widiyatmoko, 2015; Gani, *et al.*, 2017). Thus, students get education optimally. But it needs to be applied in a fun way to achieve optimal results.

One of the learning model that is able to support fun learning is quantum teaching model. Quantum teaching as a method of learning outlines new ways, facilitates art elements with targeted achievements (Benianto, *et al.*, 2012). In the implementation of this model there are activities of reading, explaining, demonstration, practice, discussion, group work, and repetition. However, the learning is packed in a festive and fun way by combining student's physical,

psychological and emotional potentials into an integral strength entity.

Science learning is closely related to scientific attitudes. Scientific attitude is the tendency of individuals to act or to behave in solving a problem systematically through scientific steps (Sukaesih, 2011). Scientific attitudes can be describe as ways of thinking, acting, and responding in the form of accepting, comparing, applying, and evaluating scientific knowledge (Muhaimin *et al.*, 2015). Scientific attitude is needed students in everyday life. It is intended that students motivate themselves to be able to understand the material being studied so as to improve student learning outcomes.

Learning outcomes are the most important thing in the learning because learning outcomes are a picture of the effectiveness of learning (Sutrisno, *et al.*, 2016). Kartikasari, *et al.*, (2013) states that the learning outcomes are the abilities that students have after experiencing the learning experience. Learning outcomes can be seen through evaluation activities that aim to obtain evidence data that shows the ability of students in achieving goals.

Based on the above description, the purpose of this research is as follows: (1) to identify the influence of multiple intelligences approach through quantum teaching model to scientific attitude and science learning outcomes of students in the fourth grade students; (2) to identify the influence of quantum teaching model toward scientific attitudes and science learning outcomes for students in the fourth grade students.

The results of this study are expected to be useful to give a good contribution on the implementation of science learning toward scientific attitudes and student learning outcomes increased as well as reference for further research related to multiple intelligences approach and quantum teaching model.

METHODS

The research is designed using design of true experimental design with pretest and posttest control group. The study was conducted in two

classes given different treatment, the experimental class experience multiple intelligences approach through quantum teaching model but the control class that implements quantum teaching model but not emphasize in multiple intelligences. The research procedure consists of the initial observation stage, the research planning stage, the implementation stage, and the data analysis phase.

The population of this research is all fourth grade students in the district Tugu with the study's sample of the SDN Tugurejo 01 and the SDN Tugurejo 03 Semarang. The sampling technique is simple random sampling with a total of 53 students. There are two of the fourth grade students as sampled, namely the fourth grade on Tugurejo 01 as an experimental class and fourth grade on Tugurejo 03 as the control class.

The research variables consist of independent variable, dependent variable, and control variable. The independent variables namely the approach of multiple intelligences and quantum teaching models. The dependent variable in this study is the result of learning science and scientific attitude of students. Control variables in this study is the material structure of the plant parts. Data were collected by using instruments of test, documentation, questionnaire, interview, and observation. Test is the student learning outcomes. By using documentation process data gathered are general information about the learning process at the SDN Tugurejo 01 and the SDN Tugurejo 03 Semarang. Assesment about students intelligence type was done by giving questionnaire to the experiment class. Data about student activities were gathered through interview session with the teacher and class observation.

The data analysis technique consists of a pretest and posttest analysis of learning within multiple intelligences approach through quantum teaching model. The data analysis instrument in the form of validation of learning tools and analysis items a pretest and posttest with validity, reliability, level of difficulty, and the distinguishing features to get a valid question. Analysis of the effect of the approach of multiple intelligences through quantum teaching model

toward the scientific attitude and sciences learning outcomes using independent sample t test. By using the t test the differences in average learning outcomes in the experimental class and control class; the percentage of occurrences for testing the scientific attitude; as well as the percentage of the largest to test the type of multiple intelligences were analyzed.

RESULTS AND DISCUSSION

This study aims to influence multiple intelligences approach through quantum teaching model toward the scientific attitude and sciences learning outcomes in the fourth grade students and the effects of quantum teaching model toward scientific attitude and sciences learning outcomes in the fourth grade students. The analysis results are described as follows.

Effect of Multiple Intelligences Approach Through Quantum Teaching Model toward The Scientific Attitude and Science Learning Outcomes

This learning approach in the form of learning by applying the multiple intelligences and quantum teaching model. The lesson was held in the SDN Tugurejo 01 Semarang in the academic year 2017/2018. The subject of research is the fourth grade students, consist of 27 students. The results of research in the form of scientific attitude and science learning outcomes in the fourth grade students. The results as described in Table 1.

Table 1. Scientific Attitudes in Experiment Class

Indicator	Experiment class (%)	Criteria
Curiosity	97.2	Very good
Respect attitude to data/facts	91.6	Very good
Critical thinking	57.4	Poor
Attitude of discovery	49	Very poor
Open mindedness and cooperation	94.4	Very good
Perseverance	79.6	Good
Attitude is sensitive to the surrounding environment	79.6	Good
Average	78.4	Good

Based on the observation, the data show that multiple intelligences approach through quantum teaching model influences the scientific attitude of students. It can happen because the

teaching process through multiple intelligences approach is implemented in accordance with the students' intelligences, so they will not bored and tired. Besides, rousing teaching concept in quantum teaching model can help the students to improve the scientific attitude. It is in accordance with Christison (1999), Armstrong (2009) and Bas & Beyhan (2010) who stated that the improvement of the scientific attitude in experimental class is caused by the multiple intelligences approach can be applied in the learning by applying the learning activity in accordance with the intelligence of the students. It is supported by Rapi (2008) that increasing scientific attitude in the experimental class due to multiple intelligences approach can provide a pleasant atmosphere so that students do not feel tired and bored and strengthened by Harlen (1992) that increasing scientific attitude for students with a basic level of learning can also be enhanced through learning using quantum teaching model with media-assisted. This is the reason of the scientific attitude in the experimental class is higher than the control class.

The learning outcomes in the experimental class are described in Table 2.

Table 2. Results of Science Study in Experiment Class

Information	Experiment class (%)	
	Pre test	Post test
The highest score	67	95
Lowest value	26	55
Average	40	81
MCS achievement	0	87.9

Based on Table 2, the data shows that the approach of multiple intelligences through quantum teaching model impact on student learning outcomes. The increase of learning outcome is caused by the learning which is done in accordance with the students' intelligence and implemented rousingly and the direct experience in the lab work that makes the students easier in understanding the content of learning.

This is in line with Huda and Arief's (2013) research which shows that multiple intelligences approach positively affects students' learning outcomes in the cognitive, psychomotor, and affective (attitude) areas. This success is due to

the approach of multiple intelligences can be applied in learning by applying learning activities in accordance with the intelligence of learners (Christison, 1999; Armstrong, 2009; Bas & Beyhan, 2010). It is strengthened by Calik & Birgill (2013) that the existence of multiple intelligences questionnaire makes learning is designed in accordance with the talents of students in the class so that students can also be assisted appropriately in learning. The same thing is also proposed by Probowening, *et al.*, (2014) that by developed learning with methods that vary and interesting and tailored to the intelligences they have, students' ability is appreciated so that there is an increase in learning motivation that can optimize learning outcomes. The success of this learning is also supported by the learning of quantum teaching model in the form of direct experience techniques that will improve and facilitate students' understanding of the content of learning (Wankat & Oreovocz in Wena, 2009).

The Influence of Quantum Teaching Model Toward Scientific Attitudes and Science Learning Outcomes

This learning is in the form of learning by applying quantum teaching model. The learning was conducted at the SDN Tugurejo 03 Semarang in the academic year 2017/2018. Research subjects namely class IV elementary school with as many as 26 students. The results of research in the form of scientific attitude and science learning outcomes in the fourth grade students. The results as described in Table 3.

Table 3. Scientific Attitudes in the Control Class

Indicator	Control class	Criteria
Curiosity	81.2	Very good
Respect attitude to data/facts	92.6	Very good
Critical thinking	54.6	Poor
Attitude of discovery	34.3	Very poor
Open mindedness and cooperation	91.6	Very good
Perseverance	61	Enough
Attitude is sensitive to the surrounding environment	81.5	Good
Average	70.97	Enough

Based on Table 3, the data shows that the model of quantum teaching impact the scientific attitude of students. This is because learning is

done in a fun way and the role of learning steps in quantum teaching model which gives opportunity to develop attitude. This is in accordance with the opinion of Widnyani, *et al.*, (2016) that the implementation of quantum teaching in science learning can lead to acceleration in absorbing all the learning not only cognitive but also affective and psychomotor through the growth of student interest and the learning process is fun. In line with that opinion, Srivastava (2015) also explained that scientific attitudes for students with basic level learning can be improved by means of quantum teaching model with media-assisted. The success of this research can not be separated from some of the steps that have a major role in improving scientific attitude: showing examples, giving reinforcement with praise and approval, and providing opportunities for developing attitudes (Harlen 1992).

The learning outcomes in the control class as described in Table 4.

Table 4. Science Learning Outcomes in the Control Class

Information	Control class (%)	
	Pre test	Test post
The highest score	55	96
Lowest value	25	50
Average	36	76
MCS achievement	0	81.3

Based on Table 4, the data shows that the model of quantum teaching effect on student learning outcomes. The improvement of learning outcomes through the quantum teaching model is due to the role of learning steps in quantum teaching model that is carried out in an interesting and fun way. In addition, the implementation of this learning model is also adjusted to the level of student development supported by the mastery of teachers to the implementation of learning.

It is according from Durant, *et al.*, (2012) which states that learning science with quantum teaching model effect on student learning outcomes. It is according to Koolang, *et a.,l* (2012) and Rofingah, *et al.*, (2013) that the success of sains learning with quantum teaching model caused due: (1) the ability of teachers to generate

motivation for students, (2) teachers are able to design innovative learning in order not to bore in learning, (3) the success of learning is also influenced by the mastery of teachers to learning methods and adjusted with students' developmental level. Thus, good mastery in the implementation of learning model quantum teaching is needed.

Increased Science Learning Outcomes between Experiment Class vs Control Class

The improvement of student learning outcomes in experimental class using multiple intelligences approach through quantum teaching model with control class using quantum teaching model was analyzed using N-gain formula. The result of N-gain calculation shows that maximum N-gain in the control class has a maximum N-gain of 1 with high criterion, minimum N-gain of 0.21 with low criterion and average N-gain of 0.66 with medium criterion . This is due to the role of learning steps in quantum teaching model that is carried out in an interesting and fun. In addition, the implementation of this learning model is also adjusted to the level of student development supported by the mastery of teachers to the implementation of learning. This is appropriate with the research of Durant *et al.*, (2012) that the improvement of learning outcomes through quantum teaching model is due to: (1) the ability of teachers to generate motivation of the students, (2) teachers are able to design innovative learning so as not be bored in learning, (3) the success of learning also influenced by the mastery of teachers on learning methods and tailored to the level of student development.

Based on the results of the analysis, it is obtained the results of N-gain calculation in the experimental class with a maximum value of 1 with high criteria, N-gain minimum of 0.143 with low criteria and N-gain average of 0.74 with high criteria. The gain of the N-gain can be explained as follows: (1) The equality of the maximal result of N-gain in the experimental class and control class is 1 which proves that learning with multiple intelligences and quantum teaching approach will give optimal learning result if the learning is

designed according to the talent of student interest, (2) N-gain minimum results 0.142 with lower criteria than control class due to lack of management of teachers in managing learning multiple intelligences, so that there is a small percentage of students who do not understand the learning system using four types of learning activities in one class and one learning material, (3) The average increase in learning outcomes in the experimental class is higher than the control class is due to the theory of multiple intelligences is applied in accordance with the intelligence of learners and performed in a fun way. The success of this learning is also supported by the learning of quantum teaching Model in the form of direct experience technique that will improve and facilitate students' understanding of the content of learning. This is according to Huda and Arief's (2013) study which shows that multiple intelligences approach positively influences students' learning outcomes in the cognitive, psychomotor, and affective (attitude) and Koolang, *et al.*, (2014) research which shows that the use of quantum teaching with Concrete Media, can improve science learning.

CONCLUSION

Based results of research and discussion, be concluded about the impact of multiple intelligences approach through quantum teaching model toward the scientific attitude and science learning outcomes in the fourth grade students. Results of research scientific attitude results a percentage of 78.4% in goal categories while sciences learning outcomes completeness percentage of 87.9% with an average of 81. While on the model of quantum teaching to generate a percentage of 70.97% of scientific attitude with moderate categories while sciences learning outcomes completeness percentage of 81.3% with an average of 76. The study's findings are not significant differences in the scientific attitude and science learning outcomes among students who take learning multiple intelligences approach through quantum teaching model with students who follow learning through quantum teaching model. Although the scientific attitude

and learning outcomes in learning with Multiple intelligences approach through quantum teaching model is better than learning used quantum teaching model.

Based on the conclusions of the implementation of science learning through multiple intelligences approach through quantum teaching model in the fourth grade students, it can be put forward some suggestions as follows. Teachers should always apply innovative learning appropriate to the type of student learning, including multiple intelligences approach through quantum teaching model to be useful for scientific attitudes and science learning outcomes.

Based on the results, there was a scientific attitude indicator is lower than the experimental class is the attitude of respect for the data/facts and attitudes sensitive to the surrounding environment. Therefore, the learning is further recommended to provide more activities and more innovative in the application of multiple intelligences approach to learning so that the impact of learning on scientific attitude of students become more optimal.

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