

Comparison of TADIR Learning Based on Islamic Values and PBL on the Students' Mathematical Problem Solving Ability

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Abstract. This study aimed to compare the effectiveness of TADIR (Translation, Analysis, Design, Implementation, Review) learning model based on Islamic values and PBL (Problem Based Learning) on the students' mathematical problem solving ability for Grade VII students at Integrated Islamic Junior High School (SMP IT) of Wahdah Islamiyah. This study used quantitative approach with the type of quasi-experimental research design. The population in this study were all students of grade VII SMP IT Wahdah Islamiyah consisted of 5 classes with a total of 145 students while the sample was 58 students with sampling techniques using purposive sampling. The instrument used in this study was a test of mathematical problem solving ability in the form of a essay test with a total of 5 items. The data analysis techniques used were descriptive statistics and inferential statistics using the Independent sample t-test and gain test. The results revealed that the students' mathematical problem solving ability which taught by applying TADIR learning model with integrating Islamic values was in high level, while the students' mathematical problem solving ability which taught by applying PBL learning model was in moderate level. This study showed that there was significant differences between the students' mathematical problem solving ability through the application of TADIR learning model by integrating Islamic values with PBL learning model in grade VII students SMP IT Wahdah Islamiyah. Meanwhile, based on the gain test, it was known that TADIR learning model based on Islamic values was better than PBL learning model.

1. Introduction

Education is one of the efforts that done by human in order to improve and require knowledge. Science is a very important thing in human life that it must be studied and contemplated so that they can run their lives well. Knowledge of human can be increased with education. Education is created by human should have goals that based on divine and human values. Islamic values are developed by human through the process of educational transformation that is always oriented to the mighty of Allah and His faith will determine their success. It means that all education are developed in the earth should be in the name of Allah Almighty that The Most Merciful. Thus, the more intelligent humans should be more to spread affection to fellow human beings.

The final goal of education itself is to train and to teach students how to solve various problems namely problems of mathematical, physical, health, social, adaptation and one of the most important targets of modern education is to educate students to be able to solve problems that they find in everyday life [1]. Based on the problems, it can be seen that one final goal in education is to solve mathematical problems. The statement emphasizes that the ability to solve mathematical problems is the important part of learning mathematics. The importance of having ability to solve problems is the same with some experts's statements, they are Branca argues that mathematical problem solving is one of the important goals in learning mathematics and even solving mathematical problems process is the heart of mathematics [2].

But the reality in the field of education today, especially in Indonesia, learning focused only on achieving the knowledge aspect and it did not focused on students' cognitive indicators that were important in solving mathematical problems they faced. Meanwhile, based on the findings after an observation in one of the schools that students cannot solved the problem given and it seemed difficult to solve the problem given. While according to [3] the low ability caused of the students' mathematical problem solving was an inappropriate teaching of teacher. If students have difficulty in solving mathematical problems and they have not formed the social attitude of students, the learning objectives of mathematics cannot be achieved. Actually, students were the main factors because there were still many students who thought that mathematics was difficult and boring. Therefore, there needed to be an innovative learning model with Islamic values in order to make learning more enjoyable and the lesson was more easily accepted by students and more religious.

When viewed from the meaning of education in the Islamic context, the reality that occurs today shows that the education has failed in building human character. At present, there is still many mathematics learning process at SMP Islam (Islamic Junior High School) which rarely combines mathematics with Islamic values. It is known that SMP Islam is one of the schools that has a strong religious basis. It must be an example that if students have difficulty in solving mathematical problems and they have not formed the social attitude of students, the learning objectives of mathematics cannot be achieved. Actually, students are the main factors because there are still many students who think that mathematics is difficult and boring. Therefore, there need to be an innovative learning model with Islamic values in order to make learning more enjoyable and the lesson is more easily accepted by students and more religious. Therefore, to address the problem we need a more varied learning strategy. One alternative that can be chosen in the learning process is the effective use of learning models. Learning models must be relevant and support the achievement of learning objectives. One of the relevant learning models applied to develop the problem solving ability is TADIR learning model (Translation, Analysis, Design, Implementation, Review) and PBL learning model (Problem Based Learning) by integrating Islamic values and PBL (Problem Based Learning) models.

[4] presents the steps of TADIR learning model consist of 1) Translation, in this step, the teacher leads the student to visualize the problem situation so it can give a picture to students about the problem. 2) Analysis, in this step, the teacher helps the student in analyzing problems with understanding concepts that are appropriate to the problem. 3) Design, in this step, the teacher will lead the student in designing an investigation or inquiry that is appropriate to the problem, so the student will produce the design which used in solving the problem. 4) Implementation, in this step, the teacher leads the student in implementing the problem solving based on the design that has been made. 5) Review, in this step, the teacher leads the student to review and gives students the opportunity to acquire new knowledge structures that are the result of reflections from previous knowledge.

One of ways to integrate TADIR learning model with Islamic values for mathematical problem solving. TADIR Learning Model does not only help students to understand mathematics subject material, but also can solve mathematical problems by integrating Islamic values during the learning process. Thus, students are expected to be able to solve mathematical problems and motivate themselves to behave better. The Qur'an is the source of all sciences that must be used as the main reference for the development of science before referring to the theory or other concepts. The integration of Islamic values

in mathematics learning means integrating Islamic values into mathematics learning so that it becomes a whole unit. The purpose of integrating Islamic values in this study is to unite and insert Islamic values that originate from the Qur'an and Hadith into mathematics learning with TADIR learning model to habituate students behave good attitudes. Islamic values integrated in this learning are moral values related to Hablum Minannas, including in the step of Translation, there are the value of responsibility, mutual cooperation, and self-confidence; in the step of Analysis, there are the value of mutual cooperation and tolerance; in the step of Design, there are the value of responsibility, tolerance, and self-confidence; in the step of Implementation, there are the value of responsibility, mutual cooperation, and tolerance. Mathematics as a science is very important to integrate with Islamic values. The integration is expected to build positive values and social attitudes from each student. Islamic values referred to in this study, including [3]:

Table 1. Indicators of Achieving Islamic Values

Islamic values and definitions	Indicators
1. Responsibility is the attitude and behavior of a person to carry out their duties and obligations, which they should do, towards oneself, society, environment (natural, social and cultural), the State and God Almighty.	a. Carry out individual/group tasks well. b. Explain/present the results of the discussion.
2. Tolerance is an attitude and action that respect diversity of backgrounds, views, and beliefs.	a. Appreciate the opinions of friends b. Able and willing to cooperate with anyone with a diversity of background.
3. Mutual cooperation is working together with others to achieve common goals by sharing tasks and helping sincerely.	a. Active in group work. b. Find the ways to overcome differences of opinion / thoughts between yourself and others.
4. Confident is the mental or psychological condition of a person who gives strong confidence in doing or acting.	a. Dare to presentation in front of class. b. Dare to argue, ask, or answer questions.

Some examples of integration model of Islamic values in mathematics learning [5] can be seen in the following table.

Table 2. Integration Model of Islamic Values in Mathematical Learning

Topics and Values	Islamic Values Intergration	Learning Activities	Islam Sources
Social Arithmetic Ethical values Caring Values	Rasulullah trades honestly and fairly in every transaction Every trader needs to pay attention to ethics in trading according to Islam as it is prohibited to <i>riba</i> , deceive buyers, and breaking the agreements.	The teacher invites students to discuss the attitudes that the seller and the buyer must have in the trade.. Conducting simulation of buying and selling. The teacher acts as a facilitator to clarify the ethical values in Islamic trade during and after the simulation..	QS ali- 'Imran/3: 130 QS al- Baqarah/2 : 275
Integers and Fractions Justice Values	Fractions are used in completing the calculation of inheritance with the rules set out in the Qur'an which	Discuss mathematical problem solving problems related to the division of inheritance according to Islam. The teacher needs to convey that in the rules of inheritance there	QS al- Nisa'/4: 11

contain the principle of are values of justice so that no heir is
justice harmed..

The learning with PBL model is a learning model that provides challenges for students to find solution to the real-world problems individually or grouply. PBL learning model is designed in the form of learning that begins with structure of real problems related to mathematical concepts to be taught, students not only get information from teacher, but teacher must motivate and direct students to be actively involved in whole learning process. PBL model has five stages, namely the orientation of students to the problem, operating students, guiding individual and group investigations, developing and presenting work result, analyzing and evaluating problem solving process [6].

Based on some explanations above, it can be concluded that the purpose of this research is to find out the description of the mathematical problem solving ability at VII grade students of SMP IT Wahdah Islamiyah who are taught by applying TADIR learning model and integrating Islamic values, knowing the description of mathematical problem solving ability of VII grade students SMP IT Wahdah Islamiyah taught by applying PBL learning models, and knowing significant differences between students' mathematical problem solving ability through the application of TADIR learning models by integrating Islamic values with PBL learning models in VII grade students of Wahdah Islamiyah IT Junior High School.

2. Method

This study approach was quantitative research with the type of quasi experimental research using the Nonequivalent Control Group Design. The writer chose this type of research because it was not possible to control the external variables affecting the implementation of the experiment. The population in this study was all students of grade VII SMP IT Wahdah Islamiyah consisted of 5 classes with a total of 145 students. The fifth class was academically equivalent because in grouping students into classes, the students were homogeneous, there was no classification between students who have high intelligence and low intelligence. Sampling was carried out by the purposive sampling technique. The sample in this study was VII B1 class as an experimental class using TADIR model by integrating Islamic values and VII B2 class as the control class using PBL model. The number of samples were 58 people.

The instrument used in collecting data to improve the students' mathematical problem solving ability on rectangular material. Mathematical problem solving ability test was a matter of description (essay): (1) ability to understand problems, (2) ability to plan or design problem solving strategy, (3) ability to carry out calculation, and (4) ability to re-check the truth of a result or solution [2]. Before being used, content validity testing was carried out by involving two experts in the field of mathematics, empirical validity testing of test items using product moment correlation and reliability testing using Cronbach's alpha formula.

The results of empirical validity testing of 5 test items indicated that all five items were valid category ($r_{count} > r_{table}$). The five questions were used as tests of students' mathematical problem solving ability. The reliability test results were obtained reliability coefficient (Cronbach's Alpha) for pre-test problem was 0.702 and for post-test problem was 0.704. In [7] stated that an instrument was said to be reliable if it had an Alpha coefficient was greater than 0.60. It shows that the students' mathematical problem-solving ability tests were reliable, both pre-test and post-test questions. Analisis data terdiri dari analisis deskriptif dan analisis inferensial yaitu uji independent sample t-test dan uji N-Gain menggunakan bantuan SPSS versi 20.0

3. Results and Discussion

Data on students' mathematical problem solving ability were obtained from pre-test and post-test given to experimental class 1 and experimental class 2. The summary of the results is shown in table 3.

Table 3. Results of Data Analysis of the Mathematical Problem Solving Ability of Students in Experiment Class and Control Class

No	Variable	Experiment		Control	
		<i>Pre Test</i>	<i>Post Test</i>	<i>Pre Test</i>	<i>Post Test</i>
1.	The number of students (N)	29	29	29	29
2.	Mean score (\bar{x})	29,12	70,55	28,48	51,29
3.	Standar Deviation (s)	11,72	17,19	10,23	14,98
4.	Increation Percentage (%)	142.27		80.09	

Based on the results of the data analysis in table 3, it seemed that the mean score of the mathematics problem solving ability of experimental class 1 students who learned by using the TADIR learning model by integrating Islamic values was higher than the mean score of mathematics problem solving ability of experimental class 2 students which used PBL learning models, both for pre-test and post-test.

To find out if there was a significant difference between the students' mathematical problem solving ability that follow TADIR learning model by integrating Islamic values with PBL learning model, it is required to do an independent test of t-test sample.

Table 4. Summary of T-test for Students' Mathematical Problem Solving Ability

Group	N	t_{count}	t_{tabel}	Sig. (2-tailed)
Experiment	29	4,34	2,003	0.000
Control	29			

Based on the results of processing SPSS version 20.0 with Independent Sample t-test, the value of $t_{count} > t_{table}$ was obtained, so H_0 was rejected. Thus, it can be concluded that there were significant differences among students' mathematical problem solving ability, the application of TADIR learning models and integrating Islamic values with PBL learning models.

The ability difference to solve mathematical problems between the two groups were caused by differences treatment given. In implementation of the TADIR learning model by integrating Islamic values, students were given the freedom to construct their own knowledge and directed to determine their own learning activities in accordance with the problems given and were trained to find and present something new that was related to Islamic values that occur in daily life so as to make the atmosphere of learning mathematics feel more religious. Whereas in the application of PBL learning models, students were only trained to develop the ability to solve problems oriented to authentic problems from the actual lives of students so as to stimulate students to learn critical thinking.

Furthermore, to find out how many percent effectiveness of these models in improving the students' mathematical problem solving ability and which were more effective than two models conducted N-Gain test. The summary of t-test results for the N-Gain value is shown in Table 5 below:

Table 5. The Summary Of T-Test Results For The N-Gain Value

	Class	N	Mean	Sig.	Sig.(2-tailed)
NGain_Persen	Experiment	29	60.54	0.826	0.000
	Control	29	32.09		

Based on table 5 above, it can be seen that the average value of N-Gain percent of TADIR learning model by integrating Islamic values is 60.54%. This means that, based on the category of effectiveness interpretation in the N-Gain percent, this value explains that applying the model in improving the students' mathematical problem solving ability is quite effective. Whereas PBL learning model is also

the control class obtains an average value of N-Gain percent is 32.09 percent. Based on the interpretation of the effectiveness category in the N-Gain percent, it can be seen that the application of PBL model in improving the students' mathematical problem solving ability is in the ineffective interpretation. Meanwhile, based on the information of table 5 is also known that the value of significance gained for both models is $0.826 > 0.05$ which means that both models have a Homogeny data variance. The value of SIG. (2-tailed) is obtained $0.000 < 0.05$ which means that there is a difference in effectiveness. Therefore it can be concluded that TADIR model by integrating Islamic values is quite effective enough and PBL model is ineffective in improving the students' mathematical problem solving ability. Therefore, TADIR model by integrating Islamic values is better than PBL model. The implementation of the TADIR learning model by integrating Islamic values, which was preceded by the researcher explaining the subject matter to students by including the Qur'anic evidence relating to rectangular material such as QS al-Qamar / 54: 49, in the verse implies that all in nature have sizes, there are calculations, there are formulas, or there are similarities. The formulas that exist today are not created by humans, but have been provided by Allah. Humans only find through the results of studying and reading the provisions of Allah swt. Then symbolize it in mathematical language. Likewise, with the form and formulas related to rectangular matter.

Furthermore, researchers provided contextual problems that contain Islamic values, that was, researchers presented a problem in the form of Islamic nuances such as pictures of mosques or the Kaaba. then other students answered to find out and explore students' initial knowledge related to the problem. Then, the researchers organized students in some groups so that students were easier to solve the problems by discussing that presented by researchers in the form of questions in LKPD by using TADI steps.

Step T (Translation), the researchers guided students in visualizing the problem situation provided with everyday language into mathematical language, such as pictures, systems, or graphics. Islamic values contained in this step are the value of responsibility (individual/group tasks), mutual cooperation (active in group work), and self-confidence (courageous opinion).

Step A (Analysis), the researchers helped students in analyzing problems with understanding concepts in accordance with the problem. Islamic values contained in this step are the values of mutual cooperation (active in group work) and tolerance (able and willing to work with anyone who has a diverse background).

Step D (Design), the researcher guided students in designing an investigation or inquiry that is in accordance with the problem. Islamic values contained in this step were the value of responsibility (explaining / presenting the results of the discussion), tolerance (able and willing to work with anyone who has a variety of backgrounds), and confident (dare to present in front of the class).

Step I (Implementation), the researchers guide students in carrying out problem solving based on the design that has been made. Islamic values contained in this step are the value of responsibility (explaining / presenting the results of discussion), mutual cooperation (looking for ways to overcome different opinion / thoughts between yourself and others), tolerance (being able and willing to work with anyone who have a variety of backgrounds), and confident (dare to present in front of the class, and dare to think, ask, or answer questions).

Next the researcher asked one of the group representatives to present their work. The researchers also gave awards to students who dare to make presentations so that other students were also motivated to have the courage to present their work.

The final step R (Review), the researchers guided students to did a review and gave students the opportunity to obtain a new knowledge structure that was the result of reflection of previous knowledge. The Islamic value contained in this step is the value of tolerance (respecting the opinions of friends).

There are also learning by applying the PBL learning model began the provision of contextual problems that stimulate students to learn, then do problem solving by students, with the hope of increasing student skills in achieving learning material.

The first stage of PBL learning models, researchers explained the learning objectives and learning models that be done in class. The researchers also motivated students to be actively involved in the chosen problem solving activity. Next, students were shown a problem in the form of a picture, the researchers asked students to re-express their understanding related to the problem, the researchers asked questions to find out and explore students' initial knowledge related to the problem.

The second stage was to organize students to learn, namely students were divided into groups and gave students the opportunity to discuss. The researcher tried to develop motivation so that all students were actively involved in the discussion. Researchers at this stage provided LKPD to students that contained problems related to quadrilateral material.

The third stage was to guide individual and group investigations. Students were required to investigate the problems that exist in LKPD to be found solving the problem. Researchers helped students understand problems, helped students to gather information from various sources, asked questions so that students thought about problems and information needed to solve problems.

The next stage is to develop and present the work, which was at these stage students present the results of discussions with their group friends, students exchanged opinions about the results of the investigation they had done with their group friends.

The last stage is to analyze and evaluate the problem solving process, namely at these stage students reviewed the process and the results of problem solving that had been done in the previous stage.

After data processing, there was a difference between the two learning models. It was known that the learning model by integrating Islamic values was quite effective in improving the students' mathematical problem solving ability. This achievement confirms that this model was quite successful in creating successful learning. The application of learning system design aimed to create a successful learning, which was learning that can helped the students achieve the competencies used because each model has a purpose to produce an instructional system which effective and efficient in facilitating the achievement of instructional objectives [8]. Therefore, the results of this study was as the complement results of previous studies in both research on the impact of implementing TADIR learning model by integrating Islamic values [3], [9] as well as the impact of Problem Based Learning (PBL) model [10] in mathematics learning. This can happened because in the process of applying students are given the freedom to exchange their minds with their group friends (learning community). Discussing with group friends was the best and foremost thing that students will do when they did not understand the mathematic problems given by the teacher. In addition, with the integration of this model on Islamic values has a positive impact on the students' attitude in the learning process. Some of which were considered the greatest change is a big sense of responsibility to the problem given, good cooperation, and active communication in problem solving process.

The PBL model was ineffective in improving the students' mathematical problem solving ability. There were several things that caused this condition to occur 1) the characteristics of the students who taught did not correspond to the model, 2) students were not accustomed to work on the problem independently without the detailed explanation of the teacher, 3) students needed a long time to work on, 4) students did not have great confidence in their efforts, 5) students who have low ability difficult to interact with their friends. Other opinions also said that difficult questions made students confused what to do, student interactions were not as expected by the teacher [11]. The PBL Model took a long time, and made students have difficulties in making time efficient so that teachers still have difficulty in organizing their learning [12]. In the meantime, the PBL learning instruction from the teacher was very important in the process of application [13]. In addition, the need for combination with other approaches that can strengthen the PBL in mathematics learning.

4. Conclusion

Based on the results and discussion of the research that has been described, the following conclusion can be drawn

- The ability to solve math problems of seventh grade students of Wahdah Islamiyah IT Junior High School who were taught by applying TADIR learning model by integrating Islamic values increases by 142.27%.
- The ability to solve math problems of seventh grade students of Wahdah Islamiyah IT Junior High School who were taught by applying the PBL learning model increased by 80.09%.
- There is a significant difference between students' mathematical problem solving ability through the application of TADIR learning models by integrating Islamic values with PBL learning models in the seventh grade students of Wahdah Islamiyah Junior High School.
- TADIR learning model by integrating Islamic values was quite effective in improving the students' mathematical problem solving ability, while the PBL model was ineffective. Therefore, it can be concluded that TADIR model by integrating Islamic values was better than PBL model.

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