

ISLAMIC VALUES IN MATHEMATICS LEARNING THROUGH THE REALISTIC MATHEMATICS EDUCATION (RME) MODEL

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Abstract

Mathematics is one of the subjects that are less attractive to students who attend Islamic boarding schools. They assume that mathematics has nothing to do with Islamic values. Whereas mathematics has a relationship with Islamic values such as arithmetic sequences and series. In this case, a teacher needs to use the right learning model to deliver the subject matter, for example with the Realistic Mathematics Education (RME) model. RME is a model of mathematics learning that can connect mathematics learning objects with real life so that students can easily understand. This study aims to describe the effect of internalizing Islamic values in mathematics learning through the RME model in arithmetic sequences and series subjects which were carried out for two meetings. The research method used is descriptive qualitative method with the research subjects are 29 students of class XI IPA MA Matsaratul Huda. Data collection techniques used teacher and student activity observation sheets, student response questionnaire sheets, documentation, and test sheets. The results of the observation data analysis of teacher and student activities can be categorized as "very good" and students also respond "positively" to learning. From the results of student learning tests can be said to be "complete" classically with the results of 89.65% 85%. Based on the results of this study, it can be said that the internalization of Islamic values in mathematics learning through RME affects student learning activities and outcomes and helps students understand the material and can provide new knowledge about the relationship between mathematics and Islamic values.

Keywords: Arithmetic sequence and series; Realistic mathematics education

Abstrak

Matematika merupakan salah satu mata pelajaran yang kurang diminati oleh siswa yang sekolah di lingkungan pesantren. Mereka beranggapan bahwa matematika tidak ada hubungannya dengan nilai-nilai Islam. Padahal materi matematika memiliki keterkaitan dengan nilai-nilai Islam seperti pada materi barisan dan deret aritmetika. Dalam hal ini seorang guru perlu menggunakan model pembelajaran yang tepat untuk menyampaikan materi pelajaran, contohnya dengan model Realistic Mathematics Education (RME). RME merupakan salah satu model pembelajaran matematika yang dapat menghubungkan objek pembelajaran matematika dengan kehidupan nyata sehingga siswa mudah memahami matematika. Penelitian ini bertujuan untuk mendeskripsikan pengaruh dari internalisasi nilai-nilai Islam dalam pembelajaran matematika melalui model RME pada materi barisan dan deret aritmatika. Metode penelitian yang digunakan adalah metode kualitatif deskriptif dengan subjek penelitian adalah 29 siswa kelas XI IPA MA Matsaratul Huda. Teknik pengumpulan data menggunakan lembar observasi aktivitas guru dan siswa, lembar angket respon siswa, dokumentasi, dan lembar tes. Hasil analisis data observasi aktivitas guru dan siswa dapat dikategorikan "sangat baik" dan siswa juga merespon "positif" terhadap pembelajaran. Dari hasil tes belajar siswa dapat dikatakan "tuntas" secara klasikal dengan hasil $89,65\% \geq 85\%$. Berdasarkan hasil penelitian tersebut dapat dikatakan bahwa internalisasi nilai-nilai Islam dalam pembelajaran matematika melalui RME berpengaruh terhadap aktivitas dan hasil belajar siswa dan membantu siswa memahami materi serta dapat memberikan pengetahuan baru tentang hubungan matematika dan nilai-nilai Islam.

Kata kunci: Barisan dan deret aritmatika; Pendidikan matematika realistik



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INTRODUCTION

The existence of education is expected to be able to create quality students, both in terms of intellectual, emotional and spiritual intelligence. In realizing quality students, the government continues to improve the education curriculum. In the 2013 curriculum, the government issued Permendikbud No. 24 (2016) which contains core competencies in learning which include spiritual attitudes, social attitudes, knowledge, and skills (Kemendikbud, 2016). Schools are required to implement the curriculum. Religion-based schools are very relevant to maximize the achievement of the core competencies expected by the government. Therefore, the 2013 curriculum directs that learning is not only oriented to the cognitive aspect, but can also develop the affective aspect by forming the attitudes and character of students through the internalization of religious values such as Islamic values in schools based on Islam. Islamic values are divided into three important aspects, namely the values of aqidah, the values of worship, and moral values (Hakim, 2012). However, education development as an integral part of nation-building which has been framed in the nation and character building from the beginning, has not provided an enlightenment of noble values and human character (Nihayati, 2017). Thus, to overcome this is to instill Islamic values in the learning process.

Islamic values is one of values that can be embedded in mathematics learning. Studies related to the internalization of Islamic values in mathematics learning have been carried out. To introduce the concepts of mathematical and Islamic integration and internalizing Islamic values through

analogies and interpretations of mathematical concepts (Abdussakir, 2017). Mathematical learning not only produces students who are successful in mathematical and procedural calculations, but also develops religious thinking (Muslimin, 2020). Learning mathematics integrated with Islam to instill Islamic values (Kurniati, 2015). The internalization of the value of the truth of intentions and ways and sincerity through analogy and integrate Islamic values through set learning (Nihayati, 2017).

The application of Islamic values in learning mathematics requires a relevant learning model. In addition, it must be able to integrate new knowledge based on the experience of students in learning work in real (Ulum, 2021). However, most students are assume that mathematics is a very heavy and difficult subject. One reason is because the object of mathematical studies is abstract (Gafoor & Kurukkan, 2015). So that the teacher needs to apply mathematical learning models that link the understanding of concepts that have been learned with students real life experiences about mathematics learning. The advantages of mathematical concepts presented in concrete form will be understood well by students (U. R. Jannah, 2013). One of the mathematical learning models developed based on real contexts is RME developed in the Netherlands by Freudenthal.

Realistic Mathematic Education (RME) is a learning of mathematics that links mathematical concepts with everyday experience and applies mathematics to life. According to Freudenthal (Wijaya, 2012) a writer, educator, and mathematician stated ini German/ Netherlands that mathematics is a form of human activities. This

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means that mathematics should be given to students not as a ready made product, but as a form of activity in constructing mathematical concepts. RME is one approach to mathematics learning that is fun and relevant to everyday life (Zulkardi, 2019). To improve the ability of mathematical connections it is more appropriate to use the RME (Febriyanti, 2019; Elpina, 2020; Hasbi, 2019; Menanti, 2018). This is because RME associates and engages the environment around students and real experiences experienced by students in daily life, and makes mathematics as a student activity. Student learning outcomes in the application of learning using a real good approach (Subaidi, 2016).

RME is an approach to learning mathematics. Learning that uses a realistic mathematical approach does not start with formal mathematics teaching, but rather to appreciate and understand the importance of mathematics as a human activity (Nuraida & Amam, 2019). In addition, the principles of RME are based on the idea of building knowledge by students themselves, and are considered very useful for learning mathematics by most researchers (Papadakis & Zaranis, 2017). In RME, students are not given ready-made models that embody certain mathematical concepts, but they are faced with context problems, presented in such a way that they obtain activity modeling, which in turn leads to the emergence of models and realistic mathematic education that integrates Islamic values feasible and practical for use by students (Papadakis & Zaranis, 2017) dan (Yuniati & Sari, 2018).

Arithmetic sequences and series materials with using RME model can be applied in real life with Islamic values. So that learning is not only teaches the understanding of concepts, but is

expected to instill Islamic values in students so that they can form students who are smart, true, and professional, and realize the usefulness of mathematics and its relationship in Islam.

The purpose of this study was to describe the Realistic Mathematic Education (RME) model in the arithmetic sequences and series of class XI MA Matsaratul Huda and describe Islamic values in the application of the Realistic Mathematic Education (RME) model in the arithmetic sequence and series XI MA Matsaratul Huda.

RESEARCH METHODS

This research is uses descriptive qualitative research. Descriptive research as a form of the most basic research aimed at describing or describing existing phenomena, both phenomena that are natural or human engineering (Creswell, 2013). The study was intended to describe Islamic values in mathematics learning applied to the subject of research using the Realistic Mathematic Education (RME) model in the arithmetic sequences and series.

This research was conducted in the XI IPA class of MA Matsaratul Huda Panempan Pamekasan which amounted to 29 students consisting of 24 female students and 5 male students. In this case the researcher is a key instrument (Moleong, 2013). The researchers them selves acted as teachers (actors of action) with the help of two observers. The first observer is a mathematics teacher who is in charge of observing the activities of the teacher (researcher). The second observer is colleagues who are tasked with observing student activities during the learning process. This research was conducted in two meetings.

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The learning objective in the first meeting is to determine the elements of arithmetic sequences through everyday problems, explain the definition of arithmetic sequences, determine the formula for the arithmetic sequence, and solve everyday problems related to arithmetic sequences. While the learning objectives in the second meeting are to explain the meaning of arithmetic series, determine the formula for the number of n first term arithmetic sequences, and solve everyday problems related to arithmetic series. Data collection in this study through documentation, observation, questionnaires, and tests.

The data that has been collected will be analyzed by calculating the data from observations of teacher and student activities using the formula:

$$NA = \frac{\sum n}{\sum a} \quad (1)$$

Information:

NA = final score

n = value of each aspect observed

a = observed aspects

By category determination NA: 0,00 – 1,49 = not good; 1,50 – 2,49 = less good; 2,50 – 3,49 = good; 3,50 – 4,00 = very good. While the data from the student response questionnaires will be analyzed descriptively because this research uses an open questionnaire by presenting students' answers to each question item. For data analysis of test results, it is done by calculating Classical Learning Completeness (KBK). Classical learning mastery can be achieved if the percentage $\geq 85\%$ of the number of students with the following formula:

$$KBK = \frac{N}{T} \times 100\% \quad (2)$$

Information:

N = Number of students who completed

T = Total Number of Students

RESULTS AND DISCUSSION

1. Realistic Mathematic Education (RME) Model on Arithmetic Sequence and Series Material of Class XI MA Matsaratul Huda.

The learning process carried out during the two meetings eventually went smoothly, although there were some students who had not adapted themselves to the learning done by the researchers. Students are not used to learning with the RME model that is internalized with Islamic values. However, with the guidance provided by teachers and researchers, this can be solved well. In general, the teacher in this case the researcher can succeed in applying the Realistic Mathematic Education (RME) model in accordance with the steps and also the RME characteristics that mathematics is a form of human activity. This means that mathematics should be given to students not as a ready made product, but as a form of activity in constructing mathematical concepts (Wijaya, 2012).

Learning begins with the apperception given by the teacher by asking the previous material about the even and odd number patterns. Based on Figure 1, the teacher analogizes the even number pattern with the number of rakuh dhuha prayers (for example 2, 4, 6, 8, 10, 12) while in the pattern of odd numbers, the teacher analogizes the number of rakit prayer times (eg 1, 3, 5, 7, 9, and 11). In addition, the teacher also inserts verses of Al-Qur'an in the form of Al-Fatir surah verse 1 and surah Al-Mujadilah verse 7. Then the teacher gives Student Worksheet (LKS) which contains problems related to arithmetic sequence and series. These problems are everyday problems related to student activities. The teacher directs and guides students in solving the problem.

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In this case the teacher acts as the only facilitator (Revina & Leung, 2019). The

documentation of teacher's activities can be seen in Figure 1.



Figure 1. Teacher activities in learning

Learning begins with the apperception given by the teacher by asking the previous material about the even and odd number patterns. Based on Figure 1, the teacher analogizes the even number pattern with the number of rakah dhuha prayers (for example 2, 4, 6, 8, 10, 12) while in the pattern of odd numbers, the teacher analogizes the number of rakit prayer times (eg 1, 3, 5, 7, 9, and 11). In addition, the teacher also inserts verses of Al-Qur'an in the form of Al-Fatir surah verse 1 and surah Al-Mujadilah verse 7. Then the teacher

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The teacher's activities during teaching were observed by the observer. The results of data analysis obtained about teacher activities are shown in the Table 1.

Table 1. Results of data analysis based on teacher activity

No	Part	Observed Aspects	Assessment		Aver age	Cate gory
			RPP 1	RPP 2		
1	Preliminary	The ability to motivate students/communicate learning objectives and explain about the RME model.	4	4	4	Very good
		The ability to connect lessons at that time with previous lessons or discuss homework.	3	4	3,5	Very good
		The ability to lead students in group formation and at the time of reading the verses of the Qur'an together.	4	4	4	Very good
		The teacher's ability to connect arithmetic sequences and series with verses from the Qur'an.	4	4	4	Very good
2	Core activities:	Ability to explain contextual problems.	4	4	4	Very good

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No	Part	Observed Aspects	Assessment		Aver age	Cate gory
			RPP 1	RPP 2		
		The ability to direct students to find answers and how to answer questions, by providing limited assistance.	3	4	3,5	Very good
		The ability to observe the way students solve problems.	4	4	4	Very good
		The ability to optimize student interaction at work.	4	4	4	Very good
		The ability to encourage students to compare answers with their friends' answers (with group members).	3	4	3,5	Very good
		Ability to lead class discussions/master class.	4	4	4	Very good
		Ability to appreciate various student opinions.	4	4	4	Very good
		The ability to direct students to find themselves and draw conclusions about mathematical concepts/principles/definitions/theorems/formulas/procedure	3	3	3	Very good
		The ability to encourage students to ask questions, express opinions or answer.	3	4	3,5	Very good
3	Closing:	The ability to emphasize important things/essence related to learning.	3	4	3,5	Very good
		The ability to convey wisdom contained in the verses of the Qur'an.	4	4	4	Very good
		The ability to submit the title of the next sub-material/give homework/close the lesson.	4	4	4	Very good
4.	Time	Ability to Manage Time	4	4	4	Very good
5	Class situation	Student enthusiastic	4	4	4	Very good
		Teacher's enthusiastic	4	4	4	Very good
Total ($\sum n$)					72,5	

Based on data in Table 1, the overall activity value of teachers is as follows:

$$NA = \frac{\sum n}{\sum a} = \frac{72,5}{19} = 3,82$$

NA = 3.82 indicates that teacher activities include the Very Good category. The teacher has used the

learning model well, connecting the subject matter with Islamic values.

Observations on student activities were carried out during the learning process for two meetings. The documentations of student's activities can be seen in Figure 2.



Figure 2. Student Activities in Learning

Based on Figure 2, it can be seen that during the learning process students are actively working with their group friends in solving problems given. They actively asked about things they did not understand, and the teacher was happy to guide them. Students also work with their groups to solve problems. In addition, the teacher also asks students to present their answers and then the teacher guides students in class discussions. Most students have been able to solve the problem and can construct the results of the process so they can find the concepts of arithmetic sequences and series, even though there is one group that has not resolved the problem to completion and can conclude the results of the process. Students can use models to solve problems. This is in accordance with the characteristics of RME model presented by Treffers (Wijaya, 2012). And also in accordance with the principles of RME (Revina & Leung, 2019).

Based on the results of the student response questionnaire, the majority of students think that the learning applied by researchers has never been applied by their teacher. However, there were some students who said that their teacher had applied it, but did not internalize Islamic values. With the learning applied by the researchers, it is easier for students to understand the material and easier to do math problems. So that students are interested and interested in following the next

lesson. Students hope that mathematics learning can be better by applying models that can make it easier for students to understand mathematics.

Based on this analysis, it can be concluded that students respond "positively" to mathematics learning by internalizing Islamic values through Realistic Mathematical Education (RME).

The results of the tests show that only 26 of 29 students who complete and 3 students who do not complete because the value obtained under the KKM. While classical learning completeness (KBK) is 89,65%. This shows that students of class XI IPA have achieved classical mastery.

Based on the analysis of learning management data by applying the Realistic Mathematic Education (RME) model, teachers (researchers) can be said to be successful in the learning process carried out. This can be indicated by the observation of the teacher's activity with a final score is 3,82 so that the teacher can be categorized as "Very Good" in doing the learning. While the activities of students obtain a final grade is 3,14 so that students can be categorized as "Good" in following the learning. Besides iu, students also respond "Positive" to learning that has been done for two meetings.

Management of this learning turns out to be relevant to the results of student learning tests conducted at the

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end of learning. Classically the results of student learning tests get results is 89,65% so that the completeness of student learning in a classical way can be said to be "Completed". While individually there are 26 students who complete and 3 students who do not complete because the value obtained is under the KKM. Learning mathematics with the RME model in arithmetic sequence and sequence material also uses problems related to daily life that have been done by students to make students more interested and more active in participating in learning.

2. Islamic Values in the Application of the Realistic Mathematic Education (RME) Model

Based on the results of interviews with several students of MA Matsaratul Huda said that mathematics is not a science of religion so they are assume that studying mathematics has not benefit and has not connection with Islamic teachings. In fact, they did not have time to study mathematics because of the activities of Islamic boarding schools which were very crowded with religious activities. So that students learning interest is low in general subjects, especially mathematics. In addition, mathematics lessons are considered difficult to learn, one of which is the arithmetic sequences and series material. In the material students are less able to understand problems so they are difficult to analogize formulas and numbers. This can lead to low student learning outcomes.

Based on the research that has been done, it can be acknowledged that Islamic values internalized by researchers in mathematics learning through the Realistic Mathematic Education (RME) model in the

arithmetic sequences and series include the values of aqidah, the value of worship, and moral values. One of the values of aqidah can be seen in the reading of the prayer and the pronunciation of the lafad basmalah and the hamdalah which is done when starting and ending learning (Hakim, 2012). One of the values of worship can be seen in the reading of the Qur'an. While the moral value of one of them can be seen in the process of discussion conducted by students. In internalizing Islamic values in learning mathematics, teachers (researchers) use several strategies (Wahyuni, 2018): 1). Always name Allah SWT, 2). Visual illustration, 3). Insert the relevant Quranic verses and 4). Use of Islamic terms in contextual problems.

These strategies are applied in the mathematics learning process carried out by the teacher (researcher). In opening the lesson or when starting the RME steps the teacher asks students to read the basics and read the ham when ending it. The teacher also uses Islamic illustrations in learning, such as when the teacher analogues the pattern of even numbers with rakaah dhuha prayers and a pattern of odd numbers with rakaah prayers. The teacher inserts several verses of the Qur'an, including in the Al-Fatir verse 1 in the first meeting and in the surah Al-Mujadilah verse 7 at the second meeting. At the time of giving the verse of the Qur'an, the teacher asks students to read it together then the teacher explains the relevance of the content of the verse with arithmetic sequences and series.

Surah Al-Fatir verse 1 which means: *"All praise be to Allah the Creator of heaven and earth, Who makes angels as messengers (to take care of various kinds of affairs) who have wings, each (there are two), three*

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and four. God adds to His creation what He wants. Indeed, Allah is All-Powerful over all things." (Surat al-Fatir: 1).

In the above verse there are mathematical concepts included in the arithmetic sequences material, namely in the sentence "angels as messengers (to take care of various kinds of affairs) that have wings, each (there are two), three and four." If the sentence written in the form of a number sequence to 2, 3, 4, Then this sequences of numbers can be developed by the teacher to provide understanding to students. This verse will be used in the implementation of learning at the first meeting.

Surah Al-Mujadilah verse 7 which means: *"Do you not see that Allah knows what is in heaven and on earth? There were no secret talks between three people, but he was the fourth. And there is no (conversation between) five people, but He is the sixth. And there is no (discussion) between (number) less than or more, but He is with them wherever they are. Then He will tell them on the Day of Judgment what they have done. Lo! Allah is the Knower of all things.*" (Surat al-Mujadilah: 7).

The mathematical concept of the arithmetic sequences in the verse above is in the sentence "There are no secret talks between three people, but He is the fourth. And there is no (conversation between) five people, but He is the sixth. " If it is written in the form of numbers to be 3, 4, 5, 6, Then this sequence of numbers can be developed by the teacher on arithmetic series material. This verse will be used in the implementation of learning in the second meeting.

The teacher also uses Islamic terms in learning as well as in problems given to students, such as mosques, Islamic boarding schools, congregational prayers, and so on. And, experience

and prior knowledge students on the concept of mathematics gave an important rule on the students' understanding (U. Jannah, Sisworo, & Nusantara, 2019)

Based on previous research on the development of an integrated mathematical module of Islamic values through the Realistic mathematic education approach (Yuniati & Sari, 2018) that there are limitations in his research that is limited to triangle material in junior high schools. so that in this study developing Realistic mathematic education on other material namely ranks and series based on Islamic values in high school. this has an impact on student learning activeness, student achievement is increased and student responses are positive.

CONCLUSION AND SUGGESTION

The results of the study, it can be concluded that the application of the Realistic Mathematic Education (RME) model in the arithmetic sequences and series material in class XI IPA Matsaratul Huda Panempan Pamekasan with internalize Islamic values have an effect on learning mathematics both from the activities of students who actively participate in learning from beginning to end, as evidenced by the results of student learning tests that achieve completeness. In addition, students responded positively to the learning carried out by researchers. They are interested in following the next lesson because the learning carried out by the researcher is a new lesson for them. They argue that most of their teachers have never applied the mathematics learning that the researchers did.

This research is expected to be used as a reference for mathematics

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teachers in providing better learning and to improve student learning achievement, teachers should strive to know more about the characteristics of the material and their students, so that they can selectively choose the right learning model so that the atmosphere creates an atmosphere conducive learning process, the students are more active, and the learning design is fun.

The advantage of this research is that learning mathematics with the internalization of Islamic values with the Realistic Mathematics Education model is a new learning for XI IPA Matsaratul Huda Panempan Pamekasan students and the same research has never been done at the school. The weakness of this study is that Islamic values cannot be internalized in all mathematics materials, only a few, so adjustments are needed first.

For the perfection and achievement of the outputs of this research, it is necessary to conduct development research on the internalization of Islamic values in mathematics learning through RME.

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