Development of Islamic Value-Based Mathematics Teaching Materials to Improve Students' Understanding of Mathematical Concepts

Ani Choirunnisa1, Nurhanurawati1, Syarifuddin Dahlani, Choirudin2, and Muhammad Saidun Anwar
1. Lampung University, Indonesia
2. Institut Agama Islam Ma'arif NU (IAIMNU) Metro Lampung, Indonesia
*corresponding: anichoirunnisa400@gmail.com

Received: 24 Maret 2022; Accepted: 24 Mei 2022; Published: 30 Juni 2022

Doi: 10.15575/ja.v8i1.17073

Abstract

This study aims to produce media in Islamic-based modules on social arithmetic material in improving students’ understanding of mathematical concepts. The study method used is Research and Development (R&D) with the ADDIE development model. The stages carried out are Analysis, Design, Development, Implementation, and Evaluation. The research data was obtained using questionnaires, interviews, and special tests. The assessment results based on a material expert validation questionnaire for this module are included in the "Valid" category with an average score of 83%. The media expert's assessment obtained an average score of 87% in the "Valid" category. In a large-scale field trial, an average of 83% was obtained with the "Attractive" criteria. The quality of the product's effectiveness is seen from the learning outcomes test. The results of data analysis using t-test learning using Islamic-based mathematics modules that are applied in class VII 1 are more effective than in class VII 2, whose education does not use Islamic-based mathematics modules. The analysis results using N-Gain are an increase in students' understanding of...
mathematical concepts. Based on these results, it can be concluded that Islamic-based modules are valid (feasible), attractive, practical to be used as learning resources, and can improve students' understanding of mathematical concepts.

Keywords: Concept Understanding, Development, Islamic Values, Module

1. INTRODUCTION

Mathematics is the queen of science as a basic science that plays a vital role in training students to solve various problems in everyday life. So do not be surprised if mathematics lessons have existed since elementary school, middle school, and even college to make students qualified. It is in line with Permendiknas No. 22 of 2006 (Depdiknas, 2006: 345) mathematics lessons need to be given to all students starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together. Students will find it challenging to learn higher mathematics if they do not understand mathematical concepts (Bringula et al., 2021; Rach & Ufer, 2020; Saripudin, 2021).

Understanding the concept is an essential element in learning mathematics. Understanding the idea is in mastering several learning materials, where students do not just know and know but can re-express concepts in a form that is easier to understand and apply (Darling-Hammond et al., 2020). Mastery of many concepts allows someone to solve problems better because you need rules based on your images. A picture is an abstract idea that will enable one to group objects or events and explain whether the thing or event is an example or not an example of the concept—by the indicators of understanding students’ mathematical concepts (Kartika, 2018) — re-expressing the ideas that have been studied—classifying objects according to specific properties according to the concept, Applying concepts or algorithms to problem-solving. Presenting concepts in various forms of mathematical representation, and combining multiple ideas (internal and external mathematics). As one of the sciences that must be taught, mathematics must apply value education through learning in class. Mathematics learning must be more empowered and changed to touch all aspects, namely spiritual, social, knowledge, and skills, to contribute more to students' character and personality (Durak, 2022; Yuniati & Sari, 2018).

Mathematics has the meaning of learning or intelligence. Mathematics plays a role in shaping the character of students starting from the material to their environment (Kurniati, 2015). Learning mathematics also needs to produce students with good morals and critical personalities. But what happens, mathematics learning still focuses on the knowledge (cognitive) of students, so that the assessment of attitudes (affective) and psychomotor is still quite lacking, these two aspects seem to be just a formality in the lesson plans. Applying formulas, symbols, abstract nature, and deductive thinking patterns are characteristics of mathematics (Syahratunnusa Syamsuar, 2021).

One of the important parts in the implementation of learning in schools is teaching materials. With the existence of teaching materials, teachers will be easier to carry out learning and students will be more helpful and easier in learning (Prastowo, 2013). Said that teaching materials are all materials (both information, tools and texts) that are systematically arranged that display a complete figure of competencies that will be mastered by students and used in the learning process with the aim of planning and studying the implementation of learning. So, with teaching materials teachers can save time in teaching, improve the learning process to be more effective and interactive and as a teacher guide that directs all activities in the learning process.

Islamic education teaches values that can form a noble and civilized personality. So education based on Islamic values will develop a good character. Islamic values can be integrated into the mathematics learning process to lead students to achieve knowledge (cognitive), understanding, and applying Islamic values. Therefore, we need to learn mathematics by integrating Islamic values into school mathematics topics (Abdullah et al., 2021; Choirudin et al., 2020). The application of Islamic
Development of Islamic Value-Based Mathematics Teaching Materials to Improve Students’ Understanding of Mathematical Concepts

nuances in learning mathematics is reinforced by the purpose of the 2013 curriculum, which is to prepare Indonesian people to have personalities and become citizens of faith (Syamsuar et al., 2021). Thus, we can realize that the first objective of this mathematics lesson is for students to have the ability to form a positive attitude towards mathematics by recognizing the order and beauty of nature and glorifying the greatness of God Almighty.

Making or building materials that show values in Islamic quality means making or building materials, especially modules where numerical material is discussed related to values in the Qur'an, and that means mathematics is taught by narrative strategies, infusion, uswah hasanah, as well as analogies. The infusion strategy (SI) focuses on the value of the Qur’an related to the material. Narrative strategy (SN) is more about telling stories from Muslim mathematicians so that lessons can be drawn. The analogy strategy (SA) is a condition in which educators analogize the values of kindness when teaching. The uswah hasanah (SUH) strategy is used by educators to show good behavior related to mathematics, for example, accuracy, sincerity, not giving up easily, and being honest (Syahratunnusa Syamsuar, 2021).

Based on a pre-survey conducted by researchers on August 4, 2021, at SMP Negeri 1 Puggur, an interview was conducted with Mr. A Ali Hanafiah S.Pd. as a mathematics teacher at the junior high school. He said that grade VII had used the 2013 curriculum. However, the morale itself was still relatively low. For example, some students played truant, smoked, and lacked respect for teachers, and students’ learning achievement in mathematics was not good enough. The use of learning media is still only using textbooks, so the goal of K13 has not been realized because there are no religious values that should have been introduced to students in the books.

Moreover, for another mandala, most students cannot solve math problems different from the examples given. Then if given a task, students tend not to know the steps to solving the problem. Some students only memorize formulas but cannot apply them to problems, and students' mathematics learning outcomes are still low. This can be seen from the average completeness below 55%, especially in social arithmetic material.

From the information provided by the teacher can be concluded that students' understanding of concepts is still relatively low. There are no Islamic values in it. This is not merely a student's fault, but the common sense of the concept can also be influenced by several factors, including the teaching materials used.

Based on the problems above, efforts to improve students' understanding of mathematical concepts at SMP Negeri 1 Punggur are by developing mathematics teaching materials that are by the characteristics of students by providing Islamic content in mathematics material. Helping students solve math problems should be introduced and taught to children in exciting ways by combining and aligning mathematical material with Islamic values. Combining mathematics with Islamic values will form a strong nation oriented to science and technology (IPTEK), all of which are imbued with faith and piety to Allah SWT (IMTAQ). Based on some of the opinions above, it can be understood that the mathematical material provided with Islamic content can help students develop in the mastery of science and technology based on IMTAQ so that with it a nation that is superior in terms of science, Islam can be formed. Student development can be affective, cognitive, and psychomotor (Saripudin, 2021). So that researchers will research the development of Islamic values-based teaching materials to improve students' understanding of mathematical concepts.

Research conducted by Takwa et al. (2021) on developing mathematics teaching materials based on discovery learning models to improve students' understanding of concepts on sequences and series. Previous research conducted by Takwa explained that students who use teaching materials based on discovery learning models are more interactive and better able to improve students' understanding
of concepts according to the steps. The difference in this study is that the teaching materials used are based on Islamic values.

Another research conducted by Hasanah (2015) on the development of mathematics teaching materials based on Islamic values education on the subject of instruction at MTs Negeri Mlinjon Klaten. The study explains that the quality of teaching materials for Mathematics Based on Islamic Values Education in general is very good with an ideal percentage of 85.33%. Student responses to Islamic Value-Based Mathematics Teaching Materials are in the High category with an ideal percentage of 79.61%. This means that teaching materials and learning mathematics based on Islamic values education are attractive to students.

2. METHOD

The type of study used research and development (R&D) to produce specific products and test their effectiveness (Sugiyono, 2017). The procedure used is the research model, namely the ADDIE model. The stages used in this research are analysis, design, development, implementation, and evaluation. The advantages of the ADDIE model are that it is simple and easy to learn and has a systematic structure. In comparison, the drawback of this model is that it takes a long time because, in this model, the designer must be able to analyze the two components first. After all, these components are critical and affect the next stage of learning design (Duli, 2019). Data collection instruments are validation sheets, questionnaires, and tests (pre-test and post-test).

Two data were obtained in qualitative and quantitative data. Qualitative data in comments and suggestions for media improvement from material experts, design experts, and student trials. While quantitative data were obtained from the results of evaluation work on 30 students of social arithmetic material. The data on the validity of teaching materials was obtained from a questionnaire of material experts and design experts. The assessment results were converted into qualitative data with a Likert scale with four categories of four categories, where the lowest category (1) stated that it was not suitable and the highest type (4) noted that it was very reasonable. To determine the practicality of teaching materials used, questionnaire data from teacher and student responses. The results of this assessment are converted into qualitative data with a Likert scale.

To determine the effectiveness of teaching materials, used test sheet data. The design used is pre-test and post-test. There are five pre-test and post-test questions each, containing indicators of understanding mathematical concepts for social arithmetic material. The maximum score for each question is three, and the minimum is 0. The score calculation determines the increase in students’ ability to understand mathematical concepts.

The test results then tested the data using the gain normality test (N-Gain). After using the learning module, this test determined the interpretation of increasing students’ conceptual understanding abilities. The N-Gain formula is as follows:

\[
N \text{- Gain (g)} = \frac{\text{Nilai Posttest} - \text{Nilai Pretest}}{\text{Nilai Max} - \text{Nilai Pretest}}
\]

The N-Gain (g) value calculation results were then classified using the following classification.

<table>
<thead>
<tr>
<th>Gain Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 0.7</td>
<td>High</td>
</tr>
<tr>
<td>0.3 &lt; g &lt; 0.7</td>
<td>Currently</td>
</tr>
<tr>
<td>0 &lt; g &lt; 0.3</td>
<td>Low</td>
</tr>
</tbody>
</table>

The module is practical if the data results show an increase in students' ability to understand
Development of Islamic Value-Based Mathematics Teaching Materials to Improve Students’ Understanding of Mathematical Concepts

mathematical concepts and include the "Medium" or "High" interpretation of the N-Gain classification (Budi Susetyo, 2016).

3. RESULTS AND DISCUSSION

After analyzing the data, the product is validated by material expert validators and design experts. Mr. Ali Hanafiah, S.Pd as a teacher at SMP N 1 Punggur as a material and integration expert. Mr. Choirudin, M.Pd is a design expert. After analyzing the quantitative data from the module validation questionnaire by the validator, the validity results are obtained, as shown in Table 3. This value was brought before the revision was carried out. The value from the learning expert was accepted after the correction.

<table>
<thead>
<tr>
<th>No.</th>
<th>Rated aspect</th>
<th>NA percentage (%)</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theory</td>
<td>83%</td>
<td>Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Islamic integration</td>
<td>91%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Language</td>
<td>81%</td>
<td>Valid</td>
</tr>
<tr>
<td>4.</td>
<td>Design</td>
<td>89%</td>
<td>Very Valid</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>86%</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Based on Table 2, the average results of the validation of the learning module are 86%. This shows that the learning module developed meets the valid criteria. Meanwhile, the practicality component was validated by three junior high school mathematics teachers. The aspects assessed in the practicality component of the module consist of attractiveness, ease of understanding, and clarity of writing. The results of the practicality validation are presented in Figure 1. Thus, the module can be interesting. The report is clear and easy to understand.

The average result of the practicality validation of the module was 83%. In addition to providing quantitative assessments, the validator also offers comments and suggestions for improvements to the developed module. Comments and suggestions from the validator are used as a reference for revising the module. Based on the comments and suggestions of material experts related to integrating Islam with social arithmetic material, especially the integration of Islamic values, it was declared excellent and feasible to be used in the next stage. Moreover, here is a picture of an Islamic-based math module. Thus, the developed module is ready to be tested in the field, and further research can be carried out to see the module’s effectiveness.
Before Validation

After Validation

Figure 2. Islamic-Based Mathematics Module Before and After Validation

After the module has been tested for validity, the next step is to test the product's effectiveness in a pre-test and post-test. The effectiveness test was conducted in 2 classes: class VII 1 and class VII 2. Class VII 1 is an experimental class consisting of 34 students, and class VII 2 is a control class comprised of 34 students. Test the effectiveness in terms of pre-test and post-test given by the researcher. The pre-test was given first before the two types received learning treatment. At the same time, the post-test is given at the end when all the material has been provided. The pre-test and post-test results were analyzed using a t-test to determine the module's effectiveness. Meanwhile, to find out the increase in students' understanding of mathematical concepts, it was analyzed using n-gain.
Based on the normality test of the pre-test results in the experimental class, an average value of 35.88 was obtained, with = 0.05 then it was received and a standard deviation of 15.30, so \( L_{\text{count}} = 0.0908 \) and \( L_{\text{table}} = 0.1497 \), it means \( H_0 \) is accepted, and the sample comes from a normally distributed population. While the normality test in the control class obtained an average value of 33.68 with = 0.05 and standard deviation of 16.20, then got \( L_{\text{count}} = 0.1450 \) and \( L_{\text{table}} = 0.1497 \), it means \( L_{\text{count}} < L_{\text{table}} \) can be concluded \( H_0 \) is accepted, and the sample comes from a normally distributed population.

The homogeneity test of the experimental pre-test class consisting of 34 students and the control class consisting of 34 students resulted in \( X^2_{\text{count}} = 0.1092 \) and \( X^2_{\text{table}} = 3.481 \). It means \( X^2_{\text{count}} \leq X^2_{\text{table}} \), it can be concluded that \( H_0 \) is accepted, and the sample comes from a homogeneous population.

Analysis of the pre-test data using the t-test resulted in a variance in the experimental class of 234.0463 and the control class of 262.5891. \( t_{\text{count}} = 0.2800 \) and \( t_{\text{table}} = 1.995 \) which means \( t_{\text{count}} < t_{\text{table}} \). It can be concluded that \( H_0 \) is accepted, and the average mathematical concept understanding of the experimental class and control class students has the same ability.

The post-test normality test in the experimental class resulted in an average value of 70.74 with a standard deviation of 12.56 and = 0.05 obtained \( L_{\text{count}} = 0.1301 \) and \( L_{\text{table}} = 0.1497 \), which means \( L_{\text{count}} < L_{\text{table}} \) can be concluded \( H_0 \) is accepted, and the sample comes from an average population. While the results of the normality control class obtained an average mark of 64.118 with a standard deviation of 12.152 and = 0.05 received \( L_{\text{count}} = 0.1264 \) and \( L_{\text{table}} = 0.1497 \) it means \( L_{\text{count}} < L_{\text{table}} \) can be concluded \( H_0 \) is accepted, and the sample comes from a distributed population average.

Post-test homogeneity test of the experimental class consisting of 34 students and the control class composed of 34 students resulted in \( X^2_{\text{count}} = 0.1320 \) and \( X^2_{\text{table}} = 3.481 \), which means \( X^2_{\text{count}} < X^2_{\text{table}} \) can be concluded \( H_0 \) is accepted, and the sample comes from a homogeneous population.

Analysis of the final test data (post-test) using the t-test resulted in an average in the experimental class of 70.734 and the control class of 64.118, and the variance produced in the realistic style of 153.387 and the control class of 147.683 \( t_{\text{count}} = 2.108 \) and \( t_{\text{table}} = 1.995 \) which means \( t_{\text{count}} > t_{\text{table}} \). It can be concluded that \( H_0 \) is rejected, and by looking at the averages in the experimental class and control class, it can be concluded that learning using Islamic-based mathematics modules is more effective than learning that does not use Islamic-based mathematics modules.

N-gain normality test in the experimental class resulted in an average value of 0.5633 with = 0.05 and a standard deviation of 0.0877 obtained \( L_{\text{count}} = 0.1184 \) and \( L_{\text{table}} = 0.1497 \) it means \( L_{\text{count}} < L_{\text{table}} \) can be concluded that the sample comes from a normally distributed population. While the n-gain normality test in the control class produces an average value of 0.4714 with = 0.05 and a standard deviation of 0.0653 obtained \( L_{\text{count}} = 0.1245 \) and \( L_{\text{table}} = 0.1497 \), it means \( L_{\text{count}} < L_{\text{table}} \) so it can be concluded that \( H_0 \) is accepted and the sample comes from a normally distributed population.

N-gain homogeneity test in the experimental class, which consisted of 34 students, and the control class, which amounted to 34 students, resulted in \( X^2_{\text{count}} = 0.6048 \) and \( X^2_{\text{table}} = 3.481 \). It means \( X^2_{\text{count}} < X^2_{\text{table}} \) can be concluded that \( H_0 \) is accepted, and the sample comes from a population homogeneous.

Analysis of the final test data (post-test) n-gain used to see if there is an increase in students' understanding of mathematical concepts analyzed using the t-test resulted in an average in the experimental class of 0.5634 and the control class of 0.4714 and the resulting variance in the practical course of 0.0088 and the control class of 0.0043 obtained \( t_{\text{count}} = 2.108 \) and \( t_{\text{table}} = 1.995 \) which means \( t_{\text{count}} > t_{\text{table}} \) it can be concluded that \( H_0 \) is rejected and by looking at the average in the experimental class and control class it can be supposed that there is an increase in understanding mathematical concepts whose learning uses Islamic-based mathematics modules. The last stage is
an evaluation where this stage is carried out on all previous stages. Evaluation is carried out at each stage to find errors and justifications. With the review at each stage, Islamic-based mathematics modules to improve students' understanding of mathematical concepts produced are feasible to be used in the learning process.

Islamic values are related to the combination of mathematics with Islamic values, and do not forget the characteristics of these sciences (Huda et al., 2016; Mustamin & Wahono, 2020). In mathematics teaching materials, the internalization of Islamic values should be reflected in the examples of questions, then in practice questions and exam questions that discuss problems from the Islamic perspective without changing the competency standards in the predetermined curriculum. Integrating Islamic values in question combines Islamic values and mathematics in general with Islam without eliminating the uniqueness between the two sciences. The integration of Islamic values in mathematics teaching materials can at least be illustrated in examples of questions, practice questions, and exam questions that raise problems that occur in an Islamic perspective as an effort to realize better mathematics teaching materials that can improve students' understanding of mathematical concepts (Choirudin et al., 2021; Isnaniah & Imamuddin, 2020).

4. CONCLUSION

Based on the discussion study that researchers have carried out, the following conclusions are obtained: Islamic value-based mathematics module to improve understanding of mathematical concepts that have been developed with ADDIE procedures consisting of analysis, design, development, implementation, and evaluation. The modules developed are categorized as suitable for use in the field. The response of students regarding the use of Islamic values-based modules is exciting. Based on the results of the two-sample hypothesis testing using the t-test, it can be concluded that the module is effectively used, and based on the n-gain results obtained, it can be concluded that there is an increase in students' understanding of mathematical concepts.

ACKNOWLEDGEMENT

Thanks to the Lampung University, SMP Negeri 1 Puggur and IAIMNU Metro Lampung for supporting the implementation of this study.

References


Development of Islamic Value-Based Mathematics Teaching Materials to Improve Students’ Understanding of Mathematical Concepts


