

Development of Teaching Material “Mathematics Contribution to the Implementation of Sharia” in Mathematics in Islamic Treasure Course

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Abstract: This research was based on the needs of teaching material of Mathematics in Islamic Treasure (MIT) course. This research applied research and development method, used to produce and test the effectiveness of the product. The result of this research was teaching material on the topic of mathematics contribution in the implementation of sharia, which is expected to be taught by integrating history into mathematics learning. The procedure of research and development we applied involved seven steps, namely: potentials and problems, data collection, product design, design validation, limited trial, field test, and limited production. In conclusion, teaching material that have been designed should: meet the valid criteria, can be used in MIT lectures with historical integration strategy on mathematics instruction, and effective in achieving learning mastery.

1 INTRODUCTION

The curriculum implemented at the Mathematics Education Department of Teacher Training and Education Faculty of Nusantara Islamic University contains two courses of identification, one of those is Mathematics in Islamic Treasure (MIT). This course has a level of 2 credit hours, and administered to meet special needs, for example to make students understand the relationship between mathematics with the implementation of Islamic laws (Kurikulum Program Studi Pendidikan Matematika FKIP Uninus, 2016). In order to achieve the goal, the lecturer had designed and arranged the syllabus, several handouts and student worksheets required for the lecture.

Reading materials that can support the lectures of MIT, both printed books and articles published in various websites, are widely available. However, these materials did not entirely meet the reference needed by the MIT course. This is due to the particularity of the subjects of MIT, which probably is not discussed in the available sources. There is no other choice, a more representative and comprehensive instructional material of MIT needs to be compiled so that it can be used as lecture

material. Given the breadth and depth of the MIT study, for the sake of practicality and for the consideration of time and budget efficiency, we decided to design the course materials part by part.

In this article we will discuss about teaching materials development from one of the subjects of MIT, namely the contribution of mathematics to the implementation of sharia. One of the sub-subjects we developed is the distribution of inheritance (*faraa-idl*), which requires mastery of operations on fractions. Although it seems simple, in practice it was still found high school graduates, even college students, who have difficulty in finding solutions from the problems about operations on fractions.

In the holy book of Qur'an letter Annisaa verses 11-12 we could find fractions: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{2}{3}$. Those are very simple at first. However, adding up some of the fractions will produce a new fraction with the denominator of the Lowest Common Multiple (LCM) of the denominator of the initial fraction. Not only that, the provision that men earn twice the women's part (Al Quran, Annisaa verse 12), also the provisions of *dzawil furudl* and *ashabah*, will eventually bring up fragmentary numbers that are not simple for those who do not usually solve problems related to fractions.

In relation to the use of developed teaching materials, researchers are interested in the opinions of Panasuk and Horton (2012) which stated that mathematics cannot be separated from history. An interesting opinion related to the application of the history in mathematics learning, in this case in MIT learning with the teaching materials we developed, proposed by Wahyu and Mahfudi (2016). According to them, as a source of knowledge, history provides valuable information related to events that has occurred in the past. Knowledge gained through the history of mathematics was very useful to be used in learning. It is possible when we take advantage of past developments that support progress in the present.

Based on various thoughts that have been described, researchers agreed to arrange teaching material of MIT subjects on the topic of mathematics contribution to the implementation of sharia, which is expected to be taught through the application of historical integration on the instruction of MIT. The research questions formulated in this study is, on the development of teaching materials on the topic of mathematics contributions to the implementation of sharia: 1) how is the validity of teaching material that have been designed? 2) how is the practicality of teaching material that have been designed? 3) how is the effectiveness of teaching material designed?

The research and development conducted by the research team has the objective of producing teaching material for the subjects of MIT—mathematics contribution to the implementation of sharia—which is valid, practical, and effective.

2 METHODOLOGY

Research was conducted by using research and development method, the research method used to produce and test the effectiveness of a product. The result of this research was teaching material—mathematics contribution to the implementation of sharia—through the application of history integration in MIT learning.

From various development models offered by the experts, researchers have chosen the development model of Sugiyono (2013) which set 10 stages of development, namely: 1) Potentials and problems, 2) data collection, 3) product design, 4) design validation, 5) design revision, 6) limited trial, 7) product revision, 8) field test, 9) product revision, 10) mass production. In practice, the researchers decided to do all the stages set by Sugiyono (2013)

but tried to shorten the procedure by picking several possible steps to be merged. In addition to merging certain steps, the researchers also modified some steps. Precisely, steps 5, 7, and 9 were not done separately, but merged with design or trial. As for modification, researchers applied it to the 6th step (limited trial), 8th step (field test) and the 10th step (production). Furthermore, we will explore the reasons or details about the merging and modification that we did.

The researchers did not place the revision step separately. The reason is, the revision was done at least 3 times repeatedly: immediately after the completion of the teaching material, after the end of limited trial, and after field test process. Unlike Sugiyono (2013) who tested the usage in three different classes, the researcher did it to 11 students: three students representing lower class, four students came from middle class and another four representing upper class.

Furthermore, while Sugiyono (2013) done the experiment in three different schools, in this study we test the product by applying CAR (Classroom Action Research). CAR conducted on 27 students 4th semester of the Department of Mathematics Education the Faculty of Teacher Training and Education Uninus academic year 2016/2017. The last stage was the production of research and development, which Sugiyono (2013) did in bulk (mass production), but the researchers did so for a limited scope.

2.1 Research instruments

In this research and development, the researchers used the following instruments: validation sheets, observation sheets, questionnaires, and tests. These instruments were used in three different processes, namely: product design, limited trial, and field trial. Product design toke a validation sheet filled by experts, to determine the validity of teaching material. The limited trial used two observation sheets: the first was filled by students to analyze the practicality of teaching material; the second was filled by lecturers to analyze the learning activities. Field test applied: tests, observation sheets and questionnaires; all were used to analyze the effectiveness of teaching material.

2.2 Research procedure

After some merging and various modifications, the procedure of the research and development undertaken by the researchers will be illustrated in the following chart.

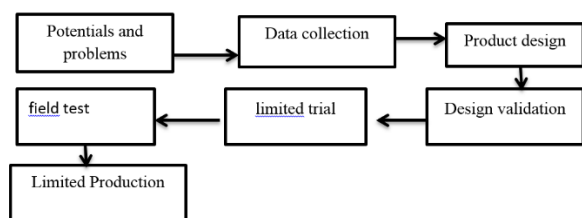


Figure 1: Procedure of research and development.

3 RESULT AND DISCUSSION

The results of the study are presented and discussed in accordance with the research procedure, then divided into five sections, namely: 1) preparation, which summarizes the steps of potentials and problems with data collection 2) design of teaching materials, which also includes validation and revision steps 3) limited trial, 4) field test, and 5) production.

3.1 Preparation

Mathematics contribution to the implementation of the sharia is one of the subjects in the MIT course. In the curriculum structure of mathematics education department, MIT is placed in 4th semester. In this semester there are important role that is being undertaken by students, and there are various important events experienced by them. The explanation can be illustrated as follows: most students acting as the core organizers of the organization of associations in the campus environment, some students are sent as representatives of the department in various academic and student affairs events, and at the end of the semester all of them will be enrolled in Real Work Lecture. Conditions that have been described need more provision than an understanding of mathematical content and mathematics education. As a characteristic or marker course of the department, MIT has a great potential to prepare and color students in such a way that they have strong mathematical beliefs in order to finally become self-masters of Islamic mathematics teachers.

Based on studies of the various potentials and problems that have been described, researchers began collecting other supporting data to create teaching materials. Data collection is done through: literature studies, curriculum analysis, and needs analysis. In addition to the aforementioned ways, to obtain comprehensive data the research team also conducted interviews with students and department leaders.

The decision to develop MIT materials, in this case “mathematics contribution in the implementation of the sharia,” is a manifestation of the commitment to provide adequate learning resources for the achievement of quality learning. The commitment of researchers in accordance with the opinion of the Textbook Committee, Education Bureau (2016) is that in order to apply the curriculum effectively, a conducive learning environment which among them requires the provision of quality learning and teaching resources is necessary.

3.2 Design of teaching materials

Based on the results obtained from previous steps, namely the study of various potentials and problems, and analysis of miscellaneous data or materials collected; researchers decided to construct suitable teaching materials—mathematics contribution to the implementation of the sharia—to be taught by applying historical integration to MIT instruction.

Prior to the trial to students on a limited scale, teaching materials that have been designed then validated in advance by two validators, namely: an expert of Islamic education, and an expert in mathematics education. Criteria of validity that the researchers used is the criteria put forward by Akbar (2013), as presented in the table 1.

Table 1: Criteria of learning material validity.

	Score	Category of Validity
1.	85,1%–100%	Very valid, or can be used without revision
2.	70,1%–85%	Quite valid or can be used but need a small revision.
3.	50,1% –70%	Less valid, recommended not used because it needs major revision
4.	01% –50,%	Invalid, or may not be used.

Next, we will present the results of validation of teaching materials by two validators. The results presented are the average scores, with the validity of each component is, a component is said to be valid if

at least satisfy the criteria is quite valid. Validation results from the two validators will be presented in the table 2.

Table 2: The result of validation of teaching material.

	Rated aspect	Average Score percentage	Note
1.	Relevance	82.5 %	Valid
2.	Accuracy	80 %	Valid
3.	Completeness of presentation	85 %	Valid
4.	Systematic of presentation	87.5 %	Valid
5.	The alignment of the presentation with the integration of history	77.5 %	Valid
6.	Conformity of the presentation with the Islamic rules	82.5 %	Valid
7.	Presentation method	82,5 %	Valid
8.	Conformity of language with good and correct of the rules of Bahasa Indonesia	85 %	Valid
	Total	82.81 %	Valid

The table above shows the average of overall percentage score of the two validators is 82.81%, with the note of each component meeting the valid criteria. The score of 82.81% is in the range of 70.1% – 85%, which means that the instructional material that has been designed is quite valid and requires a small revision before use. Such an assessment is obtained because of the commitment of researchers to produce adequate teaching materials for MIT course, one of them using real context in religious practice. This is consistent with the opinion of Westera (2011) about contextual learning that cannot take place in a vacuum but must be related with real-world events to make sense for the students.

3.3 Limited Trial

After being corrected in accordance with the validator's suggestions, product design that has been made was then piloted on a small group of students. Eleven students selected were from: high group of four students, medium group of four students, and low group of three students. The purpose of the limited trial was to determine the practicality of the learning material that has been made. The criteria of

practicality test in this research and development refers to the criteria used by Ningrum (2014). Criteria referred to is, learning material is said to be practical if it meets the following indicators: 1) the implementation of lecture program plan according to the lecturer should at least meet the good criteria; 2) learning material according to the assessment of the students should at least meet the good criteria.

The observation during the limited trial showed that almost all of the activity points listed in the lecture plan were conducted by the researcher. The only activity that researcher did not do is gave homework to students. Researcher deliberately did not give homework. The reason was, that in this trial the researcher only held once lecture meeting—to the students who are not taking the course—to know the criteria of practicality of learning materials that have been made. Scores obtained by researcher on the observation sheet by the lecturer is 92.8%, which means it meets the criteria of very good. Meanwhile, the questionnaire results about students' responses to learning material gave an average score of 3.75. From the highest ideal score of 5, the score obtained categorized as the good category.

A very good category for the implementation of instruction by using teaching material that have been designed, and good category for students' responses to teaching materials, indicating that the MIT material that have been designed are said to be practical. Nevertheless, the researchers continued to make revision, in this case on the layout and coloring of the figure, to be more interesting; in accordance with the suggestions provided by students. We did this because we agreed with Plank et.al. (2014), which stated that students were expected to be able to provide feedback to teachers, about: their learning needs, and about the teaching they were getting. Meanwhile, teachers had to create learning conditions that support active student disclosure.

3.4 Field Test

Subsequent activities, products that have been tested its practicality was applied in real conditions for wide scope. Trial are conducted using Classroom Action Research (CAR). CAR is conducted to 27 students in 4th semester of the Department of Mathematics Education of the Faculty of Teacher Training and Education Uninus, academic year 2016/2017. The effectiveness criteria in this development research refers to the criteria used by Mukhlis (2005), which was based on: 1) mastery learning, 2) the ability of lecturer in managing

instruction, 3) students' activities, and 4) students' responses to instruction. If at least three aspects of the four aspects are meet the criteria, provided that the mastery learning aspect was met, then the instruction is declared effective. In order to know the effectiveness of learning material that have been designed, then the researchers decided to measure all aspects except student activities.

3.4.1 Learning Mastery

Student learning mastery was obtained from the quiz given at each end of the course, with the criteria of learning mastery in accordance with the provisions of Depdikbud (Triantoro, 2010). Each student was said to have achieved learning mastery (individual learning mastery) if the proportion of correct answers of students reached $\geq 65\%$. Meanwhile, a class was said to have achieved learning mastery (classical learning mastery, abbreviated with CLM) if there are $\geq 85\%$ of students who have achieved learning mastery in the class.

Table 3: Learning mastery in each cycle.

	Cycle	Number of students who have achieved learning mastery	Classical Learning mastery (CLM)	Note
1.	First	22	81 %	CLM is not reached
2.	Second	24	89 %	CLM reached
3.	Third	23	85 %	CLM reached

Table 3 showed that classical learning mastery had not been achieved in the first cycle. Nevertheless, the researchers decided not to provide re-quiz to students who had not yet reached individual learning mastery, but simply assigned the task of re-studying parts they had not mastered, outside of MIT's lectures. Despite the decline in performance from the 2nd cycle to the 3rd cycle, in both cycles the classical learning mastery had been achieved.

Classical learning mastery could be achieved mainly due to the commitment of lecturers, to always try to invite and remind the students to jointly implement the mandate of curriculum of the department. The mandate referred to is a commitment to implement and at the same time help to create a quality curriculum, in this case to

articulate the competencies required for lifelong learning and the competencies required for holistic development. In order to achieve the success of learning, so that can reach mastery learning, lecturers are guided by various tools which according to Guskey (2007) can help the teachers to increase their power. The various tools or strategies suggested by Guskey are feedback, correction, enrichment, and instructional alignment.

3.4.2 The Ability of Lecturer in Managing Instruction

During classroom instruction activities, researchers were observed by one of the lecturers who teach MIT. Observations were conducted by referring to the observation sheet prepared by the team, which contains all of the instruction steps that should be done by the lecturer. Implementation of activities is assessed starting from not implemented at all until it is done very well, by giving the value 0 to 4. The final value of each cycle is the average of all scores in percentage forms. The results of observation by the lecturer can be seen in the following table.

Table 4: Observation result of lecturer activity in each cycle.

Cycle	Average Value	Category
First	0,82	Good
Second	0,94	Very Good
Third	0,90	Very Good

Table 4 showed that MIT lectures have been well managed, or even very well. Such an assessment was obtained because of the commitment of researchers to improve knowledge in terms of education and learning materials. The commitment was realized by carefully studying the material content and discussing the steps of the instruction activities to be undertaken, so that the instruction became simple. In order to obtain simple instructions, lecturers try to build positive relationships with students: both inside and outside the classroom, at the time of study or outside of lecture hours. Such lecturers' effort is in accordance with the opinion of Liberante (2012) on the importance of building positive relationships between teachers and students in order to create a quality learning environment.

3.4.3 Student responses

In this study, students' responses were captured through journals filled with the students about their responses and suggestions to the instruction of each cycle. Students' opinions were further interpreted into 3 response categories: positive, mediocre, and negative. The results of the interpretation of the journal filled by the students could be seen in the table 5.

Table 5: Student's respons

No	Category	RESPONS		
		1 st cycle	2 nd cycle	3 rd cycle
1.	Positive	24	25	27
2.	Negative	2	1	0
3.	Mediocare	1	1	0
4.	% Positive	88.9	92.6	100
5.	% Negative	7.4	3.7	0
6	% Mediocare	3.7	3.7	0

In the table 5, it's appeared that almost all students gave a positive response to instruction, on each cycle. According to researchers, it happened because the students were actively involved in learning. In addition, the responses and suggestions they provide at the end of each cycle, responded back by the research team, to improving instruction. Researchers agreed with Spiller (2009) who stated, it is generally believed that feedback is an important part of the learning cycle.

All three parts of the field test had been carried out. The learning mastery analysis concluded that classical learning mastery had been achieved; the learning activity analysis resulted in a very good category; and analysis of student responses also resulted in a positive category. Based on those three results, it can be concluded that the teaching materials the topic of Mathematics Contribution to the Implementation of the Sharia which had been designed through the integration of history in MIT lecture meet the effective criteria.

3.5 Production

The last part of our research and development was producing output research, in the form of teaching material. In the meantime, we decided to produce only limited teaching material, enough to meet the needs of the lectures themselves. Mass production will only be done if we have finished compiling all the topics studied in MIT lectures.

4 CONCLUSIONS

In accordance with the formulation of the problems that have been described in the beginning, we will put forward three conclusions. In the development of teaching materials for the topic of mathematics contributions to the implementation of sharia: 1) The teaching material that have been designed meet the criteria valid with quite valid category; 2) The teaching material that have been designed can be used in MIT lectures with historical integration strategy on mathematics instruction; 3) The teaching material that have been designed is effective in achieving learning mastery.

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