Students' Mathematics Learning Model in the Integration of Character Value (PMT-Character)

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ABSTRACT---- *This study aims to determine valid, practical and effective characteristics of the mathematics learning model in the integration of character values of mathematics education students. This study is a Research and Development (R&D). The process of model development refers to the Plomp development model, which includes 4 phases, namely (1) the initial investigation phase, (2) the design phase, (3) the realization phase and (4) the test, evaluation and revision phase. There was twice the test activity in this study—the first test conducted in class A and the second in class B. The sample was the students in the Mathematics Education Study Program, Faculty of Tarbiyah and Teacher Training at the IAIN Palopo Third Semester 2020. The results showed that the PMT- character meets the valid criteria with a value of 3.72. There are two results obtained in the first test. (1) The PMT-Character model is practical, but there are still some things that need to be revised based on the suggestions of observers. (2) The PMT-Character model has been ineffective because of the three indicators and only one indicator that meets the student response indicator. In contrast, student learning outcomes and student activities in internalizing character values have not been met. The analysis results in the first test were used to revise the model and its devices before proceeding to the second trial stage. The results of the second test are: (1) the PMT-Character model has been practical; (2) the PMT-Character model has been effective. Following the development phase, the PMT-Character model was obtained that was valid, practical, and effective and had three characteristics, namely: (1) the PMT-Character model was developed as an integration model of character values , which proceeds in stages and hierarchically following the stages of learning implementation; (2) the model is designed to internalize the character values that exist in students through several supporting activities; (3) the tools used are designed to be attractive and integrated with Islamic values.*

Keywords--- Development, PMT-Character, Islamic Mathematics
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1. INTRODUCTION

To realize the quality of quality learning, the government issued Government Regulation no. 19 of 2005 concerning National Education Standards (SNP) for Higher Education as a further elaboration of the National Education System Law which contains content standards, process standards and graduate competency standards (Standar Nasional Pendidikan [JDIH BPK RI], 2005). In addition, the Directorate of Islamic Higher Education, the Directorate General of Islamic Education, Ministry of Religion of the Republic of Indonesia has established competency standards for the alumnus of undergraduate students of the Mathematics Education Study Program. The alumnus of undergraduate should have a profile as an educator and developer of mathematics teaching materials knowledgeable, in-depth and up-to-date. , good personality, knowledge and up-to-date in their field and capable of carrying out duties and responsibilities based on Islamic ethics, science and expertise (Standar Keagamaan Pendidikan Tinggi Keagamaan Islam, 2019). How important it is to seek knowledge is also explained by Allah SWT in Q.S. Al-Alaq/96: 1-5, in addition to knowledge, the character is very important in education.

Character education is an effort made by educators to help shape students' character. It is included in the exemplary behaviour of the lecturer when speaking or delivering the material, how the lecturer tolerates it, and various other related matters (Zubaedi, 2012). Apart from the terms character, courtesy, and morality, there are no significant differences. All three are defined as an action that occurs without thinking anymore because it is embedded in the mind, and in other words, all three can be called habits (Andayani & Majid, 2004).

Character education implementation in Indonesia has been around for a long time. It's just that the use of the term character has only been around for the last decade or so. It is formerly known as moral and civic education, character

education and others. Currently, character education is getting more serious attention from the government; even in 2018, the government, through the ministry of education and culture, issued a national movement called Strengthening Character Education (PPK) which is further regulated in (Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia, 2018). This movement requires educational institutions to be the leading locomotive of character education pioneers. One of the Surah in the Qur'an that discusses a person's character is Q.S. Luqman/31: 17-18. Likewise, the command to do good and be good is explained by Allah in Q.S. Al-Baqarah/2:195.

The results of the researcher's observation as a teacher give an idea that the pattern of the learning system is centred on the institution or lecturer. There are several tendencies of mathematics lecturers to teach by giving general explanations of the subject. Then distribute the material and sub-materials to students for further presentation on the next opportunity. The learning model used is teacher-centred.

One of the compulsory subjects in the Mathematics Education Study Program, Faculty of Tarbiyah and Teacher Training, IAIN Palopo, is an Islamic mathematics course. Islamic Mathematics is a subject taught in odd semesters and is an integration of knowledge from mathematics and the Koran. The learning outcomes are that students can understand the mathematical structure of the number 19 in the Quran, develop mathematical concepts in the Koran, and study mathematics and the Koran. Likewise, the soft skills expected to be formed in students are fear of God Almighty and showing religious attitudes, having skills and can understand mathematical concepts in the Al-Quran. Thus, they can be applied in social life with the values of honesty, enthusiasm, and mutual respect for others.

From some of the descriptions above, the author examines the extent to which the development of a mathematics learning model in the integration of character values (PMT-Character) for mathematics education students at IAIN Palopo. This research is expected to contribute to the characteristics of the PMT-Character model in the ongoing learning process.

1.1. Islamic Education Theory

In Islam, education is fundamental, and the goal to achieve in Islamic education is a balance between the life of the world and the hereafter. There is no difference between men and women, so every Muslim, both male and female, has obligations and responsibilities. Equal opportunity to seek knowledge and have the same chance to obtain an education. Rashid Rida argues that the scholars agree that there is a similar obligation to seek knowledge for men and women. People with different social, political and economic structures must study and equip themselves with knowledge and conduct their duties to investigate.

1.2. Ki Hajar Dewantara's Education Concept

Character education in the perspective of nationality, culture, humanity, development and progress, which is the spirit of the Ki Hajar Dewantara concept, is the correct answer for the Indonesian people to prepare themselves for the globalization of the 22nd century and in entering the era of science and technology advancement in the future. In-depth understanding and application of noble character as a character for students and skills in maximizing their potential through implementing the Ki Hajar Dewantara education system concept in learning at school. It will be able to be a provision to face MEA and also live their adult lives in the era of globalization. With the principles and outlook on life to be a human being, *Ing ngarsa sung tuladha* (in front of setting an example), *Ing Madya mangun karsa* (in the middle giving opportunities to work), *Tut wuri handayani* (from behind giving encouragement and direction).

1.3. Character Education in Mathematics Learning

In general, educational goals are classified into three domains: cognitive, affective, and psychomotor. The cognitive domain shows educational purposes directed at intellectual abilities, thinking abilities and intelligence achieved. The affective domain shows educational goals directed at the abilities to behave in the face of reality or problems that arise around them. The psychomotor domain shows educational purposes that are required at skills, specifically for learning mathematics, understanding physical skills, such as painting shapes, also includes skills to perform certain algorithms that only exist in mind.

(Bishop et al., 2010) gave view that there are three categories of values in mathematics learning, namely: (1) general education values, (2) mathematics values, and (3) mathematics education values. These values can be integrated through the implementation of the mathematics teaching and learning process and conveyed by the lecturer through the interaction of lecturers and students. Through learning mathematics, students are expected to think logically, rationally, critically, carefully, efficiently, effectively, honestly, and have high integrity. (Siahaan, 2019) said that the teaching and learning process of mathematics is not only teaching mathematical concepts but also internalizing mathematical values (characters) to students. (Fadillah et al., 2019) that lesson plans that involve the formation of students' character must be designed

intentionally (by design) because it cannot happen by chance. The use of innovative learning models in learning mathematics needs to be developed to shape students' character. (Satrianawati, 2015) that there are five aspects to shape character in education in the 21st century: (a) building intelligence and good attitudes; (b) prioritizing cooperation over individuals; (c) regulating literacy mentality, thinking, being sensitive, and act, (d) prioritize quality over quantity; and (e) resolve conflict resolution.

1.4. Components of the Integrated Mathematics Learning Model Character values (PMT-Character)

The components of the integrated mathematics learning model of character values refer to the components proposed by (Joyce et al., 2011), which include: (syntax), which is a sequence of activities commonly called phases, (social system), namely (1) the role of the teacher (lecturers) and students, (2) the types of rules needed, (3) the principle of reaction, which gives an overview to the teacher (lecturer) about how to view or respond to the questions of students (students), (4) a support system, namely the conditions required by the model, (5) instructional impact and accompaniment, namely where the instructional result is in the form of integration of character values that are achieved directly by students (students) according to the expected goals. The PMT-Character model uses the basis of the 5E learning cycle model developed by the Biological Science Curriculum Study (Bybee, 2013), which is elaborated on and the valuing process models by Quisumbing (UNESCO Bangkok, 2006). The results of the elaboration of the two models were confirmed by the affective domain of (Krathwohl et al., 1964); and (Lickona, 1992) theory of character. The 5E Learning Cycle (Engagement, Exploration, Exploration, Elaboration, and Evaluation) model was chosen as the basis for syntax development. While the Quisumbing valuing process model was chosen with three main considerations, namely: 1) recommended by UNESCO as a model for value education to address various social and cultural problems; 2) assimilate with the stages of developing character value education, namely introduction, growth, development and stabilization (Supinah & Parmi, 2011)and 3) associated with the stage of moral development (moral knowing, moral feeling, and moral action (Lickona, 1992).

1.5. Syntax

The syntax of the integrated mathematics learning model of character values (PMT-Character) is as follows:

Table 1. The Mathematics Learning Model Syntax Integrated on Character Value

No	Stages	Mathematics Dimension	Values Dimension [*)]
1	Conditioning concepts and values	Exploring prior knowledge, raising questions/problems Submission of learning outcomes for Study Programs and subjects	Introducing the value of "targets" through learning activities Submission of character value indicators
2	Organizing groups	Dividing students into small groups heterogeneously	
3	Exploration and value creation	Collecting data through learning activities (practice/discussion) to solve problems Create a report of the activity results	Value Conceptualization: Learning activities Student Worksheet
4	Explanation and deepening of values	Clarifying learning experiences through class discussions Provide feedback and reinforcement of exploration results.	Conduct value deepening
5	Application and commitment of values	Application of concepts in context; broaden understanding and skills through concept study	Organizing a value commitment plan based on the target values in daily life through habituation activities
6	Evaluation and follow-up	Make a summary/conclusion of learning Evaluate the learning process and results	Conducting follow-up of the value commitment plan (habituation)

*Description: *) The specific activity depends on the integration of the character value*

1.6. Reaction principle

Important aspects that should be the main concern in the reaction principle of the integrated mathematics learning model of character values are as follows:

Table 2. Activities of Lecturers and Students on the PMT-Character Model

No	*Lecturer Activities*	*Student Activities*
1	*Lecturers carry out learning with an integrated mathematics learning model of character values.*	*Students pay attention to the explanation/information presented by the lecturer*
2	*Introducing the mathematical concepts of the Qur'an about the problems and their solutions*	*Students pay attention to the explanations given by the lecturer*
3	*Lecturers explain the cultivation of character values that will be instilled and explain the importance of character behaviour for students*	*Students listen to explanations from lecturers*
4	*Lecturers divide students into heterogeneous groups*	*Students join their respective group members*
5	*Lecturers give student worksheets*	*Students' complete student worksheets*
6	*Lecturers provide opportunities for students to ask, answer, and give opinions*	*Students ask questions, answer, and give opinions*
7	*Lecturers provide assistance/ guide, supervise, and help students who have difficulty solving problems*	*Students complete the student worksheets*
8	*The lecturer asks each group's representative to report their work results.*	*Each group that has finished t the discussion must report their group work to the lecturer*
9	*The lecturer asks several groups that have finished to present the results of their discussions in front of the class.*	*Each group representative presents the results of their group work in front of the class.*
10	*Lecturers provide scaffolding by providing a model of task completion procedures, showing students what they have done well, showing mistakes in the steps of doing assignments, and keeping students' frustration at a level they can still bear.*	*Students pay close attention to what the lecturer gives and complete the work that has been given.*
11	*The lecturer re-explains the results of the discussion that the students have presented.*	*Students listen to the lecturer's explanation*
12	*The lecturer evaluates the results of student discussions.*	*Students conclude the results of their group discussions.*

1.7. Support system

The support system needed so that this model can still be implemented namely a warm and skilled personality in managing interpersonal relationships and group discussions, lecturer skills in managing the implementation of the model, student discipline in activities, and availability of facilities to facilitate the cultivation of values and integrated learning tools for character values. Lecturers must also be able to guide the group towards behavioural assessment and commitment.

1.8. Instructional impact and accompaniment impact

- Instructional impact

In the integrated mathematics learning model of character values, the instructional impact as the expected learning outcome is the integration of character education values in Islamic mathematics, namely: a) Responsibility; b) Discipline; c) Honest; d) Cooperation; e) Hard work; and f) Curiosity.

- Accompaniment Impact

The accompaniment impact that is expected to emerge as the application of the integrated character values mathematics learning model (PMT-Character) is that the integration of character values is expected to be reflected in students' daily lives.

2. RESEARCH METHODS

The type of research used in this study is Research and Development, namely the research method used to produce certain products and test their effectiveness of these products (Sugiyono, 2017). In this case, the development of the mathematics learning model in the integration of character values (PMT-Character) for Mathematics Education students.

The research was carried out in the odd semester of the 2021/2022 academic year located at the Palopo State Islamic Institute (IAIN) campus, especially the Tarbiyah Faculty and Teacher Training Mathematics Education Study Program. The subjects in the study were students of the Mathematics Education Study Program, IAIN Palopo, and were in the third semester. This study also involved the subject of expert judgment (expert judgment), namely by involving experts in providing an assessment (content validation and construct validity) on the product prototype. These experts are taken from elements from experts in the field of mathematics education.

3. RESEARCH RESULTS AND DISCUSSION

3.1. *Process and Results of PMT-Character Model Development*

The results obtained at each stage of development in connection with the PMT-Character model development process are described below:

Stage 1: Initial Investigation

To ensure the content's validity and construct the developed learning model, a number of data and information are needed. The data and information needed are obtained through two main activities: (1) literature review and related research results; and (2) survey activities. The survey activity was carried out to obtain an overview of the problems of learning Al-Qur'an mathematics courses in relation to character education programs on campus. The focus of the study includes (i) learning tools (Curriculum, RPS, Modules, Student Worksheets) used; and (ii) implementation of learning in the classroom.

The learning tools used by the third-semester Al-Qur'an mathematics lecturer and the implementation of the learning are the main focus of the survey activities. In connection with the declaration of a character education program on campus, the survey activity was also carried out to check the readiness and implementation on campus using a questionnaire filled out by the head of the study program and lecturers of the mathematics study program. The survey activity was carried out in September 2019.

- Al-Qur'an mathematics learning tools in Semester III

Al-Qur'an mathematics learning tools are used as study materials related to the design of the model to be developed. These tools include (1) Semester Learning Plans (RPS), (2) Modules, and (3) Student Worksheets (LKM). The results of the study of RPS, Module, and LKM show that lecturers do not develop their learning tools. This is done together with other mathematics lecturers. From the RPS document, it is explicitly stated the character values that are expected to be achieved after learning. However, in the stages of learning activities (introduction, core, and closing), the scenario for seeding character values is not read as expected.

Regarding the selection of learning models, no specific learning model is used. However, if you look closely at the learning stages, it is known that the learning activities are scripted in five stages: introduction, exploration, elaboration, confirmation and closing. For the purposes of this study, the learning stage has used the name "5-stage model". The phasing of the "5-stage model" activity is in accordance with the ministerial decree No.41/2007 on standard processes. When examined further, the design of learning activities is also in accordance with the learning model of The 5E Learning Cycle (Bybee, 2013).

The RPS on each subject is listed as a lecture method in terms of choosing learning methods. The use of the lecture method shows that the learning process is teacher-centred. A learning paradigm that is not in accordance with the standard process. (PERATURAN MENTERI PENDIDIKAN NASIONAL REPUBLIK INDONESIA, n.d.) emphasises that the learning process paradigm is student-centred (student-centred). For character education purposes, the use of the lecture method does not support the process of cultivating character values that require interaction not only between students and lecturers but between students and students.

- Al-Qur'an mathematics learning activities in Semester III

Observations on Al-Qur'an mathematics learning activities were carried out in the third semester of classes A and B. In accordance with the Lesson Plan, in the learning activities in the classroom, there were no specific or explicit value seeding process activities. The seeding of values is carried out in a non-programmed or cursory manner and is more impressive in giving advice. For example, lecturers remind students not to be late in attending lectures, remind them not to be late in submitting assignments, remind them to pay attention to lecturers' explanations and remind them not to fight or disturb friends while studying or doing assignments. The lecturer's expressions are normatively an effort to cultivate values. Thus,

certain character values have been instilled even though in very minimal portions and without being planned. The results of this observation are in accordance with the results of the questionnaire for the head of study programs and *tardis* mathematics lecturers.

The social and psychological climate on campus is a condition in which social interaction among campus residents goes well to create conducive conditions for creating a dialogical atmosphere. In the context of character education, communication between lecturers and students and between students and students went well. The observations during the learning process showed that students obeyed the lecturer's advice, reprimand or direction. For example, when a student grabs or annoys a friend during the lesson and is reprimanded or reminded by the lecturer, there is no apparent challenge or irritation. Things like this are a very positive condition for the process of seeding character values.

Efforts to cultivate character values require open interaction opportunities. Thus, an active, innovative, creative and fun learning approach is needed. One of the learning methods that can facilitate this is the discussion method. The survey results show that student activities during learning are listening to lecturers' explanations, noting things that are considered important, and students are trained to work on questions. Classical Q&A is guided by the lecturer and discusses the results of the Student Worksheets.

From the results of the survey as described above, it can be concluded that: (1) the "5 stages" learning model applied by the lecturers has not facilitated the process of cultivating character values, (2) learning tools (Lesson Plan, books, and Student worksheets) are still oriented towards developing cognitive aspects and psychomotor, and (3) in the implementation of learning in the classroom there has not been a planned effort to cultivate character values. Even if there is an effort in that direction, it is done incidentally and is casuistic. Learning activities that should be a place for seeding values (affective aspects) have received less attention, at least not programmed in learning activities. Efforts to cultivate character values are important to be carried out in a programmatic manner and take place in a process. Quisumbing (UNESCO Bangkok, 2006) and (Krathwohl et al., 1964) emphasize that the formation of values (characters) in learning takes place gradually, starting with introducing values and leads to the forming a value (character). (Lickona, 1992) suggests three aspects that must be considered in character building, namely recognizing values, understanding values, and taking value-based actions.

The implication of the survey results is the need for an initial idea to develop an integrated mathematics learning model of character values (PMT-Character Model). This learning model is expected to guide lecturers in classroom learning activities oriented to cognitive achievement and effective achievement. Lecturers need a learning model that conditions students to recognize, understand, and take value-based actions. The initial idea in question is a process of value seeding starting with value introduction, value growth, development and value commitment based on activities and (teaching materials). Thus, the process and content-based integration of values is the specialty of the PMT-Character model developed.

Stage 2: Initial Design of Learning Model Products

The initial design of the PMT-Character model is based on the results of stage 1, namely the initial investigation. The results of development activities at this stage consist of: (1) the initial design of the PMT-Character model and its supporting devices; and (2) the design of the instruments used to obtain the data needed in the process of developing models and learning support devices.

Referring to the results of the initial investigation stage, the syntax design of the PMT-Character model is based on two considerations: a) the review results of the lesson plan in mathematics of the Qur'an used by the lecturer and the implementation of learning in the classroom that the lecturer applies the "5-stage model" learning model (introduction, exploration, elaboration, confirmation and evaluation) in learning activities in accordance with process standards. This "5-stage model" corresponds to The 5E Learning Cycle model developed by the Biological Science Curriculum Study (Bybee, 2013); b) seeding of values takes place in a process through several stages. A number of experts have developed value formation through learning, including integrated humanitarian learning by (Jumsai, 2008), application of the basic values of peace by (Lincoln & AmaLee, 2007), affective taxonomy (Krathwohl et al., 1964); and the valuing process model by Quisumbing (UNESCO Bangkok, 2006).

To support the process of seeding character values with the PMT-Character Model, supporting devices are also designed: lesson plans, modules, and student worksheets. Semester Learning Plans are prepared based on an analysis of the curriculum, implementation time and academic calendar. From these considerations, four concepts/topics were determined, namely: (1) the mathematical structure of the number 19 in the Qur'an, (2) the basic mathematical concepts of the Qur'an, (3) character values in mathematics, and (4) the use of mathematics in practising Islamic teachings. In accordance with the objectives of this research, the RPS developed reflects the integration of character values. Based on the topic analysis, the four subjects were taught in 12 meetings.

Stage 3: Realization/Construction

- Realization of learning model books

The mathematics learning model in the integration of character values (PMT-character model) is realized in the form of a model book. This PMT-character model book contains 6 (six) main sections, namely: (1) introduction; (2) introduction that contains (i) rationale; (ii) PMT-character model specification; (iii) limitations and potential weaknesses of the PMT-Character model; (3) supporting theories of the PMT-character model; (4) the characteristics of the PMT-character model; (5) instructional implementation of the PMT-character model and (6) examples of planning for the PMT-character model.

- Realization of PMT-character model learning tools

Products that are realized in the form of PMT-character model learning tools. At this realization stage it includes (1) Semester Learning Plan); (2) modules; (3) Student Worksheet. Based on the results of the analysis of learning outcomes at the design stage, the three devices are integrated with four-character values, namely (i) responsibility, (ii) care, (iii) curiosity, and (iv) discipline.

3.2. Description of PMT-character Model Characteristics

The characteristics of the PMT-Character model can be seen in two aspects: (1) the value seeding process and (2) quality aspects. In the PMT-character model, the process of cultivating values occurs through various learning activities (activity-based) and is facilitated by Islamic Mathematics learning tools (content-based). Activity-based integration is possible because the character-PMT model allows teachers to use various methods such as small group discussions, class discussions, recitations and short lectures. Meanwhile, content-based integration appears in teaching materials in the form of modules, student worksheets and observation sheets.

In the dimension of value seeding, this stage shows differences from the stages of value formation proposed by Karthwohl et al. (1964). (Krathwohl et al., 1964) explained that before values are embodied in behaviour, the first step must be receiving. (Krathwohl et al., 1964) did not specifically explain value recognition. The developed model of PMT character shows that before students receive grades, it is necessary to process cognition through value recognition (knowing). According to (Lickona, 1992), knowing is the first element that must be done in the value formation process.

Furthermore, to maintain the response so that it becomes a consistent attitude and behaviour, it is necessary to provide reinforcement. The PMT-character model facilitates this opportunity, namely, phase 4 of explanation and deepening of values. In this study, the lecturer provides an opportunity for one or two groups represented by members of each group to present the results of their group work to be responded to by other group members.

To maintain an understanding of the meaning of behavioural values, students need to go deeper into it. For this purpose, after class discussion, students are given the opportunity to provide feedback on the score deepening sheet. The score deepening sheet contains information about the material in the Islamic Mathematics module for further responses.

The second characteristic of the PMT-character model is the quality aspect. The quality of the PMT-character model is defined in terms of the level of validity, practicality and effectiveness. The results of the analysis of the content and construct validity assessment of PMT-character that the model has met the criteria of validity. The developed model has a solid theoretical foundation and consistency between model components internally and is supported by solid learning tools. After the second test, the level of implementation of learning activities showed a PA value = of 78.5%. This means that the PMT-character model is practically used in the integrated mathematics learning of character values. The PMT-character model is effective because it has fulfilled three aspects, namely: (1) achieving the desired learning progress, namely behaviour with minimal character to reach the implemented/developed position; (2) completeness of Islamic mathematics learning outcomes at least 75%; and (3) the positive response of students to learning with the PMT-character model with a note that aspects are met.

4. CONCLUSION

The PM-Character model has the following characteristics: (1) it is developed to improve the part that has been an obstacle to the use of the mathematics learning model so far. The part that is improved is how to design learning in the classroom to ensure that besides being active students also integrate character values by adding learning activities in the form of reviewing materials in the evaluation section. (2) This model is designed for online and offline learning. (3) This model is designed to train attitudes/characters through several supportive activities. (4) The tools used are designed to be attractive and integrated with Islamic values.

The integrated mathematics learning model, character values and learning tools meet the valid, practical and effective criteria. The judgment of experts and practitioners indicates valid criteria. Practical criteria are shown by the

implementation of the model, the response of the lecturers and the skills of the lecturers in managing to learn. Effective criteria are shown by student activities in learning, student responses to learning, and achievement of student learning outcomes.

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