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Development of a Pocket Book with Islamic Nuances Based on HOTS and Contextual Pythagorean Theorem

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Abstract

This research was a type of development research. The objective of this research aimed to develop pocket books with Islamic nuances based on HOTS (High Order Thinking Skills) and contextual material on the Pythagorean theorem and know how the feasibility, effectiveness, and practicality of pocket books with Islamic nuances with HOTS-based and contextual material on the Pythagorean theorem. The research model used in this study was the 4-D model. Data collection techniques used in stages were observation, interviews, questionnaire instruments from material experts and media experts, as well as teacher and student responses to HOTS-based and contextual pocket books and test instruments. The results of this study are in the form of pocket books with Islamic nuances based on HOTS and contextual material on the Pythagorean theorem that is feasible, effective, and practical.

1. Introduction

Mathematics is a field of study that must be studied and given at every level of education. Mathematics is a field of science that studies or examines a form, structure, change and space. Mathematics is a facilities for students to develop and practice abilities in terms of analytical, logical, critical and etc (Puma et al., 2020). mathematics is to organize reasoning and develop students to explore various fields of education that are their expertise (Kamarullah, 2017).

At this time mathematics is often associated with boring and drab lessons during the lesson. According to Grootenboer & Marshman (2016) mathematics is disliked by students because students consider it irrelevant to their needs, resulting in erroneous views of mathematics ranging from fear, anxiety, even hating mathematics itself, so that students are not happy with Mathematics. Especially for solving problems/concepts, which results in student learning being inactive/passive, preferring to talk to friends, not paying attention and making joke at each other, so they don't listen carefully to what the teacher says.

As for the factors that influence the process of learning mathematics is first, the skills of educators in the classroom and the ability of educators to develop teaching materials properly and appropriately. An educator can use all the facilities provided by the school to maximize the teaching and learning process, and it is also possible that the teaching materials provided are in accordance with current needs and trends. In general, the teaching materials used in schools are textbooks which have the same role as learning media in achieving learning objectives, because as is known, the function of the textbook itself is to improve and increase the quality of the learning process (Ramda, 2017)

Currently, the use of textbooks is not in accordance with what we expect. Even though the textbook has been guaranteed proper by the National Education Standards Agency (BSNP), of course there are still some drawbacks to the book itself, both in terms of cover design, the weight and size of the book which is relatively large, heavy, seems boring, and sometimes it can be found that the material presented is quite complicated and difficult to understand (Ramda, 2017).

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Teaching material is a tool or object which used by the teacher that might help facilitate the learning process. The form of the teaching material itself is quite a lot, it can be in the form of reading books, worksheets, it can also be in the form of impressions. The Ministry of National Education revealed that teaching materials are defined as what students must learn (Kosasih, 2021). Learning resources or teaching materials can also be interpreted as something that contains learning value or all kinds of information, in the form of tools or texts that are commonly used by teachers to assist in carrying out teaching and learning activities, both those of particular interest such as educational films, maps, graphics, package books and etc (Panggabean & Danis, 2020). Acording to Pratita et al., (2021) to facilitate learning activities, media is needed as an intermediary to channel various information from teachers to students. From some of this information it can be concluded that teaching materials are a tool that allows to be able to assist a teacher/educator in conveying information, messages, thoughts so that it can help students to more easily understand the material in achieving the goals of learning.

Based on the Big Indonesian Dictionary, a pocket book is a book with a small size that is easy to carry and can be put in a pants or shirt pocket. Through pocket books students are expected to be able to obtain information without having to take up too much time to find out the essence of the material being studied.

HOTS (*Higher Order Thinking Skills*) is a way of thinking at a higher level than just memorizing facts or applying rules, formulas or procedures. HOTS makes us have to do something based on facts, link between facts, categorize them, manipulate them and then place them in a new context and be able to find solutions to a given problem (Widyas et al., 2020). In general, HOTS questions measure metacognitive dimensions, not only measuring factual, conceptual, or procedural dimensions (Putri, 2021)

Through observations that have been carried out at MTs Yapsi Labuhan Deli, it can be seen that there are around 70% of students who do not have the motivation to learn mathematics and are not good at solving questions with a high level of thinking using mathematics textbooks at school. This is due to the fact that the available textbooks are not very varied, the discussion of material is quite convoluted and difficult to understand, the color combinations are not attractive, and there are not many supporting images. This is what makes students feel quickly bored when learning mathematics takes place. Ms. Zulaiha as a mathematics teacher also said that mathematics textbooks still needed improvement, starting from the book design, cover and content. Especially for design issues that are very important and must be focused on because a unique and attractive design can attract students to learn mathematics.

Therefore, educators are expected to be able to process and create their own media/teaching materials which are extraordinary in supporting the teaching and learning process which later can also be used by the school if such media has never been in school (Zuliana et al., 2021). According to Rahman et al., (2022) in learning mathematics, teachers need to guide students both orally and in writing, written assistance in teaching materials is more effective, because it can be read repeatedly and studied independently by students. Therefore, one of the media that can be developed by educators is written teaching materials in the form of pocket books. So that when learning takes place students are able to focus on learning because students' interest in learning has increased with the existence of new innovations that can be easily accepted by students and can be studied repeatedly. The existence of learning media as teaching materials in learning can provide various benefits such as increasing motivation and various information conveyed by the teacher can be well received by students (Auliya & Lazim, 2020).

Several previous pocket book development studies have been carried out as character-based teaching materials on trigonometry material (Cahyono et al., 2018), as teaching materials for public relations and protocol subjects (Permana & Puspasari, 2021), filled with ideal problem solving in number pattern material (Puma et al., 2020), based on mind mapping (Masita & Wulandari, 2018), based on Contextual Teaching and Learning (Agustine & Lathiifah, 2022) and based on local wisdom (Fitri et al., 2019). The novelty of this pocket book is mathematics teaching material in the form of a pocket book with Islamic nuances based on HOTS and contextual material on the Pythagorean theorem.

Based on those, the researchers' goals in developing this teaching material include to develop pocket books as HOTS-based and contextual mathematics teaching materials on Pythagorean theorem material and to find out how the feasibility, effectiveness and practicality of HOTS-based pocket books and contextual material on the Pythagorean theorem.

2. Methods

This research was classified into research and development. The research and development method are a step in research to produce a product or improve it and to test the effectiveness of the product (Sugiyono, 2015). In this research, the product to be developed was a mathematics pocket book with Islamic nuances based on HOTS and contextual.

This development research used procedures from Thiagarajan research or commonly known as the 4-D (four-D) model. This 4-D model, as the name suggests has 4 main stages, namely, Define stage, Design stages, Development stage, and Disseminate stages which are stages for deployment.

For the define stage, the researcher conducted an analysis of the teaching materials and an analysis of the students' character. As for the design stage, the researcher designed a math pocket book as a HOTS-based teaching material for class VIII from the results of gathering various relevant sources up to the stage of making a pocket book. Then for the development stage, the researcher validates it with material experts and media experts and with students. Researchers conducted research on June 14, 2023 which was conducted in class VIII MTs Yaspi Labuhan Deli. The subjects of the research were material experts, media experts, subject teachers and class VIII students of MTs Yaspi Labuhan Deli. Finally, the disseminate stage is carried out by disseminating research results through the zoom meeting application to the general public.

The data collection techniques used by the researchers were (1) observation, (2) documentation and interviews conducted with teachers and students and, (3) pocket book assessment questionnaires by experts, teaching and learning response questionnaires when using pocket books that had been made and (4) test instruments. The data analysis technique used is descriptive qualitative analysis with the aim of obtaining a feasible, effective, practical, and quality product. For the results of questionnaire data by material experts, media experts and teacher and student responses to pocket books will be calculated using a Likert scale, then the results obtained will be analyzed using the following formula.

$$Response\ score(\%) = \frac{The\ total\ score\ obtained}{Maximum\ total\ score} \times 100\%$$

And for the effectiveness of using pocket books seen from the pre-test and post-test scores of students, it is done by calculating the normalized gain test which can be calculated using the following formula.

$$NGain = \frac{Posttest\ \text{Score} - Pretest\ Score}{Ideal\ Score - Pretest\ Score}$$

Then it will be adjusted the table of N-gain criteria values:

Table 1. N-gain Division Criteria

N-gain Score	Category
$g < 0.7$	High
$0.3 < g \leq 0.7$	Medium
$g \leq 0.3$	Low

(Hardiyantari, 2017)

The percentage results that have been obtained from the validation, teacher and student responses are then adjusted into the eligibility, effectiveness and practicality criteria for using pocket books as follows.

Table 2. Criteria for the Feasibility Level of Teaching Materials

Intervals	Criteria
0% - 20%	Very Unfeasible
21% - 40%	Unfeasible
41% - 60%	Feasible Enough
61% - 80%	Feasible
80% - 100%	Very Feasible

(Oktaviana & Susiaty, 2020)

Table 3. Pocket Book Effectiveness Criteria

Score (%)	Category
< 40%	Ineffective
40% - 55%	Less Effective
56% - 75%	Effective Enough
> 76%	Effective

(Siregar & Ananda, 2023)

Table 4. Pocket Book Practicality Criteria

Intervals	Category
0% - 20%	Very Impractical
21% - 40%	Less Practical
41% - 60%	Practical Enough
61% - 80%	Practical
81% - 100%	Very Practical

(Juniarti et al., 2021)

3. Results & Discussions

In the making of a HOTS-based and contextual mathematics pocket book for class VIII SMP/MTs was carried out through several stages. The first stage, carried out the definition stage (define). The second stage is the design process which consists of the stages of setting learning objectives, the ability to be developed so that when making a pocket book the researcher can limit research so that it does not depart from the original purpose of making teaching materials. The third stage is the development stage, namely the validation stage which contains data from the validation results of material experts and media experts, as well as data on the results of student and teacher responses to teaching materials. The last stage is the stage of dissemination (dissiminate), namely the stage of product dissemination that has been developed.

3.1 Definition Stage (Define)

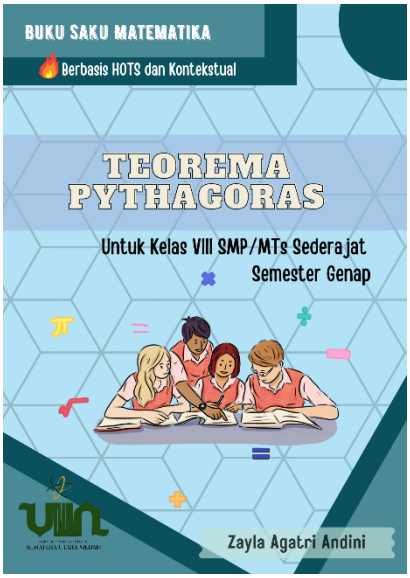
According to Dewi & Akhlis (2016) this definition stage is carried out to design a draft learning device. Meanwhile, according to Arkadiantika et al. (2020) this stage is useful for collecting, determining and defining various information related to the product to be developed. So through the results of observations and interviews that have been conducted, it was found that the learning media at MTs Yaspi Labuhan Deli only focused on textbooks. The textbook used is large in size, resulting in students being lazy to carry the book. The material presented is also very long and quite boring and in terms of color and design it is quite monotonous. This is one of the factors that make students less interested in reading and learning to use the book. After conducting interviews, researchers understand the problems faced by students and the character of students who prefer to learn when there are many interesting illustrations. Therefore, it is hoped that the HOTS and Contextual-based mathematics handbook for class VIII can help and facilitate both teachers and students in the teaching and learning process.

3.2 Design Stage (Design)

At this stage, the researcher collects various relevant sources by looking for material related to HOTS and contextual questions which will then be presented in this pocket book. This information was obtained by researchers from various books including the book Active and Fun Mathematics written by Wahyudin Djumanta and Dwi Susanti, the book Master Trick '*Matematika Ala Bimbel*' Written by the Master Tentor Team and so on. Furthermore, the researcher designed a pocket book by displaying various attractions, motivations and colorful pictures in order to encourage students.

This pocket book consists of 4 material chapters which contain brief material explanations supplemented by supporting pictures, examples and discussion as well as practice questions for students. This pocket book is printed in color and illustrated in A6 size, the material in the pocket book is guided by core competencies and basic competencies. The examples and practice questions in the pocket book are at the HOTS and contextual level, the pocket book was compiled using the Microsoft Word and Canva applications. This pocket book is also equipped with markers for HOTS questions based on the level of thinking skills. The number of pages in this pocket book is 116 pages (from the introduction to the notes). The following are examples of some HOTS and contextual questions in the pocket book.

a



b

c

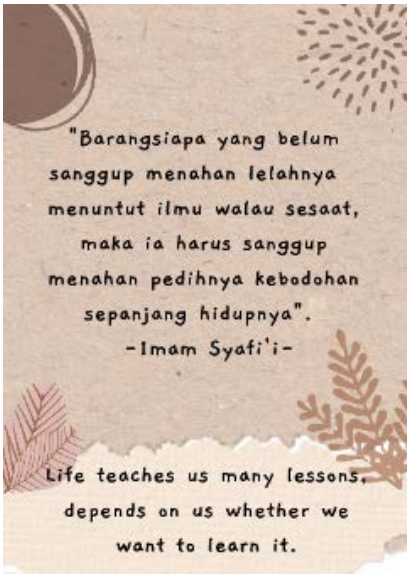


Figure 1. (a) pocket book cover; (b) material; (c) motivation with Islamic nuance.

Here are some views of the presentation of HOTS-based and contextual examples of questions and understanding tests contained in the pocket book that has been designed.

Figure 2. (a) example of C4 questions; (b) understanding test C5; (c) example of C6 questions

3.3 Development Stage (Develop)

According to Kurniawan & Dewi (2017) this stage is carried out as a final draft of a well-designed learning tool. So, at this stage the activity carried out is to validate the pocket book. The pocket book that had been designed by the researcher was printed and then validated by the mathematics education lecturer, a material expert Mrs. Siti Salamah Br. Ginting, M.Pd and media experts, Mrs. Suci Dahlya Narpila, M.Pd, so that later they can get books that are suitable for testing on research subjects.

For validation by material and media experts, only two validations were carried out. For material experts in the first validation, validation results could not be obtained, because there were suggestions and input from the validator on the size of the writing that should be enlarged, displaying more contextual questions, the layout of the subtitles should not be repeated. In the second validation stage, there is still a slight revision in some of the writing and image layout spacing.

Afterwards, the pocket book was validated by media experts, during the first validation, the validation results could not be obtained due to suggestions and input from the validator where the layout of HOTS markers should be the same entirely on the left or right, it is better if more pictures/decorations are added to the sample questions. Which can attract the attention of students. In the second validation stage, there

are no more revisions to the pocket book. The following results of validation by material experts and media experts are presented in the following table.

Table 5. Pocket Book Feasibility Validation Results

No.	Feasibility Aspects	Average Value		Average	Category
		Material Expert	Media Expert		
1	Feasible content	91%	-	91%	Very feasible
2	Language	80%	88.6%	84.3%	Very feasible
3	Presentation	88%	84%	86%	Very feasible
4	Graphics	80%	96%	88%	Very feasible

Based on the table above, the average percentage results from material experts are 85% which are included in the category very Adequate for use and from media experts it is 89.4% which are included in the category very feasible to use. So based on these results it can be concluded that the mathematics pocket book received a score in the **Very Feasible** category to be used as educational teaching material for class VIII MTs Yaspi Labuhan Deli. After validating and revising this pocket book, the researchers then implemented it in the field with the aim of getting responses from teachers and students to the use of HOTS-based and contextual math pocket books by conducting small-scale trials and distributing questionnaires. Based on research conducted by (Rohmawati, 2015) shows that to determine the effectiveness of learning can be seen based on the activities of students during learning, or through students' responses to learning. Furthermore, the researcher wanted to test the effectiveness of the pocket book which was carried out with a small-scale trial first on several students and then a large-scale trial was carried out on 23 students by providing test instruments before and after using the pocket book that had been developed..

The small-scale trial was conducted on 5 students who were directly selected by the mathematics teacher as the subject of the trial. From the observations of the researchers, it was found that before being given the pocket book to these students, 3 of them did not sufficiently understand the material regarding the Pythagorean theorem and were also lacking in recognizing questions that were at a high level of thinking. After being given a pocket book and given time to study the book, the researcher gave a test instrument at the next meeting and after being examined and assessed it was found that the test results belonged to the good category with an average of obtaining a satisfactory score. Then the large-scale test was carried out by giving the pre-test and post-test instruments, from the calculation results obtained that the average score obtained by the students for the pre-test was 44.9% with the lowest score being 37 and the highest score being 53, so for the pret-test scores the students were in the low category and below the KKM (minimum completeness criterion) of MTs Yaspi Labuhan Deli namely 70. And for the post-test scores obtained an average of 87.7% with the lowest score being 77 and the highest score being 100 which means the value of the students get a satisfactory score. By using the n-gain score to obtain a percentage of the effectiveness of using the pocket book, the researcher obtained a score of 0.7 with medium category and if the percent is obtained 71.7% which is included in the **Effective Enough** category. So based on this, pocket books with Islamic nuances based on HOTS and contextual are included in the category of books that are effective enough as teaching materials on Pythagorean theorem material.

Furthermore, student and teacher assessments through a questionnaire of teaching materials for math pocket books were carried out by research trial subjects where the mathematics teacher and class VIII students of MTs Yaspi Labuhan Deli even semester of 2022/2023. Teacher and student reactions to the practicality evaluation sheet of teaching materials which play a role in recognizing the practicality of teaching materials in terms of presentation, use, readability, and time.

For teachers (a) the presentation indicator contains 4 statement items that must be assessed by the teacher getting an assumed score of 95% in the very practical category. (b) There are 10 Items of statements with a score of 88% in the very practical category. (c) The pocket book readability indicator is 1 statement with a score of 100% in the very practical category. (d) The indicator for using the pocket book contains 1 statement for the score of 80% in the attractive category. So if taken from the results of the teacher's response questionnaire as a whole, it gets a percentage of 90% in the Very Practical category. For students'

assessment of the use of pocket books, student reactions to the practicality test sheet play a role in recognizing the feasibility of pocket books as teaching materials. In the questionnaire presented to students there were 15 statement items and after calculating the overall average score obtained from students was 81.6% included in the **Very Practical** category. So it can be stated that pocket books with Islamic nuances based on HOTS and contextual get positive responses from teachers and students. In accordance with research conducted by Arini & Lovisia (2019) that student responses have an important effect on the learning process with interesting learning making students happier and easier to absorb knowledge.

3.4 Dissemination Stage (Disseminate)

After validation and testing, then at this stage the product that has been developed is disseminated. The products that have been developed must be disseminated and socialized, so the researchers carried out the dissemination and socialization through zoom meetings by inviting various elements: lecturers in mathematics education, teachers in the field of mathematics studies, and junior high school students. Lecturers were also invited because it was hoped that the results of the research and the products produced would become previous research for students who were supervised by these lecturers. The teacher element was invited with the hope that the product being developed could be used as an alternative mathematics teaching material on the Pythagorean theorem material. Meanwhile, the student element was also invited because students are users of this developed pocket book. The lecturers present were Unimed (state university of Medan) Mathematics Education Lecturer, Mathematics Education Lecturer at the University of Potential Utama, Al Washliyah University Mathematics Education Lecturer, the teacher elements present were Mrs. Sri Rahayu, S.Pd from SMP Negeri 1 Bandar, Mrs. Lindawati, S.Pd from SMP Negeri 42 Medan and Mrs. Fitriah Khairunnisa Putri, S.Pd from MTsN Serdang Bedagai, and students who attended were students from SMP Al-Hidayah Medan, SMP Muhammadiyah 01 Medan, SMP Muhammadiyah 05 Medan and MTs PN 4 Medan. The following is the activity of distributing pocket books to several elements.

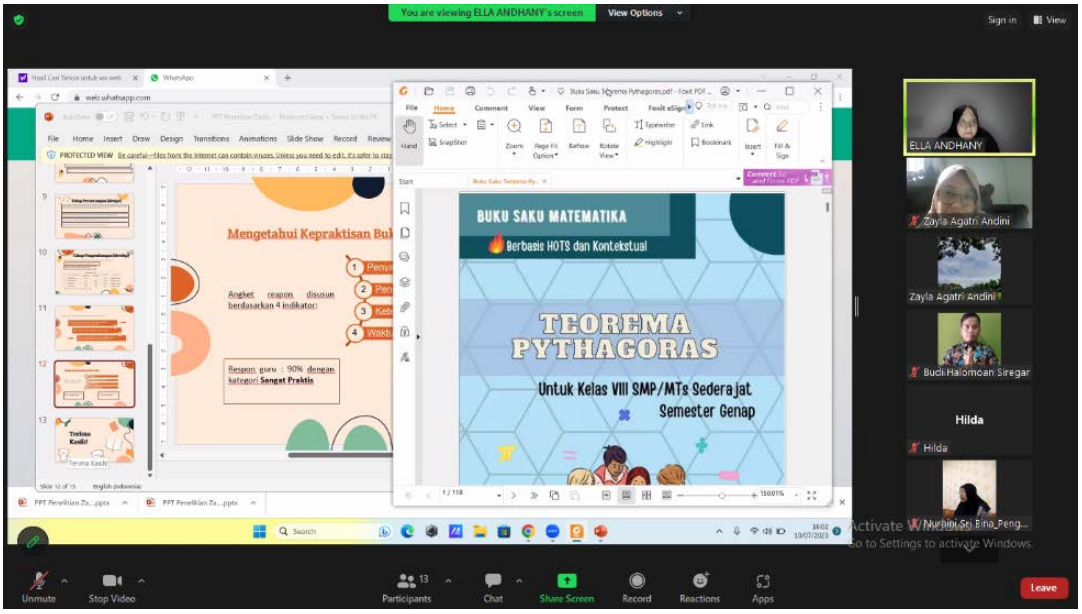


Figure 3. Dissemination activities carried out via *zoom meeting*.

Thus, this pocket book is appropriate to be used as educational teaching material for MTs Yaspi Labuhan Deli students and gets a positive response in the use of a pocket book with Islamic nuances based on HOTS and Contextual on the Pythagorean theorem.

4. Conclusion

Based on the results of the research that has been done, it can be concluded that the development of pocket book teaching materials in Islamic nuances with HOTS-based and contextual material on the Pythagorean theorem went through 4 stages: (1) Define which is the initial stage of development research. (2) Design is

the planning stage of the pocket book that will be developed. (3) Development is the stage of validating the due diligence and implementing pocket books in the field (4) Dissemination of the results of products that have been developed.

The feasibility of pocket book teaching materials with Islamic nuances based on HOTS and contextual on Pythagorean theorem material based on assessments from material experts and media experts in terms of content feasibility, linguistic feasibility, presentation feasibility and graphic feasibility are included in the very feasible category.

This pocket book is also classified as effective and practical to use during the learning process. This can be seen from the significant increase in the scores of the students' pre-test and post-test and the response of the teacher and students at MTs Yaspi Labuhan Deli to the pocket book teaching materials is very good, because it can help students to study independently during the learning process. From the research results, it was obtained that the average score of teacher and student responses to HOTS-based and contextual pocket books was included in the very practical category so that this pocket book was classified as practical and interesting for students to use in class. And after the dissemination stage was carried out via zoom, the researcher received a positive response from the various elements present and it is hoped that it will be of assistance to some of the elements present.

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