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DEVELOPMENT OF TEXTBOOKS TO BUILD STUDENT'S MATHEMATICAL LITERACY SKILLS

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ABSTRACT

The availability of adequate teaching materials, of course, can help students master these abilities. However, this has not received more attention from educators. This study aims to develop textbooks that are valid, practical, and effective for building students' mathematical literacy skills. this type of research is Research and Development (R&D). The stages of developing the textbook used to refer to the ADDIE model. The research instruments used in data collection were validation sheets, observation sheets on the implementation of textbooks, student response questionnaires, teacher response questionnaires, student activity observation sheets, observation sheets on the teacher's ability to manage learning, and tests of mathematical literacy skills. The data obtained were analyzed using data analysis techniques for validity, practicality, and effectiveness. The study found that the developed textbook met the validity criteria with a very valid category. The results of the practicality analysis were obtained based on the results of the teacher's response analysis in the very good response category, the results of the analysis of the teacher's ability to manage learning in the good category, and the results of the analysis of the implementation of textbooks in the fully implemented category. The results of the analysis of the effectiveness criteria were obtained based on the results of the student response questionnaire analysis in the good category, the results of the analysis of student activities during the learning process in the good category, and the results of the analysis of the mathematical literacy ability test with a completeness of 74%. The developed textbooks can facilitate and adequately build students' mathematical literacy skills because they meet the criteria of validity, practicality, and effectiveness.

Keywords: Mathematics textbooks; discovery learning; mathematical literacy

1. INTRODUCTION

Education in Indonesia is regulated through legislation. Law No. 20 of 2003 describes education as a conscious and planned effort to create a learning atmosphere and learning process so that students can actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed for society, nation and state (Rasyid, 2017). In accordance with this, education should be carried out consciously and well planned. This can be done with the design of learning activities, so that the learning process can be maximized to increase students' knowledge. Based on this, educators as stakeholders have an important role in realizing good education. In accordance with PP No. 19 of 2005, it is required for educators to develop learning materials. Learning materials will continue to develop according to the times. This requires educators to continue to develop learning materials taught including in mathematics lessons. Mathematics learning has a big impact in everyday life. Therefore, the use of mathematics is not only limited to counting skills, but is used thoroughly in solving various contexts of problems in everyday life (Hera & Sari, 2015). This is in accordance with the essence of mathematical literacy, where students are able to use the knowledge, they learn in mathematics learning to be used in solving various problems in the context of everyday life (Nurkamilah, et al., 2018). OECD (Organization for Economic Co-operation and Development) in the PISA 2018 Assessment and Analytical Framework provides explanations related to mathematical literacy.

> *"Mathematical literacy is an individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to recognize the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens"* (OECD, 2019: 75).

This means that mathematical literacy is a person's capacity to identify, use and interpret mathematics in various contexts. This includes mathematical reasoning and the use of mathematical concepts, procedures, facts and tools to describe, define and predict phenomena (OECD, 2019). It enables one to explore the role of mathematics in life and to make reasoned judgments and decisions required of an engaged and reflective citizen (Hera & Sari, 2015). Mathematical literacy is a person's capacity to formulate, apply, and interpret various contexts and connect mathematics in real life (Janah, et al., 2019). Khoirunnisa (2018) states that mathematical literacy trains students to formulate, use and interpret mathematics in various contexts. So, it can be concluded that mathematical literacy is a person's capacity to formulate, use, and interpret mathematics to various contexts in real life.

In this day and age, mathematical literacy skills need to be possessed by everyone to be used in dealing with or overcoming various problems that exist. This is because mathematical literacy skills are very important in relation to one's work and tasks in everyday life (Sirait, et al., 2016). The importance of building mathematical literacy skills is also because it is one of the keys to dealing with a changing society. Therefore, mathematical literacy is very important in everyday life because it is one of the keys to dealing with a changing society (Janah, et al., 2019).

Mathematical literacy is an ability that cannot be created directly, it requires various efforts or exercises so that these abilities can be created and well-honed for students. Based on several studies conducted in various schools in Indonesia, it is found that students are not accustomed to solving problems that require reasoning, Indonesian students are accustomed to solving math problems that use theoretical and procedural solutions (Aini, et al., 2018). According to Astuti (2018), the mathematical literacy skills of Indonesian students at the international level are very concerning, as evidenced by participation in the PISA assessment which is always in the 10 countries with low mathematical literacy skills.

Based on the results of observations carried out at MTs Madani Alauddin on June 9, 2022, it was found that the mathematical literacy skills of students can be said to be still low, especially in flat-sided space building material. Where students still have difficulty in understanding flat-sided space-building material and have not been able to identify, use and interpret a mathematical problem into various contexts. based on the results of solving a problem related to flat-sided space-building material integrated with mathematical literacy, of the 27 students who worked on the problem, only 15 students could answer it and of the 15 students, only 1 student answered using the right concept and solution structure and could answer the question correctly. While 14 other learners worked on the problem by using the wrong concept and interpreting the problem incorrectly. While the other 12 learners only wrote what was known in the problem and there were even some learners who did not write anything at all.

There are several factors that cause the low mathematical literacy skills of students, including the use of teaching materials and learning models applied by teachers in the learning process. The teaching materials used at MTs Madani Alauddin are only in the form of package books and are not adequate for students regarding their mathematical literacy skills. The package book in terms of its appearance, only contains ordinary pictures and the color combination is less varied so students are less interested in reading it. Whereas a book can function properly when students have an interest in reading and learning the material in the book (Agustina, et al., 2020).

One of the appropriate teaching materials is teaching materials in the form of textbooks with discovery learning models. This is because, with textbooks, students can learn optimally and with the discovery learning model which is one of the learner-centered learning models, it can provide more meaningful teaching for students. It is also revealed in research (Babys, 2017) that discovery learning is a way that can be done to develop an active way of learning for students. To overcome this, the development of textbooks is one solution to help students and teachers in learning mathematics, especially in flat-sided space-building material. The material of flat-sided spaces was chosen because the material is material that is easy enough to be associated with various contexts in everyday life. Therefore, in this study, research will be conducted on "Development of Textbooks with Discovery Learning Model to Build Students' Mathematical Literacy Ability on Flat Side Spatial Buildings Material Class VIII MTs Madani Alauddin".

2. METHODS

This type of research is research and development (R&D) and focuses on developing valid, practical, and effective textbooks. The product development procedure in this research and development refers to the ADDIE development model. According to Khikmiyah & Midjan (2017), the model consists of five stages as follows.

The analysis stage is the initial stage in the ADDIE model, where the first step taken at this stage is to assess the needs or existing problems, feasibility, and specifications of developing new textbooks. Problems can be obtained based on general information from the opinions of experts or previous researchers who then conducted interviews with teachers to obtain information about their students and to strengthen the information obtained, data collection can be carried out related to the initial abilities of students.

Setting learning objectives is the first step in the design phase which also involves creating learning scenarios or teaching and learning activities, learning media, designing learning materials, and assessing learning outcomes. The execution or subsequent stages of the development process are based on this design. The previous analysis and design stages serve as the basis for the development stage. At this stage, researchers begin working on products that have been previously designed in accordance with existing problems and the needs of students. The textbook product will be finalized at this stage and before moving on to the next stage, namely the implementation or trial stage, the product will be validated first by experts.

The design that has been developed is then tested in the classroom. The product is tested directly to students to see the effectiveness of the textbook produced. At this stage, the advantages and disadvantages of the products produced will be seen and then evaluated.

Products that have been made at the previous implementation stage are revised at the evaluation stage. Improvements or revisions are adjusted based on the results of the trial or application of the developed textbook.

The data collection methods used in the research conducted at MTs Madani Alauddin with a subject of 35 students who are class VIII students include validation sheets, questionnaires, observations and tests of mathematical literacy skills. The instruments used consisted of validation sheets, observation sheets of students' activities, questionnaires of students' and teachers' responses, observation sheets of textbook implementation, observation sheets of teachers' ability to manage learning and tests of mathematical literacy skills.

The data analysis technique used is validity data analysis with the help of validity categories, determine the validity of each criterion, the average aspect, or the overall average as in table 1 below.

Table 1. Categories of Validity Level

Interval	Category
M<1,5	Invalid
1,5 ≤ M<2,5	Moderately Valid
2,5≤M<3,5	Valid
3,5≤M<4	Very Valid

Source: (Arsyad, 2016)

Practicality data analysis consists of 1) analysis of the teacher's ability to Manage Learning which is analyzed by calculating the average value of each aspect observed from many meetings conducted with research and converted to the following criteria.

Table 2. Learning Management Category Criteria

Interval	Category
4,5<KG	Very High
3,5 ≤ KG<4,5	High
2,5≤KG<3,5	Moderate
1,5≤KG<2,5	Less High
KG<1,5	Very Low

Source: (Arsyad, 2016)

Furthermore, 2) analysis of teacher response data, the questionnaire instrument for teachers' responses to coursebooks aims to determine the quality of practicality based on teachers' responses to the ease of use of coursebooks [racticality based on the teacher's

response to the ease and benefits of using the coursebook with the following criteria benefits of using coursebooks with the following criteria.

Table 3. Teacher Response Questionnaire

Degree Criteria Average Score	Criteria
$x > 4{,}2$	Very Good
$3{,}4 < x \leq 4{,}2$	Good
$2{,}6 < x \leq 3{,}4$	Fairly Good
$1{,}8 < x \leq 2{,}6$	Less Good
$x \leq 1{,}8$	Very Poor

Source: (Widoyoko, 2016)

3) Data analysis of coursebook implementation, the practicality of integrated coursebooks for mathematics literacy can be seen from observations of the implementation of integrated coursebooks for mathematics literacy with the following category criteria.

Table 4. Teaching Book Practicability Category

Interval	Category
$1{,}5 \leq M \leq 2$	Completely implemented
$0{,}5 \leq M \leq 1{,}5$	Partially implemented
$0 \leq M \leq 0{,}5$	Not Implemented

Source: (Arsyad, 2016)

Meanwhile, the effectiveness data analysis was obtained from the student response questionnaire given after the last meeting, filling in the student activity observation sheet, and the math literacy test.

3. RESULTS AND DISCUSSION

Stages of Analysis

1. *Instructional Analysis*

Instructional analysis is carried out by analyzing KI, KD, and subject matter. At this stage, the researcher analyzes the material of flat-sided spaces in mathematics subjects

at the level of SMP / MTs class VIII by considering some of the material that becomes prerequisite material so that students are able to understand flat-sided spaces well, especially in building their mathematical literacy skills. For the procurement of textbooks adapted to the curriculum that applies to the Education unit, namely the 2013 curriculum.

2. *Analysis of Learners' Characteristics*

The selection of the subject of this research was determined in class VIII students of MTs Madani Alauddin with an age range of 12-15 years. Where this age has been in early adolescence. in adolescence children have also been able to think deductively, inductively, analyze, synthesize, reflectively think abstractly and solve problems (Sukmadinata, 2010). In addition, during adolescence children no longer take the moral code for granted, they want to form a moral code based on the concept of right and wrong that has been changed and improved to suit a more mature level of development Oladipo (2014).

Design Stages

1. *Preparation of Learning Process Plan (RPP)*

Before carrying out learning, the initial stage is to make a learning plan that is outlined in the preparation of the Learning Process Plan (RPP). RPP contains related steps that will be implemented in the learning process.

2. *Preparation of Textbooks*

This textbook is prepared based on the applicable curriculum at the junior high school / MTs education level. This textbook contains flat-sided space building material with a discovery learning model to build students' mathematical literacy skills so that learning becomes more interesting for students. The preparation of this textbook refers to the syntax of the discovery learning model, where the stages begin with providing stimuli, questions/problem identification, data collection, data processing, testing, and drawing conclusions.

3. *Preparation of Mathematics Literacy Test*

In the preparation of the mathematics literacy test, it begins with the design of the mathematics literacy test grid, question items, alternative answers, and scoring guidelines. The mathematical literacy test is in the form of an essay with a total of 4 essay items that are solved using problems in everyday life.

Development Stage

At the development stage, researchers began working on lesson plans, textbooks with discovery learning models and instruments to be used in accordance with the design at the previous stage, namely the design stage. So that the lesson plans, textbooks and research instruments that have been developed can be recognized as correct so that they can be used, the researchers provide guidance to a team of experts to be able to validate the validation sheets of lesson plans, textbooks and research instruments that have been developed. Validation of instruments and products was carried out by 2 lecturers and carried out before trials or research were carried out. So, before going to the field, all instruments and products have been declared valid and suitable for testing in the field. The following are the results of validation by the validator team.

Table 5. Research Instrument Validation Results

Items Assessed	Average Score	Description
RPP	3,38	Valid
Textbook	3,55	Very Valid
Teacher Response Questionnaire	3,51	Very Valid
Teacher Activity in Managing Learning	3,89	Very Valid
Implementation of the Teaching Book	3,54	Very Valid
Learner Response Questionnaire	3,62	Very Valid
Learner Activity	3,83	Very Valid
Math Literacy Test	3,87	Very Valid
Average	**3,65**	**Very Valid**

Furthermore, the development of textbooks. The development of the textbook is divided into three parts, namely the skin of the book, the content, and the final part. Here are some views of the parts of the product that have been developed.

Figure 1. Display of some parts at the development stage

After the product is developed, the next step is to revise the textbook, the researcher is guided by comments and suggestions from the validators which are the results of the discussion. The following is a view of the cover and learner activities of the revised product that has been developed.

Figure 2. Revised Cover I, II, III, IV Sequentially

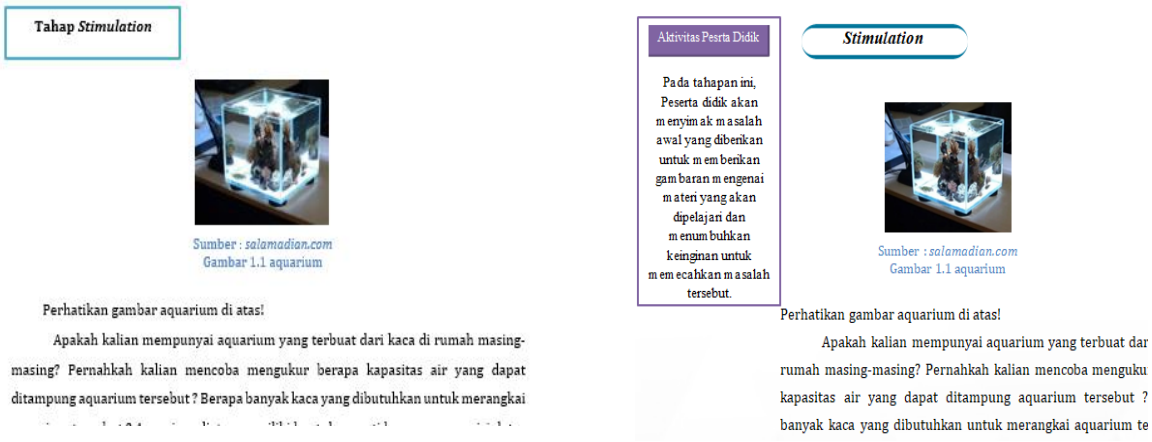

Figure 3. Revised Description of Learner Activity

The results of the assessment of coursebooks with the discovery learning model to build students' mathematical literacy skills given by the validators are shown in table 6 below.

Table 6. Results of Teaching Book Validation with Discovery Learning

Validation Sheet	Indicator	Assessment	Notes
Textbook	Content Feasibility	3,68	Very Valid
	Language Feasibility	3,5	Very Valid
	Presentation Feasibility	3,54	Very Valid
	Feasibility of Graphics	3,5	Very Valid
Total average validity of coursebook		3,55	Very Valid

Based on the table above, the average value of the validation assessment given by experts or validators with indicators on content feasibility is 3.68; language feasibility indicator is 3.5; presentation feasibility indicator is 3.54; graphical indicator is 3.5; so that the total of the validity of the coursebook is 3.68 and can state that the coursebook with the discovery learning model of flat-sided space building material is in a very valid category. Determination of these criteria is in accordance with Yunita, et al. (2017). This means that the results of the assessment of the two validators of coursebooks with the discovery learning model of flat-sided space building material are suitable for use.

Implementation Stages

1. *Limited Trial (Small Scale)*

The product produced and has been declared valid, then tested on a small scale. There were 9 students who were the subjects in the limited trial who were students of class IX MTs Madani Alauddin. The trial was conducted to find out the shortcomings contained in the product as well as to find out the responses of students related to the textbook products developed before being tested on a large scale. Learner responses were obtained based on learner response questionnaires filled out by students after the learning process was completed.

Table 7. Small Group Trial Results

No	Students Initial	Total Response	Average	Response Criteria	Acquisition Score	Cognitive Ability
1.	MFD	73	4,57	Very Positive	83	High
2.	NAS	62	3,87	Positive	84	
3.	RSS	63	3,94	Positive	90	
4.	BRM	63	3,94	Positive	75	Medium
5.	MFR	71	4,44	Very Positive	89	
6.	RR	60	3,75	Positive	74	
7.	DN	57	3,56	Positive	78	
8.	MNW	60	3,75	Positive	25	Low
9.	MRE	53	3,31	Very Positive	50	
	%	$\frac{8}{9}$ 100 % = 88,89%		Very Positive	72	

Based on the results of the analysis that has been carried out on the responses of students and the mathematical literacy test on the limited trial, several errors and suggestions were obtained to make revisions before conducting the field trial.

2. *Field Trial (Large Scale)*

Products and instruments that have been revised according to input and suggestions are then tested on a large scale or field trial. Large-scale trials were used to determine the level of practicality and effectiveness of mathematics textbooks with the discovery learning model developed. The results of the practicality analysis were obtained in activities carried out by teachers including the results of observations of the teacher's ability to manage learning, the implementation of coursebooks and the results of the

analysis of teacher responses to coursebooks with the discovery learning model. 1) Results of Learning Processing Observation Analysis. The observed teacher management skills consist of three stages of learning activities, namely introductory activities, core activities, and closing activities.

Table 8. Recapitulation of Observation Analysis Results of Teacher's Ability to Manage Learning

Observation Aspect	Average Aspect Total Meeting	Description
Introduction Activity	3,56	High
Core Activities	4,7	Very High
Closing Activity	3,75	High
Average of All Aspects	**4**	**High**

Based on the table above, it can be seen that the average teacher's ability to manage learning using textbooks with the discovery learning model is 4 so that it is included in the range 3.5 ≤KG <4.5, with a high category. 2) The results of the analysis of the implementation of coursebooks. Observations of the implementation of coursebooks conducted by teachers using coursebooks with a discovery learning model for 4 meetings to determine the practicality of coursebooks with this discovery learning model in the learning process. The following analysis results were obtained:

Table 9. Recapitulation of Observation Analysis Results of Textbook

Observation Aspect	Average Aspect Total Meeting	Description
Discovery Learning Model Steps	1,54	Fully Implemented
Math Literacy Skills	1,78	Fully Implemented
Reaction Principle	1,46	Partially Implemented
Average Aspect Total Meeting	**1,59**	**Fully Implemented**

Based on the table above, it can be seen that the average implementation of coursebooks with the discovery learning model is 1.59, so it is included in the range of 1.5 ≤M ≤2. with the category fully implemented. 3) Results of teacher response analysis. The teacher's response questionnaire to the coursebook with the discovery learning model was given to the subject teacher at the school where the coursebook was tested. Teacher response questionnaires are given after the entire series of learning processes using coursebooks with the discovery learning model has been completed. Based on the appendix that has been presented, it can be seen that the average teacher response is obtained at 4.44 and is in the range of x> 4.2 with a very good category. Based on the

results of this analysis, it can be shown that the textbook with the discovery learning model for mathematics subjects meets the practical criteria.

Furthermore, the results of the effectiveness analysis obtained from 1) the results of the analysis of student activity observations found that the overall average percentage of student activity obtained was 63.6% in the range of 60% ≤p <80%, so it was in the good category. Based on the results of this analysis, the activities of students during the learning process using textbooks are said to be effective. 2) The results of the analysis of the learners' response questionnaire. The students' response questionnaire to the coursebook with the discovery learning model was given to students after the learning process using the coursebook with the discovery learning model was completed. The questionnaire was distributed to class VIII a as many as 34 students who were present out of a total of 35 students who were declared active as test subjects of the developed coursebook. The results of the analysis of the learner response questionnaire are attached on page 256. It was concluded that the average learner response obtained was 3.9 and was in the range of 3.4 <x ≤4.2 so that it was in the good category. 3) Mathematical literacy test analysis results. The mathematical literacy test was given to all students after the entire series of learning in the textbook had been completed. The mathematics literacy test was attended by 27 students who became the subjects in this study. The mathematical literacy test was carried out using a written test and the results were then checked based on the assessment rubric that had been prepared previously. The results of the mathematical literacy written test analysis were obtained as follows.

Table 10: Percentage of Mathematical Literacy Test Completion

Score	Category	Frequency	%
≥ 75	Completed	20	74%
< 75	Not Completed	7	26%

Based on the table above, it shows that there were 20 students who took the test and were declared complete with an average percentage of 74% and as many as 7 students who took the test were declared incomplete with an average percentage of 26% in the total number of students who took the mathematical literacy written test of 27 students.

Evaluation Stage

At this stage, an evaluation is carried out based on input after the coursebook trial process. At this stage, only minor revisions were made to the coursebook as a refinement of deficiencies during the trial process. Thus. At this stage, there are no major changes to the coursebook.

DISCUSSION

The process of developing coursebooks with a discovery learning model that meets the criteria of validity, practicality, and effectiveness.

Level of Validity

This textbook with discovery learning model is designed to achieve learning objectives so that it can build students' mathematical literacy skills. Textbooks that can be used in the trial stage first go through the assessment stage by the validator. Based on the validator's assessment, this coursebook was declared valid to be developed with an average score of all aspects of validity of 3.55 with a very valid category in the interval $3.5 \leq M \leq 4$.

Practicality Level

The practicality of coursebooks can be measured based on teacher responses, the ability of teachers to manage learning and the implementation of coursebooks. This is in accordance with Aufa's explanation (2022) that practicality refers to users considering interventions can be used and preferred under normal conditions.

After analyzing the teacher's response given after using the textbook with the discovery learning model developed, it received a very good response with an average of 4.44. For the results obtained after analyzing observations of the teacher's ability to manage learning using textbooks with the discovery learning model in the good category with an average assessment of 4.

Effectiveness Level

The effectiveness of using textbooks with discovery learning models can be shown through the behavior shown by students after the learning process, students can easily understand the forms or elements of flat-sided spaces and are able to explain the differences between the four types of flat-sided spaces which include cubes, blocks, prisms, and pyramids based on their findings. The effectiveness of textbooks will be measured based on the results of the analysis of observations of students' activities, analysis of students' responses to textbooks with the discovery learning model, as well as tests of mathematical literacy skills (Suhana & Hanafiah, 2014). The results of the analysis of the effectiveness criteria are described as follows: on the results of observing the activities of students in the learning process which was carried out for 4 meetings using coursebooks with the discovery learning model obtained an overall average percentage of all meetings of 62.9 so that it was in the good category, on the results of the analysis of students' responses to coursebooks with the discovery learning model were in the

good category with an average of 3.9, and the last criterion, namely the mathematics literacy ability test, obtained the completeness of students on flat-sided space building material using coursebooks after conducting a mathematics literacy test of 74% of the total students who took the mathematics literacy written test with the number of students declared complete as many as 20 people and 7 people declared incomplete.

After testing the validity, practicality and effectiveness of coursebooks with the discovery learning model developed, it can be stated that coursebooks with discovery learning models in mathematics subjects at the MTs level on flat-sided space building material have met the criteria determined based on the level of validity, practicality and effectiveness analyzed based on the development and trial process so that coursebooks with discovery learning models can be declared qualified to be applied in the learning process.

CONCLUSION

Research on textbooks with a discovery learning model on the material of flat-sided space building class VIII was developed using the ADDIE development model which starts from analyzing existing problems, both in students and teachers, then designing textbooks that are suitable for use by students at the trial school, then the textbooks that have been prepared are validated and then implemented directly in the learning process, until the last stage, namely the textbook will go through an evaluation stage to determine the feasibility of textbooks used in the learning process. Based on the assessment of coursebooks by validators, coursebooks with a discovery learning model on the material of flat-sided space building at MTs class VIII level are declared very valid. Based on the results of the validator's assessment, the average of all aspects of the assessment is 3.55 so that it is in the very valid category. The practicality analysis given is obtained based on the teacher response questionnaire, the teacher's ability to manage learning, and the implementation of coursebooks. In the teacher's response given after using the coursebook with the discovery learning model, an average of 4.44 was obtained so that the response given by the math teacher was in the very good category. As for the teacher's ability to manage learning using coursebooks with the discovery learning model obtained 4 points in the high category and for the implementation of coursebooks obtained 1.59 points in the category of fully implemented. Effectiveness analysis was obtained based on students' activities, responses given by students to learning using textbooks, and mathematics literacy tests. The following is a description of the results of the analysis, on the activities of students carried out during 4 meetings obtained an overall average of all meetings of 63.6% so that it was in the good category, on the results of the analysis of students' responses to coursebooks with the discovey learning model were in the good category with an average response of 3.9, and the last criterion, namely the mathematics literacy test, obtained the completeness of students on flat-sided space building material

using coursebooks after the written mathematics literacy test of 74%. So, it can be concluded that the textbook with the discovery learning model on the material of flat-sided flat-sided spaces in class VIII MTs Madani Alauddin that has been developed is valid, practical, and effective.

Researchers suggest the following (1) other materials need to be developed with the discovery learning model and by considering the needs and characteristics of students and their respective schools and (2) The resulting product is expected to be accepted in every junior high school and used as a guideline and reference for teachers and students in the learning process.

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