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DEVELOPMENT OF TEACHING MATERIALS WITH ELICITING ACTIVITIES MODELS BASED ON ETHNOMATHEMATICS TO IMPROVE MATHEMATICAL LITERACY ABILITY

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Abstract
This research is a development research (R & D) which aims to produce a mathematics teaching material with ethnomathematics-based eliciting activities. The method used in this study is a development research method with five stages as follows: (1) Preliminary Investigation, (2) Design, (3) Realization/Construction, (4) Test -Evaluation and Revision (Test, Evaluation and Revision) and (5) Implementation (Implementation) but in this study, development was only carried out up to the first 4 stages because the implementation stage required a long process and time. The results of the validation of teaching materials and other tools by mathematicians and media experts show an average score of 4.46 which is classified as very good. and students, then a trial was carried out to see the effectiveness of learning through a mathematical literacy ability test where the results showed an average completeness of 80.25% in the good category. The conclusion of this study is that mathematics teaching materials using the eliciting activities model based on ethnomathematics are categorized as good and appropriate for use in teaching mathematics in junior high schools.
Keywords: teaching materials, eliciting activities models, ethnomathematics, mathematical literacy skills

Abstrak
Penelitian ini merupakan penelitian pengembangan (R & D) yang bertujuan untuk menghasilkan suatu bahan ajar matematika dengan eliciting actvities berbasis etnomatematika. Metode yang digunakan dalam penelitian ini merupakan metode penelitian pengembangan dengan lima tahapan sebagai berikut: (1) investigasi awal (Preliminary Investigation), (2) Perancangan (Design), (3) Realisasi/Konstruksi (Realization/Construction), (4) Tes-Evaluasi dan Revisi (Test, Evaluation and Revision) dan (5) Implementasi (Implementation) namun Pada penelitian ini, pengembangan hanya dilakukan sampai pada 4 tahapan awal karena pada tahap implementasi memerlukan proses dan waktu yang cukup lama. Hasil validasi bahan ajar beserta perangkat lainnya oleh ahli matematika dan ahli media menunjukkan rata-rata skor 4,46 yang tergolong dalam kategori sangat baik, hasil uji coba kepraktisan bahan ajar dan perangkat lainnya menunjukkan bahwa semuanya dalam kategori praktis hal ini ditunjukkan melalui data aktivitas guru dan siswa, selanjutnya dilakukan uji coba untuk melihat keefektifan pembelajaran melalui tes kemampuan literasi matematika dimana hasil menunjukkan rata-rata ketuntasan 80,25% dengan kategori baik. Kesimpulan dari penelitian ini adalah bahan ajar matematika dengan model eliciting activities berbasis etnomatematika dikategorikan baik dan layak untuk digunakan dalam pembelajaran matematika di sekolah menengah pertama.
Kata Kunci: Bahan Ajar, Model Eliciting Activities, Etnomatematika, Kemampuan Literasi Matematika

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INTRODUCTION

Mathematics is a very important subject and is taught from elementary school to university. Thus, it can be said that mathematics subjects play a very important role in the world of education. However, according to Dzulfikar, Asikin & Hendikawati (2012), mathematics for many students is still considered a difficult, scary, and less useful lesson in everyday life, as for many students mathematics seems difficult and uninteresting, this is supported by Matulessy et. Al (2022) who said that not a few students at various levels of school feel bored, don't like it, feel burdened and even mathematics seems to be a frightening specter for students. Therefore, educators as facilitators who control teaching and learning activities must be able to create mathematics learning that can develop the mathematical abilities of their students. Considering that life in the era of disruption is full of complex problems and challenges, and requires basic skills to be able to compete with the outside world.

Hendriana & Sumarmo, (2014) classifies several basic mathematical abilities that must be considered, in five main competencies, namely mathematical understanding, mathematical problem solving, mathematical communication, mathematical connection. , Mathematical reasoning (mathematical reasoning). Other higher mathematical abilities are mathematical critical thinking skills and mathematical creative thinking abilities. In relation to mathematical literacy skills, everything described above is clearly contained in mathematical literacy.

Mathematical literacy skills are also one of the literacy skills that have been developed for a long time, and lay a solid foundation for the development of "new literacy" in the era of disruption, because developing "new literacy" requires High Order Thinking Skills (HOTS) and other abilities. such as the ability to communicate, collaborate, think critically, creatively and innovatively. This is in accordance with what was stated by Ibda, (2018) teachers and educational institutions must be able to strengthen educational institutions from various aspects such as curriculum, systems, management, models, strategies, and learning approaches by strengthening 21st century literacy skills. One of them is strengthening the ability literacy in teachers and educational institutions from old literacy (reading, writing, arithmetic) to new literacy (data, technology, HR/humanism).

Mathematical literacy skills, on the way, are still very low so that they affect the quality of education and readiness in facing the "era of disruption" (openness), especially in the context of strengthening new literacy. The results of an international PISA study conducted to measure skills of 15-year-olds in mathematical and natural science literacy that have been conducted in the last three periods with the OECD. The purpose of PISA is to determine children's skills to use the skills and abilities they have learned at school in living their daily lives in a challenging global era, Stacey, (2011). The results of

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the 2015 PISA student assessment survey which was announced in early December 2016, show that Indonesia ranks 64th out of 72 countries. In the 2012-2015 period, the PISA score for mathematics ability rose 11 points from 375 to 386, reading ability only rose 1 point from 396 to 397, while science rose 21 points from 382 to 403, OECD (2016). This is not much different from the previous year's PISA scores, which were still very low, especially for mathematical literacy skills.

The results above show that the ability of students' mathematical literacy in Indonesia is still far from satisfactory. One of the lessons that can be a bridge between culture and education, especially mathematics, is ethnomathematics. (Alangui, 2016) states that ethnomathematics is analogous as a lens for viewing and understanding mathematics as a product of culture or a cultural product. Then (Zhang & Zhang, 2010), (Zaenuri, 2018), (Kehi, YK, et al, argued that ethnomathematics is also interpreted as research that links mathematics or mathematics education and its relationship with the social field and cultural background, namely research that shows how mathematics is generated, transferred, disseminated, and specialized in various cultural systems.

Assessment of cultural elements to be integrated into learning will be better if it is done starting from the culture that exists in the surrounding environment. One of the appropriate cultural sites to be used as a reference in ethnomathematics learning is the traditional house around students. Then the researcher combined etomathematics with the eliciting activities model where this model is an approach based on the real life of students, meaning that in learning the Eliciting Activities Model the problems given to students are problems that exist in real life. Therefore the researcher developed a teaching material with an eliciting activities model based on ethnomathematics.

Development of teaching materials using ethnomathematics-based eliciting activities models with the following stages: 1) Identifying and simplifying real-world problem situations, 2) Building mathematical models, 3) Transforming and solving models, 4) Interpreting models. The stages of the ethnomathematics-based eliciting activities model are in accordance with the goals of mathematical literacy.

Several researchers have created ethnomathematics-based teaching materials that can be used in mathematics learning, one example is research on the development of ethnomathematics-based teaching materials in junior high school mathematics learning conducted by Fadila D. R & Marsigit (2017), namely the development of ethnomathematics-based teaching materials for improve achievement and motivation of junior high school students. The results of this study are teaching materials in the form of Student Worksheets (LKS) on triangles and quadrilaterals. Apart from that, there is also research conducted by

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Jarnawi A. D & Revina P (2018). The results of this research are ethnomathematics-based teaching materials in the form of student worksheets on the topic of sets. Then clearly stated by Siregar (2022) in his dissertation showing that the development of teaching materials using the eliciting activities model can improve the representation abilities and mathematical dispositions of high school students. Therefore, researchers need to develop appropriate teaching materials to improve students' mathematical literacy skills. The teaching materials developed are in the form of modules with eliciting activities models based on ethnomathematics.

RESEARCH METHODS

This type of research is research and development (research and development). The development model used in this study is the Plomp development model. This model consists of five stages of development, namely (1) initial investigation (Preliminary Investigation), (2) Design (Design), (3) Realization/Construction (Realization/Construction), (4) Test-Evaluation and Revision (Test, Evaluation). and Revision) and (5) Implementation (Rochmad, 2012: 65-67). In this study, development was only carried out up to the initial 4 stages because the implementation stage required a long process and time.

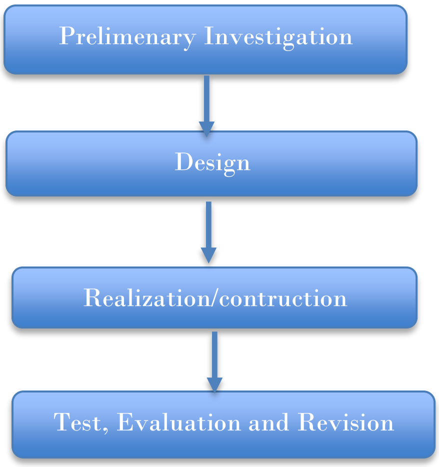

Figure 1. General Model for Developing Teaching Materials Eliciting Activities Based on Ethnomatematics (Source: Plomp, 1979)

The subjects carried out in this study were class VIII students of a SMPN in North Central Timor for the 2022/2023 academic year, a total of 26 people. Furthermore, in the trials of teaching materials and other learning tools, one class VIII was selected at the school to see the effectiveness, practicality, and learning outcomes of mathematical literacy.

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The data collected in this study are: (1) data on the validity of learning tools in the form of expert statements regarding the aspects contained in learning tools; (2) the practicality of learning tools in the form of teacher activity data and student activity data; and (3) data on the effectiveness of learning tools in the form of student response data to learning tools and test data on student learning outcomes.

The average score of each Teaching Material, Lesson Plan and LP is calculated by means of the sum of the average scores of each device divided by the number of aspects assessed on the device, or by the following formula.

$$R_i = \frac{device\ score\ sum}{many\ aspects\ of\ device\ assessment}$$

With R_i is the average score of the i-th device.

A description of the average score of each learning device is shown in Table 1.

Table 1. Learning Devices Validity Criteria

No	Average Value	Classification
1	$1{,}00 < R_i \leq 1{,}80$	Not good
2	$1{,}80 < R_i \leq 2{,}60$	poorly
3	$2{,}60 < R_i \leq 3{,}40$	Pretty good
4	$3{,}40 < R_i \leq 4{,}20$	Good
5	$4{,}20 < R_i \leq 5{,}00$	Very good

The device criterion is said to be valid if the device is in a good minimum classification.

RESULTS AND DISCUSSION

In this study, the learning tools using the eliciting activities model based on ethnomathematics were developed as teaching materials for learning mathematics on flat sided spaces. The model for developing the mathematics learning tools used in this study is the development model modified from the Plomp development model. This model consists of five stages of development, namely (1) initial investigation (Preliminary Investigation), (2) Design (Design), (3) Realization/Construction (Realization/Construction), (4) Test-Evaluation and Revision (Test, Evaluation). and Revision) and (5) Implementation (Rochmad, 2012: 65-67). In this study, development was only carried out up to the initial 4 stages because the implementation stage required a long process and time. The stages of the development of this mathematics learning tool are as follows:

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a. Learning Device Validity Data

Learning device validation is carried out to obtain data on the validity of the equipment reviewed based on content validity and construction validity. The assessment is carried out by a validator whose results are used to improve the product before it is used. The instrument used is a learning device validation sheet in the form of a teaching material validation sheet.

Assessment of the validity of teaching materials was carried out by two mathematics education lecturers. The results of validation by two validators (2) on lesson plans, teaching materials, problem sheets, and questions on the Mathematical Literacy Ability Test (TKLM) can be seen in Figure 2.

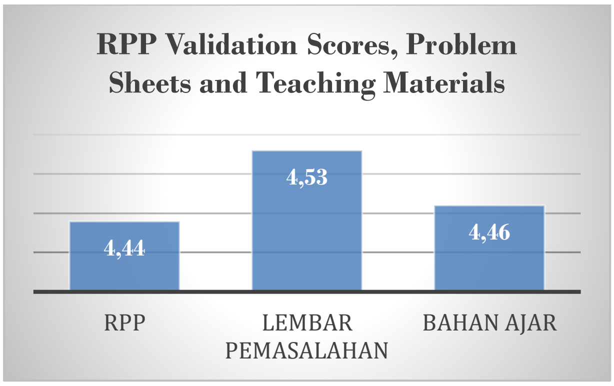

Figure 2. RPP Validation Score, Teaching Materials, Problem Sheets.

Based on Figure 2 it can be seen that the teaching materials developed have met the minimum valid criteria. This is said to be valid based on the average criteria determined by the number of device scores divided by the number of device assessment aspects. Whereas in the TKLM questions a trial was carried out in a randomly determined class to obtain the validity of the questions. Therefore, this learning device is suitable for use in further research.

b. b. Learning Device Practicality Data

The practicality assessment results of the teaching materials and other learning tools that have been developed can be seen from the analysis through the teacher and student practicality assessment sheets. The data on the practicality assessment sheet of teaching materials by teachers and students is quantitative data which is converted into qualitative data to determine the practicality criteria of teaching materials. Teaching materials and other learning tools are said to be practical if the average score of teaching materials and other learning tools meets the minimum practical criteria (Romaito et al., 2021). The results of the analysis of the assessment of teaching materials by teachers can be seen in the table below.

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1. Teacher Activity Data

Table 2. Results of the Teacher Practicality Assessment Questionnaire Analysis

No	Aspect	Average	Information
1	RPP		Practical
2	Problem Sheets		Practical
3	Teaching Materials		Practical
4	TKLM		Practical

The results of the analysis in Table 1 show that the average scores for lesson plans, problem sheets, teaching materials and TKLM each achieve very practical criteria according to the practicality assessment by the teacher.

2. Student Activity Data

Table 3. Results of Practicality Assessment Questionnaire Analysis of Problem Sheets and TKLM

No	Aspect	Average	Information
1	Problem Sheets		Praktis
2	TKLM		Sangat Praktis

Based on the results of practicality tests by students in field trials it was concluded that the teaching materials in which there were problem sheets were included in the practical criteria and TKLM was included in the very practical criteria.

c. Data on the Effectiveness of Learning Devices and Mathematical Literacy Tests

Observations regarding the implementation of learning were obtained from observations of the implementation of learning in the trial class using teaching materials based on the developed ethnomathematics eliciting activities. Observations made by observers using observation sheets prepared by researchers regarding the implementation of learning can be seen in the results of the analysis of the implementation of learning in Table 4.

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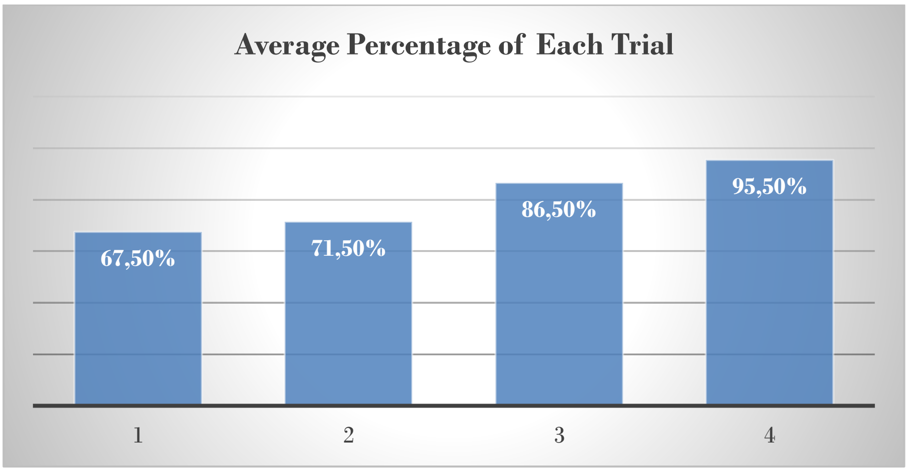

Figure 3. Analysis of Observational Data on the Implementation of Learning with Ethnomatematics-Based Eliciting Activities Models

Based on the results of the trial analysis of the four meetings mentioned above which are shown in Figure 3, it shows that the percentage of learning implementation at each meeting increased at the second, third and fourth meetings and the average reached 80%. Based on the criteria that have been prepared by the researcher, if the implementation of learning is above 80% then the teaching material is included in the practical criteria. This is in line with what was stated by Gazali (2016) explaining that teaching materials are said to be practical if the teaching materials meet the criteria determined by the researchers themselves. Furthermore, in assessing the effectiveness of teaching materials with the eliciting activities based on ethnomathematics model that has been developed, it can be obtained from the results of the problem sheet data at the end of the lesson (Siregar & Safitri, 2020). In the aspect of knowledge, TKLM is carried out at the end of learning to determine the achievement of the competencies that have been learned. Aspects of students' mathematical literacy are measured based on the number of students who achieve KKM.

The results of the validity test, practicality test and effectiveness test show that teaching materials and other learning tools are suitable for use in school learning (Afsari et al., 2021). This is supported by the research of Desi, et al (2022), Utami, (2018) and Lakapu (2020) saying that the development of contextual teaching materials for students can provide benefits so that in teacher and student learning they are not only guided by the teacher's book and textbooks. students who have been prepared besides helping students to be able to solve problems in everyday life.

CONCLUSION

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After carrying out various stages of development on teaching material products with the ethnomathematics-based eliciting activities model, the developer concluded that designing a printed teaching material with an eliciting activities model based on an ethnomathematics approach to improve mathematical literacy skills must pay attention to several important things, especially related to the content of teaching materials need to include cultural aspects that are contextual with the learning community. Illustrative images of real cultural objects into rectangular shapes are important because they are able to clarify the delivery of material and indicate that the material has applications in students' real lives. Then, the practice questions that are made must include literacy indicators so that they can train and improve students' mathematical literacy skills. The results of the validation of teaching materials and other tools by mathematicians and media experts show an average score of 4.46 which is classified as very good. and students, then a trial was carried out to see the effectiveness of learning through a mathematical literacy ability test where the results showed an average completeness of 80.25% in the good category. The conclusion of this study is that mathematics teaching materials using the eliciting activities model based on ethnomathematics are categorized as good and appropriate for use in teaching mathematics in junior high schools. Based on the conclusions obtained above, there are a number of suggestions for other researchers who will develop teaching materials using the eto-mathematical-based eliciting activities model, including that the developed teaching materials are not only limited to Quadrilaterals material and the use of teaching materials carried out in the learning process in outside class.

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