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Development of a Teaching Module Based on Ethnomathematics for Class VIII on Two-Dimentional Figure Material

Abstract

This research was motivated by students' difficulties in understanding mathematical concepts in the material of quadrilaterals and triangles. Therefore, researchers developed a teaching module to make it easier for students to understand mathematical concepts that suit student characteristics based on the ethnomathematics of typical batik found in the school environment. The aim of this research is to develop ethnomathematics-based teaching modules that are valid, practical, and effective. This research uses the Plomp development model. The subjects used in the trial class were class VIII B SMPN 1 Arjasa, using the random sampling method. Based on the results of the research analysis, it can be concluded that: 1) The ethnomathematics based teaching module developed is valid, practical, and effective; 2) The teaching module that has been developed can help students understand the concept of flat shapes with a student completion percentage of 83.33% as well as student responses who are interested and happy to use the teaching module. The teaching module that has been developed can be used in mathematics learning for class VII middle school.

Keywords: Two-dimentional figure; Ethnomathematics; Teaching Module

Abstrak

Penelitian ini dilatarbelakangi oleh kesulitan siswa dalam memahami konsep matematika pada materi segiempat dan segitiga. Oleh karena itu, peneliti mengembangkan modul ajar untuk memudahkan siswa dalam memahami konsep matematika yang sesuai dengan karakteristik siswa berdasarkan etnomatematika khas batik yang terdapat di lingkungan sekolah. Tujuan penelitian ini adalah untuk mengembangkan modul ajar berbasis etnomatematika yang valid, praktis, dan efektif. Penelitian ini menggunakan model pengembangan Plomp. Subyek yang digunakan pada kelas uji coba adalah kelas VIII B SMPN 1 Arjasa, dengan menggunakan metode random sampling. Berdasarkan hasil analisis penelitian dapat disimpulkan bahwa: 1) Modul ajar berbasis etnomatematika yang dikembangkan valid, praktis dan efektif; 2) Modul ajar yang dikembangkan dapat membantu siswa dalam memahami konsep bangun datar dengan persentase ketuntasan siswa sebesar 83,33% serta respon siswa yang tertarik dan senang menggunakan modul ajar. Modul ajar yang dikembangkan dapat digunakan dalam pembelajaran matematika kelas VII SMP.

INTRODUCTION

According to Tłuściak-Deliowska (2017) teachers are an important component in the learning process. A teacher must plan effective learning to meet learning objectives. One of the learning objectives is understanding concepts. Understanding concepts is very important, because if students understand a concept, then it will certainly be easy for students to understand the next concept (Wahyu, 2016).

In fact, many students find it difficult to understand the concept of quadrilaterals and triangles. According to Kartika (2018), the decline in students' understanding of mathematical concepts in class VII regarding quadrilaterals and triangles was because some teachers immediately gave formulas to solve problems without emphasizing the concepts. So, the problem faced by students in quadrilateral and triangle material is that students tend to memorize the formula for the perimeter and area of a triangle (Rahayu et al, 2013). As a result, students do not understand the concept of quadrilaterals and triangles, so students only listen and watch the teacher solve and resolve problems.

So that the learning process can be achieved well, and students are able to understand the concepts studied easily, new innovations in learning are needed, namely through a cultural approach or what is

called ethnomathematics. Ethnomathematics is a term used to link mathematics and culture. Ethnomathematics is a combination of mathematics and culture that lives in everyday people's lives, which without realizing it have applied mathematical concepts. By learning using ethnomathematics, it is easier for students to understand mathematical concepts because learning is directly related to the culture around the students. This is in line with research by Martyanti and Suhartini (2018) that ethnomathematics as a context in mathematics learning can be packaged in the form of problems that are used to bridge students in discovering mathematical concepts.

Apart from that, an important element in the learning process is teaching materials. One of the teaching materials that can be used is teaching modules. According to Tjiptiany, et al (2016) a module is a reading material that is written and printed because it aims to enable students to search for their own knowledge independently without the guidance of an educator. In the learning process using teaching modules, students are required to learn independently while the teacher is the facilitator. This is in accordance with Vitaloka's (2020) research, namely that teaching modules are used to help students learn independently to achieve learning goals. Apart from that, modules have an influence on the implementation of the learning system. With the module, students can easily understand the concepts of the material they will study independently. According to Inantaya (2021) teaching modules are one of the learning tools that are used to support educators in carrying out teaching and learning activities during classroom learning. When using teaching modules, a teacher is free to choose or modify those provided by the government to suit student characteristics or even compose his own teaching module to adapt the characteristics.

New innovations are needed in teaching modules, one of which is by developing teaching modules that link mathematical concepts with cultural elements. The process of linking mathematical concepts with cultural elements is called ethnomathematics. Ethnomathematics-based learning can provide a new nuance in the learning process, namely in learning mathematics, students do not only learn theory in the classroom but are connected to the outside world by observing local culture, this can be used as a learning medium.Noto, Fimasari & Fatchurrohman (2018) stated that the application of ethnomathematics to a learning approach is an alternative way of delivering mathematics in a more interesting way and overcoming boredom. Through ethnomathematics, students can learn mathematics through real activities so they can construct and understand abstract mathematical concepts (Anjarwati, 2022; Nursyahidah and Albab, 2021). In addition, culture-based mathematics learning is an interesting and innovative alternative because it encourages the emergence of contextual meaning based on students' understanding. So learning by developing teaching modules related to culture can encourage students' interest in learning independently because it is linked to the real world.

Based on the description, the researcher will conduct research with the title "Development of a class VIII SMPN ethnomathematics bar-based teaching module on flat shapes material". The aim of this research is to develop a teaching module based on ethnomathematics for class VIII SMP material on flat shapesvalid, practical, effective.

METHOD

This research was carried out at SMPN 1 Arjasa. The subjects in this research were class VIII students at SMPN 1 Arjasa. The technique for determining the research location used is *purposive area* namely the method of determining the research location deliberately based on several considerations. Some considerations for these schools as research areas are as follows: (1) Based on the results of observations, the prospective subjects in the research that will be used are at the school; and (2) Students' critical reasoning abilities in solving quadrilateral and triangle material are not yet known.

The method used in this research is Plomp. Plomp (1997) explains that in development research there are 5 stages, namely the initial investigation phase (*preliminary investigation)*, design phase (*design)*, realization/construction phase (*realization/ contruction)*, test, evaluation, and revision phase (*test, evaluation, and revision)*, and implementation phase (*implementation).* The following is an explanation of each of these phases, which can be seen in Figure 1.

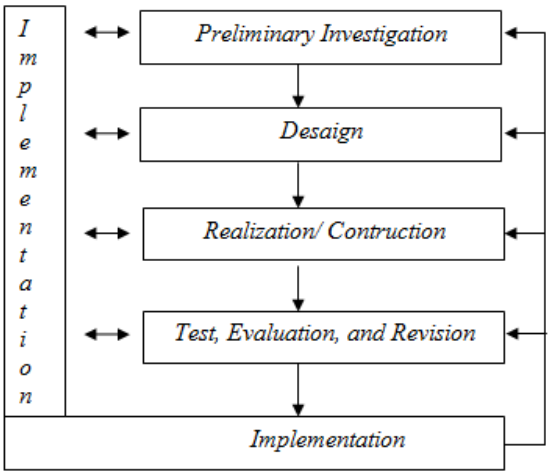


Figure 1. Plomp Model Development Scheme

Information:

Development activities

Flow of development stage activities

The direction of reciprocal activities between the development and implementation stages

Development activity cycle

A description of the activities contained in each phase is presented as follows.

Stage 1: Preliminary Investigation Phase, the activities carried out in the initial investigation stage are collecting information on previous mathematics learning problems and formulating rational thoughts on the importance of developing the model, identifying, and reviewing the theories that underlie the development of the model such as the theories that underlie the model learning that is relevant to mathematics learning, theories about development learning models. In this phase, researchers collect data or information contained in the field and relevant previous research to then identify related problems. The output produced from this initial investigation phase is the background of the problem, research objectives and benefits as well as a literature review related to the research to be carried out.

Stage 2: Design Phase (*design).* According to Isnaini (2018), activities in this phase aim to design solutions to the problems raised in the initial investigation phase. In this phase, activities are carried out in the form of analysis of theories related to ethnomathematics-based teaching modules. The output in this phase is the design of an ethnomathematics-based teaching module which will be developed on material in the form of quadrilaterals and triangles for class VIII along with the instruments needed for this research.

Stage 3: Realization/Construction Phase (*Realization/ Contruction)*, Plomp (1997) design is a written plan or work plan in the format of the departure point from

this stage is the solution is realized or created. In this phase, we will continue to determine the ethnomathematics-based teaching module that will be developed on flat figures in the form of quadrilaterals and triangles for class VIII. The results of the development of this learning device are called***Draft 1***. Apart from that, preparing the instruments needed to measure the validity, practicality and effectiveness of the ethnomathematics-based learning module that has been developed.

Stage 4: Test, Evaluation and Revision Phase (*Test, Evaluation, and Revision)* According to Isnaini (2018) evaluation is the process of collecting, processing, and analyzing information systematically, to obtain realization value from solutions, therefore the test, evaluation and revision phases are needed. Without evaluation it cannot be determined whether a problem has been solved satisfactorily (Plomp and Van Den Wolde, 1992). Based on the data collected, it can be determined which solutions are satisfactory and which still need to be developed.

At this stage, 2 main activities are carried out, namely (a) validation activities and (b) conducting field trials of the validation model prototype.

Validation activities. The type of instrument used in this phase is a validation sheet. Before use, it is first validated by experts to test whether the instruments are suitable or not to be used to measure the specified aspects, in terms of the clarity of the measurement objectives formulated, the suitability of the question items for each aspect, the use of language, and the clarity of the instructions. use of instruments.

The validators in this research were 1 master lecturer in mathematics education and 2 teachers at SMPN 1 Arjasa. Suggestions from experts and practitioners are used as a basis for improvement or revision. The result of developing a valid ethnomathematics-based teaching module is called **Product.** Activities carried out when validating the model are as follows: (a) Valid without revision, then the next activity is a field trial; (b) Valid with a few revisions, the next activity is to revise it first, then immediately field test it; (c) It is not valid, so revisions are made to obtain a new prototype model. Then return to the activity of asking for expert and practitioner considerations. Here there is a possibility that cycles (repeated validation activities) occur to obtain a valid model. After obtaining a valid model book, validation of the learning device is then carried out, using the stages as described above.

Field trial activities. After the teaching module and research instruments were declared valid, a limited trial was carried out in class VIIIB. The trial was carried out with the aim of seeing the practicality and effectiveness of the teaching module in implementing learning in the classroom. Based on the results of field trials and data analysis of trial results, revisions were made. This trial and revision can be done repeatedly until it is obtained **Final product**.

Stage 5: Implementation Phase (*Implementation).* The level of this activity is set in advance as a basis for moving on to the next stages of development.

RESULTS AND DISCUSSION

Results

This research produces products that have been developed in the education sector, namely teaching modules. The product development process in this research uses the

Plomp model. In this study, only 4 stages of the Plomp model were used, namely the initial investigation phase (*preliminary investigation)*, design phase (*design)*, realization/construction phase (*realization/ construction)*, test, evaluation, and revision phase (*test, evaluation, and revision).* At the implementation stage (*implementation)* carried out in schools that were very limited in scope in terms of where the research was carried out, namely when conducting field trials of ethnomathematics-based teaching modules. Implementation in a wider scope was not carried out in this research, due to limited research implementation conditions. The presentation of trial data contains analysis data on validity, practicality, and effectiveness. Product revisions contain the results of product improvements that have been developed based on suggestions and input from validators and the results of limited trial analysis.

The first stage, the initial investigation activities carried out were collecting information and analyzing problems related to teaching modules, class VII plane figures and Ethnomathematics.

In the next stage, the results of the plans in the design phase are realized. The realization results are in the form of a teaching module based on ethnomathematics material for class VIII flat figures. The ethnomathematics used is Situbondo batik withThe main motif is marine life with the main colors being sand and sea blue. In this teaching module the researcher used a teaching module developed using Situbondo batik motifs made by the researcher himself. This batik motif is designed in such a way without losing the characteristic of Situbondo batik, namely marine life and includes elements of flat rectangular and triangular shapes. Here are some typical Situbondo batik motifs.

Batik Motif Tale Percing

There is a picture of a starfish which is composed of several flat triangular shapes.

Figure 2. Batik motif Tale Percing

Batik Motif Parao Ngambeng

There is a picture of a boat composed of several triangular and rectangular flat shapes.

Figure 3. Batik motif Parao Ngambeng

Batik MotifKerrang Gempel

There is a picture of a boat composed of several rectangular flat shapes.

Figure 4. Batik motif Kerrang Gempel

The teaching module developed in accordance with the criteria and components of the independent curriculum teaching module. Here is the teaching module that has been developed can be seen in picture 5 (see Appendix).

The next stage is the test, evaluation and revision phase, the activities that will be carried out include evaluation, product validation by several experts, revision of product validation results and limited trials to determine the practicality and effectiveness of the product. Validity criteria: obtained from the validation results of teaching modules and research instruments which have been validated by 3 validators. Input and suggestions from validators can be seen in Table 1.

Based on the validation results of teaching modules and research instruments that have been validated by 3 validators, they meet valid criteria. The teaching module meets valid criteria with an average of 3.80, the Learning Implementation Observation Sheet meets valid criteria with an average of 3.86, the Student Response Questionnaire Sheet meets valid criteria with an average of 3.92, and the Interview Guide meets valid criteria with an average of 3.83.

Practicality criteria: after the teaching module and research instruments are declared valid, this is continued with a limited trial carried out in class VIII B of SMPN 1 Arjasa. The meeting was held once face to face, first learning with teaching modules, then students were given student test sheets. This limited trial activity was attended by the researcher as a model teacher and 2 teachers at SMPN 1 Arjasa. The following learning flow diagram can be seen in Figure 6.

Table 1. Suggestions and input for teaching modules and research instruments

No	Validator	Research Materials	Suggestions and Feedback
1.	Validator 1	Teaching Module	In the trigger questions, ask questions related to everyday life experienced by students
		Research Instrument	Add punctuation at the end of the sentence
2.	Validator 2	Teaching Module	In question number 3, attachment 2 pictures are difficult to see and understand, the shape and units are difficult to pay attention to
		Research Instrument	Good, No Revision.
3.	Validator 3	Teaching Module	Note that in Appendix 1 the use of numbers is inaccurate when applying the Pythagorean formula
		Research Instrument	Good, No Revision.

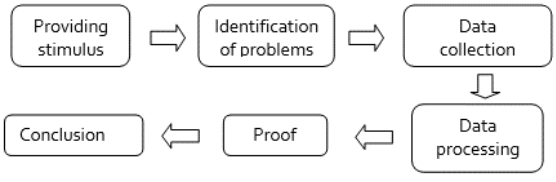


Figure 6. Learning Flow Diagram

In the trial class before learning begins, the teacher opens the lesson by saying hello, then asks one of the students to lead a prayer together, then checks the students' attendance in class. In the introductory activity the teacher conveys the learning objectives to be achieved. In the core activity the teacher provides stimulus by giving examples of rectangular and triangular shapes found in everyday life. Then the students are divided into several groups consisting of 4-5 students to understand and find the derivation of the formula for the perimeter and area of quadrilaterals and triangles in the teaching module, while the teacher acts as a facilitator. After that, the teacher invites and guides students to understand several descriptions or information related to the use of formulas for the perimeter and area of quadrilaterals and triangles in the teaching module. Then the teacher invites and guides students to solve the problems presented in the teaching module. In solving problems, students are asked to process previous knowledge from various information to solve problems. The next activity is that students in groups carefully examine the answers to the problems that have been given, then group representatives present the results of the discussion while other groups respond and provide arguments. The next activity is that the teacher provides reinforcement/clarification if there are students' answers that are not appropriate, then the students express conclusions about the material they have studied with the teacher's guidance. In the closing activity the teacher and students reflect on the learning that has been carried out. Then the teacher informs the material that will be discussed at the next meeting. The following is the learning carried out in the limited trial class.

Figure 7. Trial Class Learning

The results of limited trials are analyzed to determine the practicality and effectiveness of the teaching modules that have been used (Product). During the lesson the observer observes the implementation of the teaching module carried out by the model teacher. The aspects assessed are the ethnomathematics-based learning stage, the formation of a learning atmosphere and the principles of reaction and management. The model teacher's activities during learning take place in accordance with the teaching module. The model teacher only acts as a facilitator to direct and guide and encourage students to understand and solve problems according to their respective abilities during learning. The results of the analysis of teacher activities, learning management with teaching modules can increase students' conceptual understanding of quadrilateral and triangle plane material. Learning tools are considered practical (applicable) if the level of achievement is in the good category ($\geq 75\%$). The results of the implementation of the teaching module are at the 97% criterion, which means the teaching module is practical.

Effectiveness criteria: this criterion is analyzed from student test results and student response questionnaires. Student test results are presented in Table 2.

Table 2. Student Test Results

Criteria	Results
The highest score	91,67
Lowest Value	25
Class Average	71,17
Number of Completed Students	20
Incomplete Number of Students	4
Classical Completion Percentage	83,33%

Based on the quality criteria for ethnomathematics-based teaching modules, the average student test is at least 70% of the students who take part in the learning. The percentage of student learning completeness is 83.33%, so it can be said that the ethnomathematics-based teaching module meets the classical completeness criteria. Student responses were measured using a questionnaire consisting of 7 assessment aspects. So that the 7 aspects contain student responses to learning with the ethnomathematics-oriented teaching modules used. Researchers provide response questionnaires that students must fill out after all series of learning processes are completed. Based on the results of the student response questionnaire, some students gave positive responses to the material taught and the teacher's way of teaching. This shows that students are interested and enjoy using teaching modules in learning. The teaching module is considered effective if many students give positive responses more than 80% of the number of subjects tested. The results of student responses to the 7 aspects of the assessment given obtained positive results of 81.54%. So that in accordance with the established criteria, it can be said that the teaching module is effective to use. By using this teaching module, it is easier for students to understand the concept of quadrilaterals and triangles. This can be seen in the student test results and questionnaire results, many students gave positive responses.

Discussion

Development of teaching modules based on ethnomathematics for class VIII SMP flat material in the form of teaching modules, test questions and research instruments. The model used in this research is a modified Plomp, namely the initial investigation phase (*preliminary investigation)*, design phase (*design)*, realization/ construction phase (*realization/ contruction)*, test, evaluation, and revision phase (*test, evaluation, and revision).* At the implementation stage (*implementation)* carried out in schools that were very limited in scope in terms of where the research was carried out, namely when conducting field trials of ethnomathematics-based teaching modules. Implementation in a wider scope was not carried out in this research, due to limited research implementation conditions.

In the initial investigation phase (*preliminary investigation)* Researchers collect information and analyze problems related to teaching modules, critical reasoning skills, plane material, and ethnomathematics. In the investigation phase, researchers collect information about the school used as a research location and analyze several problems by reading several references. Researchers found several problems, namely students' difficulties in understanding concepts in geometry material. This is in line with research by Fauzi, et al (2019), namely that in learning it is sometimes very difficult for students to understand geometry material. According to Fauzi and Arisetyawan (2020), students' difficulties in using concepts are students' inability to express the meaning of terms that represent the concept of flat shapes and students' inability to remember sufficient conditions for an ob-

ject to be expressed with terms that represent the concept of flat shapes. So learning methods are needed that can help students understand geometric concepts easily. One of them is by using an ethnomathematics approach, where this ethnomathematics approach is directly related to their culture which is the daily activities of the community. This is in line with research conducted by Febriani, et al (2019) that the average ability to understand mathematical concepts for students who were given ethnomathematics-based material was higher than students who were given material that was not based on ethnomathematics. Next is the design phase (*design)* The researcher creates a solution plan based on the analysis of the problems that existed in the initial investigation phase. Next, the realization/construction phase (*realization/ contruction*) the researcher realizes the design results in the design phase.

Then the development results are consulted with the supervisor to produce teaching modules and research instruments that are ready to be validated by validators. Next is the test, evaluation and revision phase (*test, evaluation, and revision)* validation is carried out by validators on teaching modules and other research instruments. This activity was carried out to obtain valid teaching modules and research instruments, so that they are ready to be tested on students. After the teaching modules and research instruments are valid, practicality tests and effectiveness tests are carried out. Teaching modules that have been tested for practicality reach practical criteria and effectiveness tests meet the criteria for effective use.

Implications of Research

Other researchers can develop teaching modules with other material such as geometric shapes, geometric transformations or other ethnomathematics-based materials that are appropriate to the material used. Apart from that, other researchers can develop teaching modules based on the local culture known to students. So, students can easily understand the concept of material.

Limitations

This research has limitations, namely at the implementation stage (*implementation)* carried out in schools that were very limited in scope in terms of where the research was carried out, namely when conducting field trials of ethnomathematics-based teaching modules. Implementation in a wider scope was not carried out in this research, due to limited research implementation conditions.

CONCLUSION

The results of developing teaching modules using the Plomp model that have been described have met the criteria of being valid, practical, and effective. The average validation score for teaching modules, student tests, observation of learning implementation and student questionnaire sheets is 3.85, this value shows valid criteria. The results of observations of the implementation of teaching modules based on ethnomathematics were carried out very well. The average observation value of learning implementation is 97%, so it can be said to meet practical criteria. Then the effectiveness aspect is reviewed from student test results and student response questionnaire results. The student's test results met classical completeness with a completeness percentage of 83.33%. Meanwhile, the results of the

student response questionnaire showed a positive response with an average percentage score of 81.54%.

Appendix of article entitled: Development of a Teaching Module Based on Ethnomathematics for Class VIII on Two-Dimentional Figure Material

MODUL AJAR MATEMATIKA

A. Informasi Umum

Satuan Pendidikan	: SMPN 1 ARJASA
Penyusun	: Dinda Nurul Qomariyah, S.Pd.
Mata Pelajaran	: Matematika
Materi	: Bangun Datar
Fase/Kelas/Semester	: D/VIII/II
Kurikulum	: Kurikulum Merdeka
Tahun Pelajaran	: 2023/2024
Alokasi Waktu	: 2 JP
Sarana dan Prasarana	: Panpan tulis dan spidol
Target Peserta Didik	: Peserta didik reguler / tipikal (tidak ada kesulitan dalam memahami materi pembelajaran)
Model Pembelajaran	: Discovery Learning

B. Komponen Inti

Tujuan Pembelajaran

1. Menggali konsep dan menyelesaikan permasalahan berkaitan dengan keliling dan luas bangun datar segiempat dan segitiga
2. Menyelesaikan masalah kontekstual yang berkaitan dengan bangun datar segiempat dan segitiga

Pemahaman Bermakna

Terdapat motif batik yang berbentuk segiempat, masing-masing terdiri dari empat sisi, empat titik sudut, dan suatu daerah yang dibatasi oleh empat sisi tersebut. Jumlah dari keempat sisi tersebut dinamakan dengan keliling dan daerah yang dibatasi oleh empat sisi tersebut dinamakan dengan luas. Dengan demikian, keliling merupakan jumlah panjang sisi-sisi yang membatasi bangun tersebut. Sedangkan luas merupakan suatu daerah yang dibatasi oleh panjang sisi ada bangun datar tersebut.

Pertanyaan Pemantik

Sebuah tembok sekolah berbentuk persegi panjang dengan dengan gambar batik motif *Kerrang Gempel*. Pada motif tersebut ada bentuk segiempat berupa layang-layang, dengan ukuran $100cm \times 60cm$. Hitunglah luas sebuah layang-layang pada motif batik *kerang gempel*?

Profil Pelajar Pancasila

1. beriman dan Bertaqwa terhadap Tuhan YME
2. Berkebhinekaan Global
3. Bernalar Kritis
4. Bergotong Royong
5. Mandiri

Rencana Asesmen

Tes Tulis

Kegiatan Pembelajaran

1. Pendahuluan (10 menit)

a. Guru membuka kegiatan pembelajaran dengan mengucapkan salam.
b. Perwakilan peserta didik memimpin doa sebelum memulai kegiatan pembelajaran.
c. Guru mengecek kehadiran peserta didik.
d. Guru menyampaikan tujuan pembelajaran yang ingin dicapai.

2. Kegiatan Inti (70 menit)

Langkah 1. Pemberian Stimulus

Guru memberikan contoh bentuk bangun segiempat dan segitiga yang terdapat dalam kehidupan sehari-hari misalnya pada motif batik.

Langkah 2. Identifikasi Masalah

a. Peserta didik dibagi dalam kelompok yang beranggotakan 4-5 orang.
b. Peserta didik diajak untuk memahami dan menemukan penurunan rumus keliling dan luas segiempat dan segitiga pada (lampiran 1).
c. Guru membimbing peserta didik yang mengalami kesulitan dalam mengidentifikasi masalah.

Langkah 3. Pengumpulan Data

a. Peserta didik diajak untuk memahami beberapa uraian atau informasi terkait dengan penggunaan rumus keliling dan luas bangun datar segiempat dan segitiga pada (lampiran 2).
b. Guru membimbing peserta didik yang mengalami kesulitan dalam mengumpulkan data.

Langkah 4. Pengolahan Data

a. Peserta didik diajak untuk menyelesaikan permasalahan yang disajikan dalam kegiatan bernalar kritis pada (lampiran 3). Dalam memecahkan masalah, peserta didik diminta untuk mengolah pengetahuan sebelumnya dari berbagai informasi untuk memecahkan masalah tersebut.
b. Guru membimbing kelompok yang mengalami kesulitan dalam mengumpulkan data.

Langkah 5. Pembuktian

a. Peserta didik secara berkelompok memeriksa dengan cermat jawaban atas permasalahan-permasalahan yang telah diberikan.
b. Guru meminta perwakilan kelompok untuk mempresentasikan hasil diskusi.
c. Kelompok lain diminta untuk menanggapi dan memberikan argumen tentang apa yang dipresentasikan.

Langkah 6. Menarik Kesimpulan

a. Guru memberikan penguatan/mengklarifikasi apabila ada jawaban peserta didik yang kurang sesuai.
b. Peserta didik mengemukakan kesimpulan materi yang telah dipelajari dengan bimbingan dari guru

3. Kegiatan Penutup (10 menit)

C. Lampiran

Lembar Kerja Peserta Didik

Lampiran 1

Untuk mengidentifikasi dan mengetahaui terkait keliling dan luas bangun datar segiempat dan segitiga, coba kalian pahami penurunan rumus keliling dan luas bangun datar segiempat serta segitiga.

No	Bangun Datar	Keliling (K)	Luas (L)
1.	Persegi D 3 C 3 A 3 B AB, BC, CD, DA = sisi (s)	$K = AB + BC + CD + DA$ $= 3 + 3 + 3 + 3$ $= 4 \times 3$ $= 4 \times s$ Sehingga : $K = 4 \times s$	$L = 3 \times 3$ $= s \times s$ $= s^2$ Sehingga : $L = s^2$
2.	Persegi Panjang D 4 C 3 A 4 B AB = panjang (p) BC = lebar (l)	$K = AB + BC + CD + DA$ $= 4 + 3 + 4 + 3$ $= 4 + 4 + 3 + 3$ $= 2 \times 4 + 2 \times 3$ $= 2 \times (4 + 3)$ $= 2 \times (p + l)$ Sehingga : $K = 2 \times (p + l)$	$L = AB \times BC$ $= 5 \times 3$ $= p \times l$ Sehingga : $L = p \times l$
3.	Jajargenjang D 10cm C 5cm 4cm c A E F 3cm 7cm A	$K = AB + BC + CD + DA$ $= 10 + 5 + 10 + 5$ $= 10 + 10 + 5 + 5$ $= 2 \times 10 + 2 \times 5$ $= 2 \times (10 + 5)$ $= 2 \times (a \times c)$ Sehingga : $K = 2 \times (a + c)$	$L = CD \times CF$ $= 10 \times 4$ $= a \times t$ Sehingga : $L = a \times t$
4.	Belah Ketupat	$K = AB + BC + CD + DA$ $= 13 + 13 + 13 + 13$ $= 4 \times 13$	$L = \frac{1}{2} \times BD \times AC$

Lampiran 2

Setelah kalian mempelajari dan memahami tentang keliling dan luas segiempat, cobalah untuk memahami beberapa uraian berikut.

Soal 1

Motif batik disamping terdapat gambar bintang laut yang tersusun dari beberapa segitiga. Jika panjang sisinya berturut-turut 13 cm, 10 cm dan 13 cm.

a. Tentukan luas 5 segitiga yang terdapat pada gambar bintang laut tersebut.

b. Tentukan keliling 5 segitiga yang terdapat pada gambar bintang laut tersebut.

Alternative penyelesaian

Diket : Panjang sisi a = 13 cm

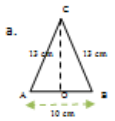
Panjang sisi b = 10 cm

Panjang sisi c = 13 cm

Dit : luas dan keliling 5 segitiga yang terdapat pada gambar bintang laut tersebut?

Jawab :

a.



$OC^2 = CB^2 - OB^2$

$OC^2 = 13^2 - 5^2$

$OC^2 = 169 - 25$

a. Guru bersama peserta didik melakukan refleksi mengenai pembelajaran yang telah dilakukan.

b. Guru menginformasikan materi yang akan dibahas pada pertemuan berikutnya.

Refleksi Guru

1. Guru merefleksikan kesesuaian perencanaan pembelajaran dengan implementasi dalam kegiatan pembelajaran yang telah dilakukan
2. Guru merefleksikan ketepatan perencanaan startegi pembelajaran yang telah dilakukan, memperhatikan kelebihan dan kelemahan strategi pembelajaran untuk memperbaiki pada pembelajaran selanjutnya.
3. Guru merefleksikan terkait dengan antusiasme siswa terhadap pembelajaran yang telah dilakukan.

Refleksi Peserta Didik

Efektivitas pembelajaran berbasis etnomatematika dapat meningkatkan hasil belajar siswa.

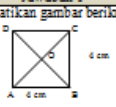
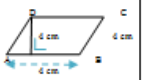
Lampiran 3

Diketahui segiempat ABCD dengan panjang sisi-sisinya adalah 4 cm dan luas 16 cm², Setujukah jika sisinya 4 cm maka luasnya 16 cm²? jelaskan!

Alternatif penyelesaian

Petunjuk Guru

1. Berikan kepada siswa beberapa jawaban atau tampilkan di papan tulis/ Layar LCD. Berikut alternatif jawaban yang dapat mengarahkan siswa pada bernalar kritis.

Jawaban 1	Jawaban 2	Jawaban 3
Perhatikan gambar berikut  Persegi Panjang sisi-sisinya = 4 cm Luas = s^2 $= 4^2$ $= 16$ cm² Jadi, benar bahwa apabila panjang sisi-sisi persegi adalah 4 cm, maka luasnya 16 cm²	Perhatikan gambar berikut  Belah Ketupat Panjang sisi-sisinya = 4 cm Luas = $\frac{1}{2} \times d_1 \times d_2$ $= \frac{1}{2} \times 8 \times 4$ $= 16$ cm² Jadi, benar bahwa apabila panjang sisi-sisi belah ketupat adalah 4 cm, maka luasnya 16 cm²	Perhatikan gambar berikut  Jajargenjang Panjang sisi-sisinya = 4 cm Luas = $a \times t$ $= 4 \times 4$ $= 16$ cm² Jadi, benar bahwa apabila panjang sisi-sisi jajargenjang adalah 4 cm, maka luasnya 16 cm²

2. Guru melakukan pemodelan dengan mendorong siswa untuk bernalar kritis. Arahkan/pancinglah siswa agar bertanya seperti pertanyaan berikut.
   a) Apakah dapat dijamin kevalidannya bahwa apabila panjang sisi-sisi belah ketupat (Gambar 2), maka panjang diagonal-diagonalnya 8 dan 4?

Lampiran Asesmen

- Observasi guru selama kegiatan belajar berlangsung
- Berikut disajikan uraian mengenai pengertian, langkah-langkah, dan contoh kisi-kisi dan butir instrumen tes tertulis.

Indikator perkembangan sikap rasa ingin tahu

1. Kurang baik = jika sama sekali tidak berusaha untuk mencoba atau bertanya atau acuh tak acuh (tidak mau tahu) dalam proses pemberalajaran
2. Baik = jika menunjukkan sudah ada usaha untuk mencoba atau bertanya dalam proses pembelajaran tetapi masih belum konsisten
3. Sangat baik = jika menunjukkan adanya usaha untuk mencoba atau bertanya dalam proses pembelajaran secara terus menerus dan konsisten

Indikator perkembangan sikap tanggung jawab (dalam kelompok)

1. Kurang baik = jika menunjukkan sama sekali tidak ambil bagian dalam melaksanakan tugas kelompok
2. Baik = jika menunjukkan sudah ada usaha ambil bagian dalam melaksanakan tugas-tugas kelompok tetapi belum konsisten
3. Sangat baik = jika menunjukkan sudah ambil bagian dalam menyelesaikan tugas kelompok secara terus menerus dan konsisten

Indikator perkembangan efektivitas diskusi (dalam kelompok)

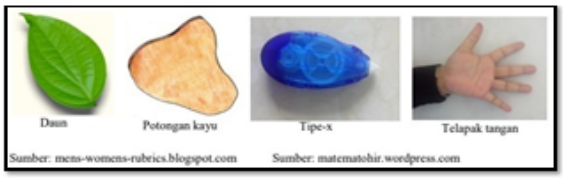
1. Kurang baik = jika menunjukkan sama sekali tidak ambil bagian dalam melaksanakan tugas kelompok
2. Baik = jika menunjukkan sudah ada usaha ambil bagian dalam melaksanakan tugas-tugas kelompok tetapi belum konsisten dalam mendengarkan orang lain, bekerja sama dan sigap dalam bekerja
3. Sangat baik = jika menunjukkan sudah ambil bagian dalam menyelesaikan tugas kelompok secara terus menerus dan konsisten dalam berpendapat,

Remidial

guru memberikan gambaran awal tentang bangun datar tidak bersturan yang ada kaitannya dengan motif batik khas Situbondo.

Bangun datar tak beraturan merupakan benda-benda nyata yang ada dalam kehidupan sehari-hari, seperti daun, batang pohon, tipe x, telapak tangan dan lain-lain. Benda-benda tersebut dapat diketahui luas permukaannya dengan menggunakan konsep mencari luas bangun datar segiempat dan segitiga. Contohnya sebagai berikut.

Perhatikan gambar berikut ini atau ambilah beberapa bangun yang menyerupai bangun datar segiempat dan segitiga, kemudian perhatikan dengan cermat.



Bangun datar segiempat dan segitiga manakah yang lebih mudah digunakan untuk menaksir luas benda-benda diatas?

Dapat dilihat bahwa bangun-bangun pada masalah diatas merupakan bangun yang tidak beraturan. Untuk menentukan luas daerah bangun-bangun yang tidak beraturan seperti masalah tersebut, lakukanlah langkah-langkah berikut.

1. Salin dan gambar bangun tersebut pada kertas berpetak dengan memberikan garis pada bagian tepinya.
2. Hitung petak yang menutupi bangun tersebut! kemudian berilah tanda. Untuk petak yang tidak utuh, jika petak yang menutupi bangun lebih dari setengahnya, maka petak tersebut dihitung satu petak.

Ilustrasi :

Glossarium

Kelling merupakan jumlah panjang sisi-sisi yang membatasi bangun tersebut. Luas merupakan suatu daerah yang dibatasi oleh panjang sisi ada bangun datar tersebut.

Daftar Pustaka

Tohir, M. 2021. Modul Bahan Ajar. Universitas Ibrahimy Situbondo.

Diskusikan

Intruksikan kepada siswa untuk mencari/menemukan 3 contoh motif batik Situbondo yang berbentuk bangun datar tidak beraturan. Kemudian ajaklah siswa untuk menghitung luas motif batik yang telah ditentukan bersama teman kelompok.

Picture 5. Teaching Module

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