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Geometry Exploration for the Development of Ethnomathematics Worksheet Based on the Ornament of Jingah River Jami Mosque

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ABSTRACT

Lack of availability of culturally oriented worksheets around students to improve the character of loving the motherland. The Merdeka Curriculum allows educators to develop teaching materials adapted to the characteristics of each region. This study aims to establish a worksheet with ethnomathematics exploration of the ornaments of the Jingah River Jami Mosque. The research method used is the Plomp model development method which consists of four stages, namely: (1) initial investigation; (2) designs; (3) construction; and (4) test, evaluation, and revision—methods of data collection, namely the method of observation, interviews, and questionnaires. The data analysis technique used is descriptive qualitative and descriptive quantitative. The research subjects included experts as validators, and 7th-grade junior high school students on a limited basis. The results of the validator's assessment were 4,77, the results of the restricted group trials were 80,00%. So the ethnomathematics-based student worksheets for the ornament of the Jingah River Jami mosque are obtained, which are valid, and practical.

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A. INTRODUCTION

Ethnomathematics is a learning that can be a bridge between culture and education, especially mathematics (Kristial et al., 2021; Zhang & Zhang, 2010). Ethnomathematics-based mathematics learning is expected to be able to visualize abstract mathematical concepts, which are then linked to the surrounding environment, making it easier for students to imagine. Learning mathematics requires tangible or concrete objects close to students as intermediaries and learning tools before studying abstract mathematical material (Murni et al., 2022; Purba & Harahap, 2022). The hope is that students can understand mathematics learning more accessible and meaningfully so they can know more about their own culture (Barton & Riddle, 2022).

Education is a civilizing process and a tool for cultural change. The education process in schools is one of the formal civilizing processes (acculturation processes) (Baldwin & Darner, 2021; Daryanto & Dwicahyono, 2014; Septian et al., 2019)(Daryanto & Dwicahyono, 2014; Roro & Khaura, 2023). One of the educational processes is through mathematics. This is done to

prepare human resources who have 21st-century skills (critical thinking and problem-solving, creativity, collaboration, and communication), especially those who can keep up with the rapid development of technology because these skills are one of the determining factors for success in facing the challenges of life that are increasingly competitive. Education will be more effective in preparing human resources to master 21st-century skills (Redhana, 2019; Rotherham & Willingham, 2009).

Therefore, learning innovations are needed to make learning mathematics more meaningful by involving the local culture, including developing ethnomathematics-based worksheets for mathematics subjects, one of which is geometry. The shapes of geometric objects discussed at school are numerous in everyday life, for example, buildings made up of flat and spatial structures. It is hoped that students will find it easy to understand the studied geometry material because they are already familiar with the discussed object. Junior high school students have difficulty in identifying the properties of flat shapes, namely the properties of quadrilaterals, because of a weak understanding of the prerequisites and a lack of skills in using geometric ideas in solving mathematical problems related to quadrilaterals (Ilyyana & Rochmad, 2018; Nurjanah & Juliana, 2020; Shomad et al., 2018). This condition reinforces that most of the students still have low problem-solving skills and fewer geometry skills (Gagatsis, 2021; Irsal et al., 2017; Riastuti et al., 2017; Sariyasa, 2016).

Responding to these problems, students need meaningful learning resources where they can construct their knowledge. One of these learning resources is the worksheet (Noor Fajriah & Suryaningsih, 2020). That the learning process is not centered on the teacher so that students are more independent because the worksheet contains steps that are arranged in a systematic and orderly manner that guides students to find something so that students can work efficiently, correct and follow the teacher's expectations (Silvia & Mulyani, 2019; Zarate, 2022). To obtain worksheets that are adapted to the characteristics of students and their environment, each teacher needs to develop them. An ethnomathematics-based worksheet in the student environment is one of the worksheets that accommodates this.

The settlement ethnomathematics-based worksheet "Taneyan Lanjheng" was developed to build students' understanding of flat shapes. The method used to create valid, practical, and effective worksheets is the Thiagarajan modification (Hasanah et al., 2019). There is also the use of the Tresmerr development method to develop worksheets based on ethnomathematics of the Timor loom for valid and practical number pattern material, which can improve student learning outcomes. (Disnawati & Nahak, 2019). The Plomp development research method used to develop worksheets based on ethnic Banjarese culture.

Based on the information above, developing a prototype of a Banjar ethnomathematics-based geometry learning device is necessary as an example for mathematics teachers who wish to use local culture as their learning context. Ethnomathematics-based learning tools effectively increase activeness, problem-solving, critical thinking, creative thinking, learning outcomes, and love for local culture (Fouze & Amit, 2018; Nida et al., 2017; Widiyastuti et al., 2021). This can be a unique attraction for students to learn so that it is not only limited to the theory, sometimes making them feel bored.

One of the buildings that can be explored in geometry is the Jingah River Jami Mosque. Based on field surveys, most of the ornaments at Jingah River Jami Mosque contain elements

of geometry (squares & triangles), whether it be ornaments on doors, roofs, poles, mosque wall decorations, and so on (Fajriah & Suryaningsih, 2021). So many geometric concepts can be explored from mosque ethnomathematics in developing geometry learning tools (Noor Fajriah et al., 2021; Nurhalisa et al., 2022). However, in reality, many mathematics teachers still do not know ethnomathematics. This can be seen from an online survey of junior and senior high school math teachers; only 6% know ethnomathematics and its benefits. Based on the information from teachers who know ethnomathematics, it can be seen that they have not used ethnomathematics in their learning, mainly ethnic Banjarese ethnomathematics. The reason is that they need time and effort to develop these learning tools, so they need prototypes of Banjar ethnomathematics-based learning devices, especially learning geometry (Fajriah et al., 2022). So this research is significant because it develops worksheets that guide students to study independently and based on ethnomathematics at the Jami Sungai Jingah Mosque, the second oldest mosque in South Kalimantan, which is a legacy of the Banjar tribe.

Furthermore, based on the results of interviews with mathematics teachers in Banjarmasin, the worksheets they used were worksheets that had been made and were on the market. The material presented is relatively short; practice questions, there is no kind of help for students who still need help understanding (Iis Juniati, 2019; Yurnalis & Bayu, 2018). Therefore, the researcher offers an ethnomathematics-based worksheet on rectangular and triangular material connected to the Jingah River Jami Mosque ornament in the hope that student learning outcomes will increase.

B. METHODS

The Plomp development research method was used to compile ethnomathematical-based worksheets on the ornaments of the Jingah River Jami Mosque. Four stages are passed to obtain a prototype worksheet that meets the valid criteria, namely: (1) initial investigation; (2) design; (3) construction; and (4) test, evaluation, and revision (Sukardi, 2008; Yoshikawa, 2012).

The investigation stage was carried out to investigate why it was necessary to develop ethnomathematical-based worksheets associated with the ornaments of the Jingah River Jami Mosque on triangle and quadrilateral material (Fajriah & Suryaningsih, 2021). The team used the design stage to design a worksheet framework consisting of a cover, contents, and cover and to select a photo of the Jingah River Jami Mosque ornament to be used. Then the construction stage, after finishing designing the framework of the worksheet, continues to assemble the parts into a single unit so that a prototype worksheet is formed. At the test, evaluation, and revision stages, the prototype I worksheet was assessed and corrected by two validators: lecturers and mathematics education teachers. Suppose the validation results do not meet the criteria. In that case, the worksheet prototype is updated according to the suggestions and re-validated to obtain prototype II worksheets, which will be tested on students in class 7. The trials carried out were limited class trials to get student responses that can be used as input, corrections, and improvements to the compiled product.

Assessment of the worksheet prototype from the validator consists of aspects of content, construction, and design with the selection of evaluations 1 to. 5. The content aspect consists of 12 questions, the constructed aspect consists of 10 questions, and the design aspect consists of 8 questions. The following are the validity criteria used to determine whether the LKPD draft

is valid, presented in Table 1. If the assessment interval of the validator is less than 4, the worksheet will be corrected, and reassessment will be continued, as shown in Table 1.

Table 1. Worksheet Validity Interval

No.	Interval	Criteria
1	$1 \leq V < 2$	Invalid
2	$2 \leq V < 3$	Not Valid
3	$3 \leq V < 4$	Quite Valid
4	$4 \leq V < 5$	Valid
5	$V = 5$	Very Valid

This limited trial was conducted on 7th-grade junior high school students selected to represent all students' abilities: low, medium, and high. The results of the limited trial phase are in the form of research data in the form of student responses. Furthermore, the research data obtained was analyzed to determine students' reactions after reading and answering the questions on the worksheet. There were four questions that students answered to find out their responses. There are only two answer choices, agree and disagree. The results of student answers are summarized in such a way as to find out the practicality of the worksheets that have been prepared. The criterion is that the practical worksheet is based on the percentage of students who agree. The worksheet is helpful if more than 75% of students decide to answer the questions given, as shown in Table 2.

Table 2. Practical Criteria

No.	Interval (%)	Criteria
1	$0 \leq R \leq 25$	Impractical
2	$26 \leq R \leq 50$	Quite practical
3	$51 \leq R \leq 75$	Practical
4	$76 \leq R \leq 100$	Very practical

C. RESULT AND DISCUSSION

1. Initial Investigation

At this stage, an investigation was carried out on teachers of mathematics, geometry materials, and ornaments at the Jami Sungai Jingah Mosque. An analysis of mathematics teachers was carried out through a questionnaire containing ethnomathematics in learning geometry. As many as 37 math teachers in the Banjar Culture environment participated in filling out the questionnaires distributed. Based on the completed questionnaire, 35 math teachers had not seen any elements of Banjar culture in the worksheets used so far, and 35 teachers had never prepared geometry problems in the context of Banjar culture. The reasons for mathematics teachers not using elements of Banjar culture include unstandardized units, few objects that can be used as teaching materials, difficulty connecting content with the context of Banjar culture, limited references, and needing time and money. Based on the results of the investigation of mathematics teachers, it is necessary to develop worksheets based on Banjar Culture ethnomathematics on geometry material.

The second step is to explore geometric material considered problematic for students from several studies. Junior high school students have difficulty in identifying the properties of flat

shapes, namely the properties of quadrilaterals, because of a weak understanding of prerequisites and a lack of skills in using geometric ideas in solving mathematical problems related to quadrilaterals (Angraini & Suparman, 2019; Sholehah, 2021; Shomad et al., 2018). This condition reinforces that most students still have low problem-solving skills and fewer geometry skills (Irsal et al., 2017; Riastuti et al., 2017). As a result, teachers have difficulty bringing up HOTS abilities. Based on the results of the investigation of the material, a way is needed so that students are more interested in learning geometry in the hope that their abilities will increase. The focus of the material to be discussed is quadrilateral and triangle.

The third step of the initial investigation is to study the ethnomathematics of the Jingah River Jami mosque, namely by direct observation in the field and confirmed with relevant literature documents. Jingah River Jami mosque is the oldest mosque in the city of Banjarmasin. Based on the results of field observations, it can be seen that there are a lot of mathematical elements in the ornaments of the mosque building. The results of words related to the concept of geometry at the Jingah River Jami mosque are described in Table 3.

Table 3. Jingah River Jami Sungai Mosque and the Geometry Concept

Photo	Geometry Concept
 (Source: personal)	Rectangle, square, volume, area, triangle, trapezoid, line, line, vertex, angle, congruence, symmetrical.
 (Source: personal)	Congruence, rhombus

The initial investigation results confirmed that it was necessary to develop a worksheet by utilizing the ethnomathematics of the Jami Sungai Jingah mosque. Mosques can be used as a source of learning mathematics, especially geometry (Fajriah & Suryaningsih, 2021; Fajriah et al., 2021; Janan, 2022; Rofiq et al., 2022).

2. Design

At the design stage, the preparation of validation sheets and student response questionnaires was carried out, as well as designing worksheets. The initial worksheets design uses software applications, namely Microsoft Word and Photoshop. For images that will be used on worksheets, it is prioritized to obtain from (personal) observations, and if using secondary photos, it is mandatory to write down the source. Next, determine the animation in the

worksheet that will be developed to attract students' interest (Suyanti et al., 2022). The sheet cover design created is shown in Figure 1.

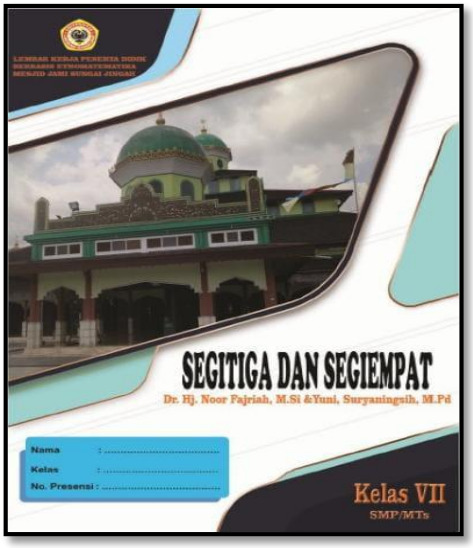

Figure 1. Worksheet Cover Design

3. Realization/Construction

At the construction stage, produce prototype 1 (initial) due to product design realization. The resulting product is a worksheet in the Jami Sungai Jingah Mosque context. At this stage, prototype 1 (initial) worksheet design was carried out by the initial design. The worksheet framework developed is: (1) The introductory section consists of (a) Front cover; (b) Prefaces; (c) Table of Contents; (d) Instructions for Using LKPD; (e) Basic Competency and Competency Achievement Indicators; (2) The Content Part consists of (a) Activity 1: Activity 1, Activity 2, Activity 3, and Comprehension Test 1; (b) Activity 2: Activity 1, Activity 2, Activity 3, Activity 4, and Comprehension Test 2; (c) Activity 3: Activity 1, Activity 2, and Comprehension Test 3; (d) Activity 4: Activity 1 and Comprehension Test 4; and (3) Closing Section consists of Bibliography. Each activity has several activities to direct students to construct their knowledge independently. If students themselves create knowledge, knowledge will be remembered for a long time (Thompson, 2020).

4. Test, Evaluation, and Revision

In this phase, two main activities are carried out, namely worksheet validation to determine the validity of the product based on expert judgment and trial worksheets for 7th-grade junior high school students to assess the product's practicality. Prototype I is a worksheet based on the initial design that will be validated by validators, namely one mathematics education lecturer and one junior high school mathematics teacher. Each validator is given a worksheet along with the worksheet validation sheet. The results of the validation are in the form of scores to test the level of validity of the worksheet as well as suggestions and criticisms from the validator, which are used as revision material, so that prototype II is produced. The validation results from the validator are shown in Table 4.

Table 4. Results of Worksheet Expert Assessment

No.	Assessed Aspects	Score	Qualification
1	Contents	4,9	Valid
2	Construction	4,7	Valid
3	Designs	4,7	Valid

Based on Table 4, the analysis of the validation sheet, and the established validity criteria, the value of each aspect is obtained that the worksheet has met the valid qualifications (Aparasu & Bentley, 2014). Based on the worksheet validation sheet, the validator also provides suggestions/comments for improvement, as shown in Table 5.

Table 5. Worksheet Expert Assessment Suggestions

No.	Suggestion
1	Image amplified
2	Signs/symbols of geometric shapes
3	History of Mosques added
4	Google map the location of the mosque
5	Definitions of perimeter of a flat shape with words
6	Minor corrections to some sentences and work instructions

Based on the suggestions/comments from the validators, revisions were made to the prototype I worksheet. The results of the changes based on suggestions/comments from the validator on the worksheet validation developed are described as follows. Changes to the description of the worksheet symbol, namely, the red box are too thick for the question description, correct the red box, reduced for the description of the problem, can be seen in Figure 2. Changes to worksheet activity 1, the order of questions added by being asked to draw a triangle found from the image provided and changes to the arrangement of the pictures and answer box. Changes to the description of the drawings about the worksheet, namely that in flat images, initially, there is no description of the sides that are the same length and a description of the location of the perpendicular lines. Improvements added symbols about side lengths and vertical position, as shown in Figure 2.

(a) Before revision (b) After revision

Figure 2. Revision of Problem Information Symbols

The results of these revisions produce worksheets that will be used for the trial phase. The trial was conducted on students in a limited way to obtain responses, input, corrections, and improvements to ethnomathematics-based rectangular and triangular worksheets. After

reading and working on the questions in each activity, the test subjects for seven junior high school students were to respond to the worksheets that had been done. Furthermore, the research data obtained was analyzed to determine the practicality of the worksheets that had been compiled. A summary of the responses that have been written can be seen in Table 6.

Table 6. Practical Criteria

Criteria	Total Student (%)
Impractical	10
Quite practical	10
Practical	80
Very practical	0

Based on Table 6 above, it was found that 80% of students agreed to the three questions, 10% gave coordinated responses to two questions, and 10% gave affirmative answers to two questions. The questions given are as follows. 1. The worksheet given is something new for me. 2. The given worksheet caught my attention. 3. The language of the worksheets provided is easy for me to understand. 4. The worksheets given are engaging in terms of appearance (writing, illustrations, pictures, and the location of the pictures) to my attention. So based on the students' answers, the worksheets meet the applicable criteria (Pungor & Horvai, 2020; Sukardi, 2008). The questions answered agreed were the worksheets presented were new to them. This is to the statement of the mathematics teacher at the time of the initial investigation that they had not used ethnomathematics in their learning.

In addition to filling out an assessment questionnaire about the worksheets being developed, students were also asked to answer questions on the worksheets. The following is an example of student answers in which they can distinguish between a quadrilateral and a non-rectangle. Likewise, when students define quadrilaterals, they even add examples of quadrilaterals. But when asked to describe the properties of a quadrilateral, there is a slight misperception of mentioning length for width or vice versa, as shown in Figure 3.

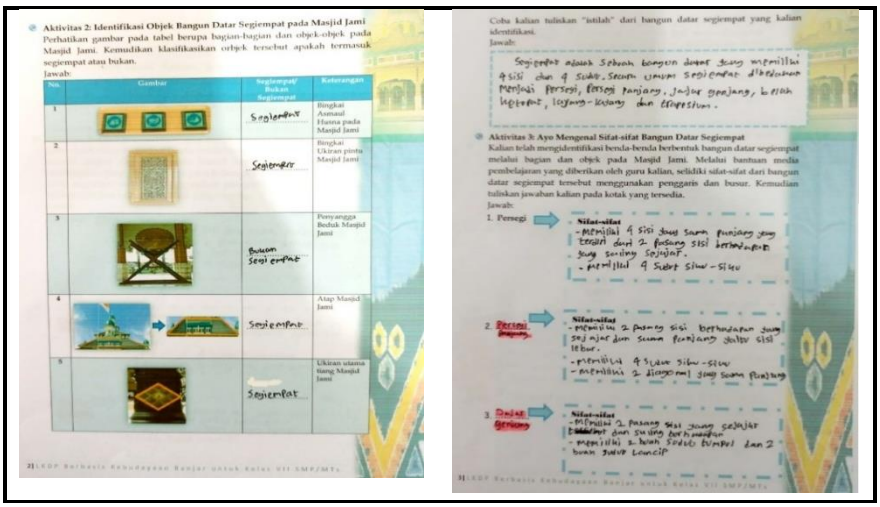

Figure 3. Student answers about the properties of quadrilaterals on the worksheet

For other quadrilateral properties, students were correct in describing them. When asked to answer one of the competency tests about the exact quadrilateral nature, students correctly

answered it. After the analysis is carried out based on the validation results by the validator and the student's response to the developed worksheet, the worksheet is declared to have met the valid, and practical criteria, from now on, referred to as the final prototype/final development of the worksheet, namely the worksheet material on Ethnomathematics-Based Quadrilaterals and Ethnomathematics at the Jingah River Jami Mosque Ornament for seventh-grade junior high school. The worksheet developed is expected to attract students' interest in learning mathematics and learning about the Banjar cultural heritage. In addition, displaying images and varied contexts in a worksheet can improve students' visualization abilities (Kashefi et al., 2015).

Activities that are presented systematically and logically in worksheet have the potential to explore students' reasoning abilities. The ability to reason is one of the activities in the scientific approach. The scientific approach is one of the leading approaches in the 2013 curriculum. Applying the scientific approach in the mathematics learning process can improve student learning outcomes (Lestari et al., 2018; Sholihah et al., 2022).

Finally, this worksheet is expected to maximize students' geometry learning outcomes, as experienced by several researchers. worksheet influences student achievement in the third semester of the UPY Mathematics Education Study Program on indefinite integral material (Sagita et al., 2018). worksheet can facilitate students learning online using the PMRI approach (Hastuti et al., 2022; Rahayu & Hernadi, 2020).

D. CONCLUSION AND SUGGESTIONS

Based on the four stages of Plomp's research, geometry learning tools were obtained in the form of ethnomathematics-based worksheets on the ornaments of the Jingah River Jami mosque, which were valid and practical. Suggestions that can be given are as follows: (1) There are still many Banjar cultures that can be explored as a context for learning mathematics in schools, and (2) worksheet that has been developed can be upgraded to e- worksheet to support online learning (Saryadi & Sulisworo, 2023).

REFERENCES

Angraini, P., & Suparman. (2019). *Analisis Kebutuhan : Problematika Geometri Pada Siswa Kelas VII SMP Negeri 2 Pundong*. *1*(1), 118–122.

Aparasu, R. R., & Bentley, J. P. (2014). *Principles of research design and drug literature evaluation*. Jones & Bartlett Learning.

Baldwin, K., & Darner, R. (2021). Preservice science and mathematics teachers' acculturation into communities of practice: A call for undergraduate research in science and mathematics teacher preparation. *Journal of STEM Teacher Education*, *56*(1). https://doi.org/10.30707/jste56.1.1624981200.209707

Barton, G., & Riddle, S. (2022). Culturally responsive and meaningful music education: Multimodality. *Multimodality, Research Studies in Music Education*, *44*(2), 345–362. https://doi.org/https://doi.org/10.1177/1321103X211009323

Daryanto, & Dwicahyono. (2014). *Pengembangan Perangkat Pembelajaran (Silabus, RPP, PHB, Bahan Ajar)*. Gava Media.

Disnawati, H., & Nahak, S. (2019). Pengembangan Lembar Kerja Siswa Berbasis Etnomatematika Tenun Timor pada Materi Pola Bilangan. *Jurnal Elemen*, *5*(1), 64.

Fajriah, N., & Suryaningsih, Y. (2021). Ethnomathematics of the Jami Mosque Jingah River as a source mathematics learning. *Journal of Physics: Conference Series*, *1760*(1). https://doi.org/10.1088/1742-6596/1760/1/012025

Fajriah, N., Suryaningsih, Y., Kamaliyah, Budiarti, Adawiyah, R., Nasrullah, N., & Amalia, Z. (2022). Eksplorasi Etnomatematika dalam Pembelajaran Geometri untuk Meningkatkan Literasi Siswa. *Bubungan Tinggi: Jurnal Pengabdian Masyarakat*, *4*(1), 268. https://doi.org/10.20527/btjpm.v4i1.4369

Fajriah, Noor, & Suryaningsih, Y. (2020). The development of constructivism-based student worksheets. *Journal of Physics: Conference Series*, *1470*(1). https://doi.org/10.1088/1742-6596/1470/1/012011

Fajriah, Noor, Suryaningsih, Y., Yuliasntui, H., Nando, A. Z., & Alitsnaiini, N. K. (2021). Pengembangan Komik Berbasis Etnomatematika Masjid Jami Sungai Jingah Pada Pembelajaran Geometri. *Prosiding Seminar Nasional Lingkungan Lahan Basah*, *6*(2), 1–8. http://snllb.ulm.ac.id/prosiding/index.php/snllb-lit/article/view/501

Fouze, A. Q., & Amit, M. (2018). Development of mathematical thinking through integration of ethnomathematic folklore game in math instruction. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(2), 617–630.

Gagatsis, A. (2021). A multidimensional approach to students' creativity in geometry: spatial ability, geometrical figure apprehension and multiple solutions in geometrical problems. *Mediterranean Journal for Research in Mathematics Education*, *18*(May), 5–16. https://www.researchgate.net/publication/351839351

Hasanah, S. I., Hafsi, A. R., & Zayyadi, M. (2019). Pengembangan Lembar Kerja Siswa Berbasis Etnomatematika Dalam Membangun Pemahaman Konsep Siswa. *Jurnal Pendidikan Matematika Dan IPA*, *10*(2), 21.

Hastuti, I. D., Ahyansyah, Mawaddah, S., & Sutarto. (2022). Development of Student Books Characterized by Indonesian Realistic Mathematics Education to Support Mathematics Problem Solving Ability. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, *6*(1), 36–50. https://repository.ummat.ac.id/4427/%0Ahttp://repository.ummat.ac.id/4427/1/9%29 Development of Student Books Characterized by Indonesian Realistic Mathematics Education.pdf

Iis Juniati, P. C. A. F. A. (2019). Perancangan Prototype LKS Materi Operasi Hitung Bilangan Bulat Untuk Peserta Didik Sekolah Dasar. *Jurnal Inovasi Matematika*, *1*(2), 132–143. https://doi.org/10.35438/inomatika.v1i2.150

Ilyyana, K., & Rochmad. (2018). Analysis of Problem Solving Ability in Quadrilateral Topic on Model Eliciting Activities Learning Containing Ethnomathematics. *Unnes Journal of Mathematics Education Research*, *7*(2), 130–137.

Irsal, I. L., Jupri, A., & Prabawanto, S. (2017). Junior High School Students' Understanding and Problem Solving Skills on the Topics of Line and Angles. *Journal of Physics: Conference Series*, *895*(1). https://doi.org/10.1088/1742-6596/895/1/012073

Janan, T. (2022). Ethnomathematical Exploration At The Great Mosque Of Bandung. *Jurnal Equation*, *5*(September), 66–75.

Kashefi, H., Alias, N. A., Kahar, M. F., Buhari, O., & Zakaria, S. (2015). Visualisation in mathematics problem solving. *E-Proceeding of the International Conference on Social Science Research*, *June*, 576–585.

Kristial, D., Soebagjoyo, J., & Ipaenin, H. (2021). Analisis biblometrik dari istilah "Etnomatematika." *Kognitif: Jurnal Riset HOTS Pendidikan Matematika*, *1*(2), 178–190. https://doi.org/10.51574/kognitif.v1i2.62

Lestari, W., Pratama, L. D., & Jailani, J. (2018). Implementasi Pendekatan Saintifik Setting Kooperatif Tipe STAD Terhadap Motivasi Belajar Dan Prestasi Belajar Matematika. *AKSIOMA : Jurnal Matematika Dan Pendidikan Matematika*, *9*(1), 29. https://doi.org/10.26877/aks.v9i1.2332

Murni, F., Marjo, H. K., & Wahyuningrum, E. (2022). Pengaruh Penggunaan Media Manipulatif pada Pembelajaran Matematika Dan Kepercayaan Diri Terhadap Hasil Belajar Siswa Kelas III Sekolah Dasar. *ELSE (Elementary School Education Journal) Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *6*, 438–459.

Nida, I. K., Buchori, A., & Murtianto, Y. H. (2017). Pengembangan Comic Math Dengan Pendekatan Etnomatematika Pada Meteri Kubus Dan Balok Di Smp. *Aksioma*, *8*(1), 31. https://doi.org/10.26877/aks.v8i1.1531

Nurhalisa, T., Alghofiati, Z. A., & Fadiana, M. (2022). Etnomatematika pada masjid aschabul kahfi perut

bumi Al Maghribi Tuban sebagai konsep geometri di sekolah dasar. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, *11*(2), 180. https://doi.org/10.33387/dpi.v11i2.5071

Nurjanah, N., & Juliana, A. (2020). Hambatan Didaktis Siswa SMP dalam Penyelesaian Masalah Geometri Berdasarkan Kemampuan Persepsi Ruang. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *11*(2), 236–244. https://doi.org/10.15294/kreano.v11i2.26752

Pungor, E., & Horvai, G. (2020). *A Practical Guide to Instrumental Analysis*. CRC Press.

Purba, Y. A., & Harahap, A. (2022). Pemanfaatan Aplikasi Canva Sebagai Media Pembelajaran Matematika Di SMPN 1 NA IX-X Aek Kota Batu. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(2), 1325–1334. https://doi.org/10.31004/cendekia.v6i2.1335

Rahayu, R., & Hernadi, J. (2020). Pengembangan Perangkat Pembelajaran Matematika Dengan Pendekatan Pmri Untuk Pembelajaran Online. *EDU-MAT: Jurnal Pendidikan Matematika*, *8*(2), 148–158. https://doi.org/10.20527/edumat.v8i2.9203

Redhana, I. W. (2019). Mengembangkan Keterampilan Abad Ke-21 Dalam Pembelajaran Kimia. *Jurnal Inovasi Pendidikan Kimia*, *13*(1).

Riastuti, N., Mardiyana, M., & Pramudya, I. (2017). Students' Errors in Geometry Viewed from Spatial Intelligence. *Journal of Physics: Conference Series*, *895*(1). https://doi.org/10.1088/1742-6596/895/1/012029

Rofiq, A., Damayanti, R., Janan, T., Sitaresmi, P. D. W., & Nuryami, N. (2022). Eksplorasi Etnomatematika Pada Masjid Agung Kota Probolinggo. *AL JABAR: Jurnal Pendidikan Dan Pembelajaran Matematika*, *1*(1), 1–11. https://doi.org/10.46773/.v1i1.284

Roro, R., & Khaura, A. (2023). Proceedings of the Annual Conference on Research, Educational Implementation, Social Studies and History (AREISSH 2021). In *Proceedings of the Annual Conference on Research, Educational Implementation, Social Studies and History (AREISSH 2021)*. Atlantis Press SARL. https://doi.org/10.2991/978-2-494069-17-6

Rotherham, A. J., & Willingham, D. (2009). 21st century skills: The challenges ahead. *Educational Leadership*, *67*(1), 16–21.

Sagita, L., Widagsa, R., & Dwipa, N. M. S. (2018). Developing Bilingual Scientific-Worksheet for Indefinite Integral. *Journal on Mathematics Education*, *9*(2), 249–258. https://doi.org/10.22342/jme.9.2.5401.249-258

Sariyasa. (2016). Creating Dynamic Learning Environment to Enhance Students' Engagement in Learning Geometry. *Journal of Physics: Conference Series*, *755*(1).

Saryadi, W., & Sulisworo, D. (2023). Development of E-Module Based on the Discovery Learning to Improve the Student Creative Thinking Skills. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, *7*(1), 11–22.

Septian, R., Irianto, S., & Andriani, A. (2019). Pengembangan Lembar Kerja Peserta Didik (Lkpd) Matematika Berbasis Model Realistic Mathematics Education. *Jurnal Educatio FKIP UNMA*, *5*(1), 59–67. https://doi.org/10.31949/educatio.v5i1.56

Sholehah, F. (2021). *Pengembangan E-LKPD Berbasis Kontekstual Menggunakan Liveworksheets pada Materi Aritmetika Sosial Kelas VII SMP Ahmad Dahlan Kota Jambi*. UIN Shultan Thaha Saifuddin Jambi.

Sholihah, M., Widadah, S., & Sukriyah, D. (2022). Development of Student Worksheet Based on Ethnomathematics Traditional Engklek Games on Cube and Rectangular Pyramid . *Proceedings of the Eighth Southeast Asia Design Research (SEA-DR) & the Second Science, Technology, Education, Arts, Culture, and Humanity (STEACH) International Conference (SEADR-STEACH 2021)*, *627*, 144–152. https://doi.org/10.2991/assehr.k.211229.023

Shomad, Z. A., Kusmayadi, T. A., & Riyadi. (2018). The Van Hiele geometry thinking levels of mild mental retardation students. *Journal of Physics: Conference Series*, *943*(1). https://doi.org/10.1088/1742-6596/943/1/012014

Silvia, T., & Mulyani, S. (2019). Pengembangan Lembar Kerja Peserta Didik (Lkpd) Berbasis Etnomatematika Pada Materi Garis Dan Sudut. *Hipotenusa*, *1*(2).

Sukardi. (2008). *Metode Penelitian Pendidikan Kompetensi dan Praktiknya*. Bumi Aksara.

Suyanti, R. W., Rahmawati, F. P., Istiprijanti, T. N., Surakarta, U. M., & Belajar, M. (2022). *Peningkatan minat belajar keterampilan bercerita melalui gambar seri digital pada siswa sekolah dasar*. *5*, 211–218.

Thompson, P. W. (2020). Constructivism in mathematics education. In *Encyclopedia of mathematics education* (pp. 127–134). Cham: Springer International Publishing.

Utomo, P., & Zubaidah, Z. (2020). Self-monitoring Techniques: Perbedaan Peningkatan Achievement Motivation Siswa SMA Berdasarkan Jenis Kelamin (Gender). *Jurnal Hawa : Studi Pengarus Utamaan Gender Dan Anak*, *2*(2). https://doi.org/10.29300/hawapsga.v2i2.3533

Widiyastuti, T., Slamet, S., & Kurniawan, S. B. (2021). Development of Science Comic Media Based on Local Culture Wisdom to Improve HOTS. *Proceedings of the 5th International Conference on Arts Language and Culture (ICALC 2020)*, *534*(534), 120–126. https://doi.org/10.2991/assehr.k.210226.056

Yoshikawa, H. (2012). Design Methodology for Research and Development Strategy (Realizing a Sustainable Society). In *Japan Science and Technology Agency (JST)*. https://www.jst.go.jp/crds/pdf/methodology/CRDS-FY2010-XR-25E.pdf

Yurnalis, & Bayu, E. P. S. (2018). Analisis Kebutuhan Lembar Kerja Siswa (LKS) Berbasis Discovery Learning Untuk Siswa Kelas VIII MTs/SMP. *Lppm Umsb*, *XII*(11), 187–192.

Zarate, E. (2022). Downloaded Worksheets : A Learning Activity to Enhance Mathematical Level. *Universal Journal of Educational Research, 1*(2), 56–63. https://doi.org/10.5281/zenodo.6850801

Zhang, W., & Zhang, Q. (2010). Ethnomathematics and Its Integration within the Mathematics Curriculum. *Journal of Mathematics Education © Education for All*, *3*(1), 151–157.