EDUMATSAINS
JURNAL PENDIDIKAN MATEMATIKA DAN SAINS
E-ISSN:2527-7235
Volume 8 Issue. 2 January, 2024, pp 293-301
http://ejournal.uki.ac.id/index.php/edumatsains

The Development of Ethnomathematics-Based Student Worksheets (LKPD) in Mathematics for Fourth Grade Students

Sudiyah Anawati[2*], Seruni[2], Mia Intan Lestari[3]

[1,2]Mathematics Education FMIPA Indraprasta University PGRI

[3]Madrasah Ibtidaiyah Nurul Huda

e-mail: ***diyaanna18@gmail.com**

Article Info

Article history:
Received November 8, 2023
Revised January 23, 2024
Accepted January 30, 2024
Available online January 31, 2024

https://doi.org/10.33541/edumatsains.v8i2.5336

Abstract

The purpose of this study is to determine the quality of the ethnomathematics-based math worksheet curriculum for the fourth-grade students of Madrasah Ibtidaiyah in the areas of material circumference and flat shapes. Research and development using the ADDIE model is used as the research type. The data source for this study was obtained from the validation results of three validators and the results of student surveys. A confirmatory study is used in the data collection technique. The results showed that five phases were used in this study, namely analysis, design, development, implementation, and evaluation. The validity results of the ethnomathematics-based mathematics LKPD were 77.46 in the good category. The results of the student survey were a good 84.15. The quality of ethnomathematics-based math worksheets for the fourth-grade students of Madrasah Ibtidaiyah can be seen from two perspectives, namely expert validation and student survey results, both of which received good results.

Keywords: Design; Students Worksheet; ADDIE; Ethnomathematics-based

1. Introduction

Students at the elementary school level and equivalent are children who belong to Generation Z. Based on data obtained from the 2020 population census, namely 27.94% of Indonesia's population belongs to Generation Z. According to BPS data for 2021, Those included in this generation are children born in the 1997–2012 range or aged 10–25 years. Technology is the result of human thought that humans use to achieve various goals in life, technology is one of the measuring tools to achieve goals. (Ngafifi, 2014). Current technological advances have greatly influenced Generation Z's learning style. The amount of time they spend playing with gadgets certainly influences their level of desire to learn. As is the case in mathematics subjects. They have difficulty finding mathematical answers because mathematics has various steps and various methods for solving problems. So they tend to want to find answers quickly and easily and look for answers on the Internet. This makes them reluctant to think critically and rely on technological advances. Technological advances also have an influence on the cultural sector. Nowadays children prefer to see culture that comes from abroad. They like to follow clothing styles and ways of speaking, and they also like listening to and watching films from abroad. This has an impact on their habits so that they forget the culture of their own country. Therefore, it is necessary to familiarize students so that they want to learn about their own culture.

Several internal and external factors cause students to find it difficult to understand the material being taught. Learning methods are one of the factors that make it difficult to learn the material. Learning methods are structured methods that can be chosen by teachers to present learning materials in organizing and directing student activities to achieve the final learning goals (Wedi, 2016). The level of student understanding is influenced by the learning methods in class, therefore the choice of method is adjusted to the characteristics of the students. Adequate school facilities also support the learning process, for example, comfortable classrooms. Then, the learning tools used by students in working on practice questions need to be adjusted to the level of students. Learning tools need to be developed so that teachers can create more interesting practice questions so that students can solve them well.

Development is a collection of science and technology that aims to use proven scientific teachings and theories to improve the function, benefits, and application of science and technology to produce new technology. Development is an effort to improve abilities. Development and application of organized knowledge to help solve problems in the field of education (Isniwatun Munwaroh, 2015). This type of research was developed so that the application of knowledge functions to improve abilities and help in solving problems.

The development of learning media should be adapted to students' learning conditions so that it is more interesting to learn and students can learn on their own. Learning Media is a benchmark for teaching and learning activities in the classroom and a tool for improving the quality of teachers in meeting qualification requirements, namely managing knowledge, skills, and attitudes (Makhrus et al., 2019). LKPD is a ready-to-use learning tool that can be used. LKPD makes it easier for teachers to carry out learning, helps students learn, and makes it easier to absorb the material being taught (Rewatus et al., 2020)

LKPD is one of the complementary learning tools that can support the implementation of learning in class which has been prepared in the learning implementation plan (Maretha & Suparman, 2018). This LKPD can be developed as well as possible so that it makes it easier for students to study the material presented by the teacher by answering the questions contained in the LKPD, especially in the field of mathematics. So that students can understand mathematical concepts, they can be developed through LKPD which are designed to provide cultural or ethnomathematics elements. This is by the criteria for elementary school-age students who do not like studying the culture of their own country.

Contextual culture-based learning can encourage interaction between teachers and students by connecting the surrounding culture which often occurs with the material being taught. (Luthfi & Rakhmawati, 2022). Ethnomathematics is a study that links culture with an emphasis on achieving integrated understanding, not just passive understanding (Fetra Bonita Sari, Risda Amini, 2020). Ethnomathematics comes from mathematical ideas, thoughts, and implementation developed by various cultures. Without realizing that mathematics is not only in the form of formulas or textbooks, it turns out that mathematics can also be found in diverse cultures.

Learning mathematics with ethnomathematics connects mathematics learning with community culture (Masamah, 2019). Ethnomathematics connects culture and education, especially mathematics education (Fajriyah, 2018). This proves that educational sciences can be interconnected. The learning contained in ethnomathematics is always related to various cultures, for example, the diversity of traditional houses, traditional clothing, and traditional

food. These cultural things will be linked to mathematical concepts so that learning is more interesting and easy for students to learn.

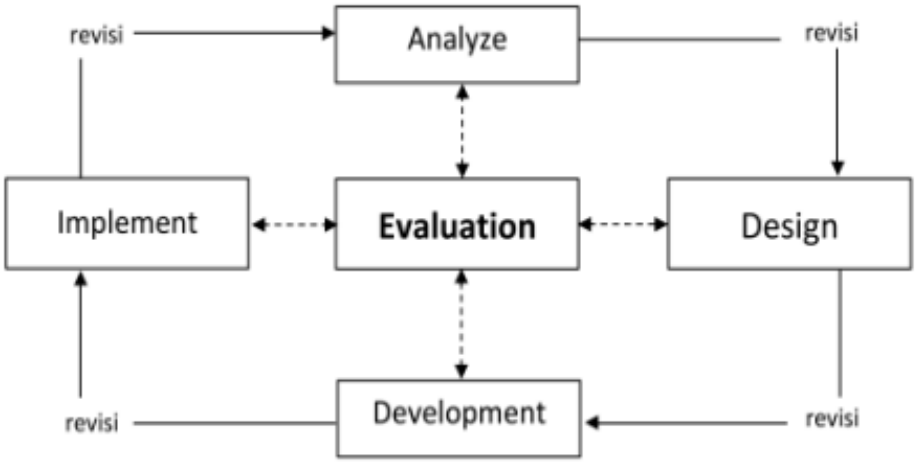
Applied mathematics education is culture-based mathematics education. (Annis Deshinta Ayuningtyas, 2019). The presence of ethnomathematics in learning will give students an understanding that mathematics is not only found in textbooks but can be found in the surrounding environment when interacting. So students will gain insight into culture through the role of ethnomathematics but do not forget the main learning, namely mathematical concepts.

2. Methods

The research method used is Research and Development (R&D). Research and Development (R&D) is a step in research to produce various specific products by testing the effectiveness of these products. To produce certain products with appropriate results and needs analysis that can be used in the wider community, research must be carried out by measuring the effectiveness of using a product. Research and Development (R&D) is a research method used to create certain products and test the effectiveness of these products (Okpatrioka, 2023). There are four stages used in the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model is a systematic approach that focuses on analyzing the interactions of each component according to the existing phases. (Yudi Hari Rayanto & Sugianti, 2020). Product development uses procedural steps that are passed from the first stage to the final stage which produces a product that is ready to **use.**

Figure 1

ADDIE Model Development Research Flow



The first stage of the development model is the analysis stage, namely this stage begins with interviews with several mathematics teachers at Madrasah Ibtidaiyah and with direct observation. The analysis stage is divided into three types, including problem analysis, curriculum analysis, and student analysis. All three have different goals. The problem analysis aims to find out the obstacles faced by mathematics teachers when implementing the learning process in the classroom. Apart from that, curriculum analysts aim to find out the

curriculum that is being used. Then, student analysis aims to determine the characteristics of class IV Madrasah Ibtidaiyah students.
In the development model during the design phase. At this stage, researchers develop learning tools and product evaluation tools based on the results of conceptual analysis. The planning carried out includes matching the material with ethnomathematics concepts, determining the screen design, and determining the questions that will be asked in the LKPD.
After the design stage, the next stage is the development stage. This development stage is a process where complete LKPD must be prepared for further validation by language experts, material experts, and media experts. Validation of environmental experts working as lecturers at PGRI Indraprastha University. Meanwhile, the mathematics and Indonesian language teacher at Madrasah Ibtidaiyah Nurul Huda confirmed the language and material experts. At this stage, the LKPD is revised based on the validator's evaluation.

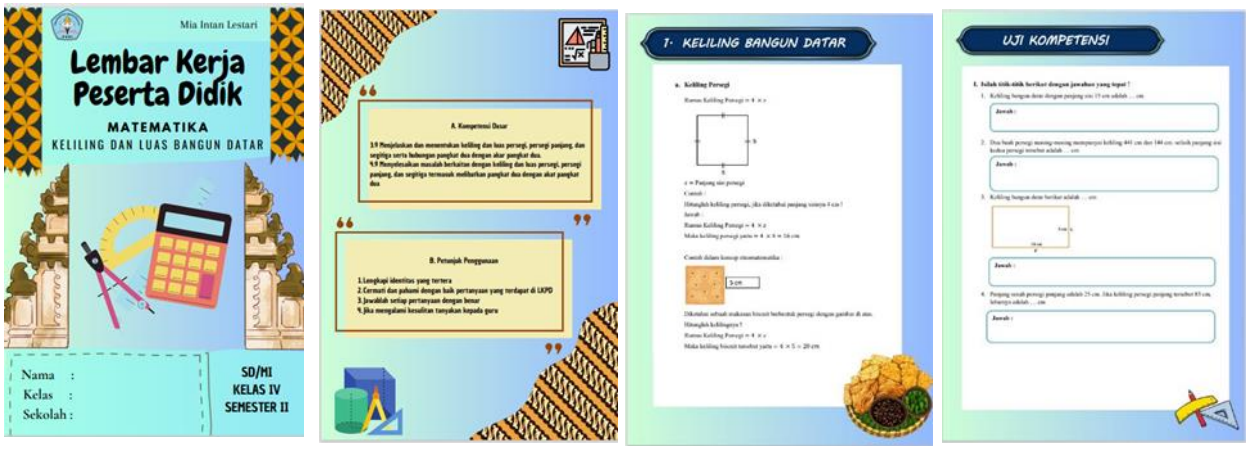
The implementation stage is the implementation of learning by applying the learning tools developed for students. The final step is evaluating the implementation of the learning process and learning outcomes.

3. Result and Discussion

Based on the results of the development carried out by researchers, the Ethnomathematics-based Student Worksheet (LKPD) educational tool has been completed. This research and development uses the ADDIE process which goes through 5 stages, namely the analysis stage, planning stage, development stage, implementation stage, and evaluation stage. Through these steps, researchers can find out the quality of the LKPD being developed. The first research and development stage is the analysis stage, which is divided into problem analysis, curriculum analysis, and student analysis. In the problem analysis, it was found that the teaching materials used at Madrasah Ibtidaiyah Nurul Huda used the Erlangga package book, while the worksheets used only the competency test worksheets contained in the book. Meanwhile, in the curriculum analysis, the curriculum implemented at the Madrasah uses the 2013 curriculum. Then at the student analysis stage, it was found that students' mathematical knowledge was still relatively weak, students were less active in learning, and students still experienced difficulties in understanding and solving mathematical problems.

Figure 2

Ethnomathematics-based LKPD page display



Based on the results of questions and answers with fourth-grade students at the Madrasah, apart from the varying abilities of each student, another factor that influences them to experience difficulties in learning mathematics is teachers who are too monotonous in the learning process. The next stage is the design stage, i.e. design stage of the product to be produced. There are three parts to compiling a LKPD: cover, contents, and closing. The cover section contains the title of the LKPD and the student's identity. Then the contents section contains basic competencies, procedures for use, materials and formulas, as well as competency tests. Meanwhile, the closing section contains enrichment questions. The following is a display of the ADDIE-oriented mathematics LKPD tool in Figure1.

The next stage is the development stage, namely the stage for designing the products and research instruments needed. The development of this LKPD learning tool was prepared using the media Canva and Microsoft Word 2013. The proposed LKPD learning tool was then given to the validation team consisting of language experts, material experts, and media experts. The results of expert validation are as follows.

Table 1

Linguist expert validation results

No	Assessment Aspects	Score
1	Easy-to-understand language	4
2.	Correct use of Indonesian language rules	3
3.	Effectiveness of Sentence	4
4.	Communicative	4
5.	Accuracy of sentence structure	4
6.	Ease of understanding Question	4
7.	Ease of understanding the material	4
8.	Clarity of instructions for use	4
9.	Suitability to student character	5
10.	Use of punctuation	5
11.	Consistency in the use of concepts 3	3
12.	The question sentence contains a double meaning	4
	Total 48	48
	Score	$\frac{48}{60} \times 100\% = 80$
	Criteria	Good

The data results from the language expert validator obtained a total assessment of 48 points with a score of 80. Therefore, the criteria were "good". Suggestions and improvements from experts are that the use of language must be adjusted to the correct use of Indonesian language rules and consistency in the use of concepts. It is hoped that the use of existing concepts in the LKPD will be consistent.

Table 2

Content expert validation results

No	Assessment Aspects	Score
1.	Conformity of material content with competency standards and core competencies	4
2.	Suitability of the content of the material with the learning objectives to be achieved	4

3.	Suitability of the title to the material being reviewed	4
4.	Clarity of study instructions (instructions for use)	4
5.	Clarity of user goals	4
6.	Suitability of material to students' ability level	3
7.	Correct use of terms	3
8.	Accuracy of grammatical use	4
9.	Suitability of image to material	4
10.	The suitability of the summary provided is appropriate to the material	4
11.	Suitability of practice questions to the material	4
12.	Ease of learning materials	4
	Total	46
	Score	$\frac{46}{60} \times 100\% = 76$
	Criteria	Good

The data results from the material expert validator obtained a total assessment of 46 points with a score of 76. Therefore, the criteria were "good". It is hoped that the material in the LKPD will be adjusted to suit the student's ability level. The appropriateness of the use of terms is adjusted based on the level of education.

Table 3

Media expert validation results

No	Aspects	Score
1.	LKPD cover	3
2.	instructions for using LKPD	4
3.	The attractiveness of packaging the LKPD is in the form of A4 paper size used	3
4.	material presented on the LKPD	4
5.	images used in each learning activity	4
6.	n the images presented are in full color	4
7.	Students can study LKPD independently (self-instruction)	4
8.	LKPD allows students to carry out independent assessments (self-assessments)	4
9.	Ease of operation	4
10.	LKPD can be used as a learning resource	4
11.	LKPD has interesting explanations in written and pictorial form	4
12.	LKPD provides complete learning opportunities	3
13.	Balance the proportion of practice/test questions on the LKPD with the content of the material	4
14.	LKPD can be used without the help of an educator as an instructor	4
	Total	53
	Score Total	$\frac{53}{70} \times 100\% = 76$
	Criteria	Good

The results of the data from media expert validators obtained a total assessment of 53 points with a score of 76. Therefore, the criteria were "good". Suggestions for improvement from experts are that the packaging of the LKPD in the form of A4 size paper used should be more attractive. It is hoped that both the material and the evaluation questions will provide complete learning opportunities for the LKPD.

The final stage is the implementation stage. This stage is carried out if the validation process has been revised and is declared suitable for testing. This LKPD was implemented for class IV students, totaling 13 students. The implementation of LKPD was carried out through limited trials on students. The student responses can be seen in the following table:

Table 4

Results of class IV student response questionnaire

No.	Student Name	Score	Criteria Score
1.	Responden 1	80	Good
2.	Responden 2	90	Good
3.	Responden 3	80	Good
4.	Responden 4	88	Good
5.	Responden 5	84	Good
6.	Responden 6	92	Good
7.	Responden 7	88	Good
8.	Responden 8	84	Good
9.	Responden 9	74	Good
10.	Responden 10	78	Good
11.	Responden 11	78	Good
12.	Responden 12	86	Good
13.	Responden 13	92	Good
	Amount	1094	
	Average	84,16	
	Criteria	Good	

From Table 4 above, it can be seen that the survey results of student responses to ethnomathematics-based LKPD as a teaching tool averaged 84.16 with the criteria "good". Thus, researchers can conclude that ethnomathematics-based LKPD can be used as a learning tool. At the evaluation stage, it can be seen from the results of the instrument validation trials and the results of limited trials, so the researchers made improvements according to expert advice. So that ethnomathematics-based LKPD can be used in mathematics learning in class.

The results of research and development in mathematics based on LKPD Etnomathematics for Class IV Madrasah Ibtidaiyah show that the research and development of learning tools is in the good category. This is demonstrated by the results obtained at the ADDIE stages, starting from the analysis stage, design stage, development, implementation and evaluation.

The developed mathematics worksheet produces good products. This is in accordance with research on the Development of Ethnomathematics Worksheets on Lines and Angles (Silvia and Mulyani, 2019). This research concluded that the mathematics task table developed was of good quality and could be used in mathematics learning.

In addition, this research is in line with Rewatus, A et al. (2020) with the title Developing Ethnomathematics-Based Student Worksheets on Triangles and Quadrilaterals. This research concludes that the LKPD developed meets the criteria of validity, practicality and efficiency (Fairuz et al., 2020).

Based on the results obtained and research that supports this research, it is proven that ethnomathematics-based mathematics LKPD can help students understand mathematics learning and explain to students that mathematical concepts exist in culture.

4. Conclusion

Based on this research, it is concluded that the development of ethnomathematics-based LKPD as a learning tool has been validated by experts including linguists, material experts and media experts, with validation results that are "good" and can be used. Apart from that, the answers of class IV students at Madrasah Ibtidaiyah Nurul Huda to the ethnomathematics-based LKPD received "good" criteria, so it was concluded that the ethnomathematics-based LKPD was a good learning tool to use in the learning process.

The suggestions that researchers can convey in this research are for other researchers who are interested in researching the same topic as this research so that they can apply and even conduct research that can support or even correct deficiencies in this research.

5. References

Annis Deshinta Ayuningtyas, D. S. S. (2019). *Pengembangan Bahan Ajar Matematika Berbasis Etnomatematika Kraton Yogyakarta*. *8*(1), 11–19.

Ditasona, C. (2018, April). Ethnomathematics exploration of the Toba community: Elements of geometry transformation contained in Gorga (ornament on Bataks house). In *IOP Conference Series: Materials Science and Engineering* (Vol. 335, No. 1, p. 012042). IOP Publishing.

Ditasona, C., & Turmudi, R. R. (2021). Arithmetic Sequence on the Pattern of Gorga. *Solid State Technology*, *64*(2), 3002-3008.

Ditasona, C. (2023). Exploring Ethnomathematics in Batak Toba Carvings for Locally-based Mathematics Teaching Material. *Journal of Education Research and Evaluation*, *7*(3).

Fairuz, F. R., Fajriah, N., & Danaryanti, A. (2020). Pengembangan Lkpd Materi Pola Bilangan Berbasis Etnomatematika Sasirangan Di Kelas Viii Sekolah Menengah Pertama. *EDU-MAT: Jurnal Pendidikan Matematika*, *8*(1), 29–38. https://doi.org/10.20527/edumat.v8i1.8343

Fajriyah, E. (2018). Peran etnomatematika terkait konsep matematika dalam mendukung literasi. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 114–119. https://journal.unnes.ac.id/sju/index.php/prisma/article/view/19589

Fetra Bonita Sari, Risda Amini, M. (2020). *Jurnal basicedu. Jurnal Basicedu,*. *6*(3), 3(2), 524–532. https://journal.uii.ac.id/ajie/article/view/971

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation and Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Isniwatun Munwaroh, M. P. (2015). *1 | D i sa jik an dala m s tu di ilmia h UK M Pe neli ti an UN Y*. 1–5.

Luthfi, H., & Rakhmawati, F. (2022). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Etnomatematika pada Materi Bangun Ruang Sisi Lengkung Kelas IX. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 98–109. https://doi.org/10.31004/cendekia.v7i1.1877

Makhrus, M., Harjono, A., Syukur, A., Bahri, S., & Muntari, M. (2019). Identifikasi Kesiapan LKPD Guru Terhadap Keterampilan Abad 21 Pada Pembelajaran IPA SMP. *Jurnal Ilmiah Profesi Pendidikan*, *3*(2), 124–128. https://doi.org/10.29303/jipp.v3i2.20

Maretha, D. G. A., & Suparman, S. (2018). Pengembangan e-LKPD Berbasis Open Ended pada Materi Segi Empat Kelas VII. *JKPM (Jurnal Kajian Pendidikan Matematika)*, *7*(2), 349. https://doi.org/10.30998/jkpm.v7i2.12681

Masamah, U. (2019). Pengembangan Pembelajaran Matematika Dengan Pendekatan Etnomatematika Berbasis Budaya Lokal Kudus. *Jurnal Pendidikan Matematika (Kudus)*, *1*(2).

Ngafifi, M. (2014). Kemajuan Teknologi Dan Pola Hidup Manusia Dalam Perspektif Sosial Budaya. *Jurnal Pembangunan Pendidikan: Fondasi Dan Aplikasi*, *2*(1), 33–47. https://doi.org/10.21831/jppfa.v2i1.2616

Okpatrioka. (2023). Research And Development (R & D) Penelitian Yang Inovatif Dalam Pendidikan. *Jurnal Pendidikan, Bahasa Dan Budaya*, *1*(1), 86–100.

Rewatus, A., Leton, S. I., Fernandez, A. J., & Suciati, M. (2020). Pengembangan Lembar Kerja Peserta Didik Berbasis Etnomatematika Pada Materi Segitiga dan Segiempat. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 645–656. https://doi.org/10.31004/cendekia.v4i2.276

Sari, A., & Ditasona, C. (2019, April). Developing Mathematics Module based on Realistic Mathematics Education (RME): Triangle Topic for 7 th grade of Junior High School. In*Proceedings of the 1st International Conference on Science and Technology for an Internet of Things*, 20 October 2018, Yogyakarta, Indonesia.

Sartika, N. S., Kusuma, Y. S. ., Martadiputra, B. A. P. ., Ditasona, C., & Safitri,M. M. . (2022). Development of Worksheets Based on the Metaphorical Thinking Approach for Students' Procedural Fluency Ability.*Brillo Journal*,2(1), 22–41. https://doi.org/10.56773/bj.v2i1.25

Silvia, T., & Mulyani, S. (2019). Development of Student Worksheets (Lkpd) Ethnomatematics Based on Line and Angle Materials. *WIDYAGOGIK (Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar)*, *1*(2), 82–95.

Wedi, A. (2016). Konsep dan masalah penerapan metode pembelajaran: upaya peningkatan mutu pembelajaran melalui konsistensi teoretis-praktis penggunaan metode pembelajaran. *Edcomtech: Jurnal Kajian Teknologi Pendidikan*, *1*(1), 21–28.

Yudi Hari Rayanto, & sugianti. (2020). *Penelitian Pengembangan Model ADDIE dan R2D2: Teori dan Praktek*. Lembaga Akademic dan Research Institute.