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THE EFFECTIVENESS OF ETHNOMATHEMATICS-BASED LKPD DEVELOPMENT IN IMPROVING MATHEMATICAL LITERACY

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ABSTRACT
This research development aims to test the feasibility of ethnomathematics-based student worksheets as an improvement of mathematics literacy in elementary schools. Validation testing was carried out by media experts, material experts, peers and trials with 3 stages including individual, small group trials and large groups. This student worksheet can be accessed online by sharing a link via WhatsApp, this student worksheet can be made easily, interactively, and cheaply because the researcher made it from the Canva application which is integrated with the youtube platform. This type of development research uses Research and Development with the ADDIE development model. The target of this research is grade V students of SD Negeri Sidokumpul Sidoarjo. Based on the results of the validation of media experts from the digital-based student worksheet, it got an average of 92.6%, while the results of the validation of the material experts got an average score of 90%. The results of the feasibility test from peers received a good response with an average of 90.4%, followed by a one-on-one (individual) test with an average result of 90%, in small group testing an average of 87%, and in large group testing with an average of 88%. Based on the validation from experts and the trials that have been carried out, ethnomathematics-based student worksheets as an improvement of mathematical literacy are feasible and effective to be used in the learning process.

I. INTRODUCTION

Mathematical literacy in elementary school is an important foundation that has a big impact. First, because math in many subjects is often the foundation, it helps learners to improve their understanding of various subjects. Second, students are able to develop Higher Order Thinking Skills (HOTS). This will be very beneficial for success in the academic and professional worlds. The results of interviews conducted with grade V teachers at SDN Sidokumpul show that there is still low mathematical literacy in grade V students, out of 59 students, only 27 children can formulate mathematical relationships in the form of mathematical models. When observing the importance of mathematical literacy at the elementary school level, it is hoped that elementary school students in Indonesia have reliable competencies for mathematical literacy. However, the fact is that in Indonesia, the mathematical literacy ability of elementary school students is very low. Therefore, the mathematical literacy skills of elementary school students must be improved. In solving math problems, the application of concepts (applying) and logical thinking (reasoning) must be prioritized, for the majority of students in Indonesia still experience difficulties. There are complex causes for the low level of mathematical literacy at the elementary level in Indonesia [1]. The Student Worksheet (LKPD) is a sheet that contains a brief description of the material and questions that are arranged step by step in an orderly and systematic manner that must be done by students in learning activities so as to facilitate the understanding of the subject matter obtained [2].

LKPD is one of the means to help and facilitate teaching and learning activities, which will increase effective interaction between students and increase student activities in improving learning achievement. LKPD is a tool that students use to solve problems. LKPD has many benefits in the learning process. LKPD can simplify the observation process of students and make it easier for them to solve problems [3]. This research fills in the gaps of previous research and makes new contributions in the field of mathematics education through several crucial aspects. First, although previous studies have explored ethnomathematics in mosque architecture and the effectiveness of ethnomathematics-based LKPD, this study specifically focuses on the integration of both in the architectural context of the Al-Abror Sidoarjo Mosque to improve the mathematical literacy of grade V students

on flat building materials. It provides a specificity of the local context that has not been explored in depth. Second, this study explicitly targets improving the ability to formulate mathematical models and interpret solutions in real contexts, which are weaknesses identified in students' mathematical literacy in HOTS questions [4]. The term "ethnomathematics" was first coined and developed by a Brazilian mathematician. Ubiratan D'Ambrosio states that the purpose of ethnomathematics is to show that there are many ways to interpret mathematics by paying attention to the understanding of school mathematics, through different layers of society, and considering the culture that practices mathematics [5].

Previous research showed that the factors that affect the low mathematical literacy of students can be classified into internal factors and external factors. Internal factors include initial ability, confidence, and interest. Meanwhile, external factors include the environment, learning model, and teaching materials. Solutions to improve mathematical literacy are as follows: (i) improving students' initial abilities; (ii) increase the confidence of students; (iii) increase students' interest and motivation; (iv) improving the quality of learning; (v) develop quality teaching materials [6]. Mathematical literacy and ethnomathematical approaches have crucial relevance to today's global demands, especially in the face of the industrial era 4.0 which emphasizes problem-solving and critical thinking. Mathematical literacy equips individuals with the ability to understand, use, and interpret mathematics in a variety of real-life contexts. These skills are an important foundation for solving complex problems that often involve quantitative data and logical reasoning, skills that are in high demand in this digital and automation era. The ethnomathematical approach, by linking the concept of mathematics to the context of the local culture, actually reinforces this relevance by making mathematics feel more meaningful and easy for students to understand. When students learn math through familiar cultural contexts, they are more motivated to actively engage and develop a deeper understanding [7].

Initially, this ethnomathematics was concerned with the activities of illiterate people in the past, who were not involved in reading at all, only knowing shapes. In this case, D'Ambrosio emphasizes that the initial emphasis on ethnomathematics was based on the lack of public attention to mathematics in formal or informal schools. Ethnomathematics is a method to examine the way students learn, process, and then apply mathematical strategies in solving problems related to habits [8].

The results of previous research showed that when solving the proportion HOTS problem at the formulation stage, students were less able to describe mathematical situations using mathematical models that were in accordance with the topic of proportion [9]. However, in the employ stage, students can use mathematical concepts and procedures to solve the proportion HOTS problem. While in the interpret and evaluate stage, students are less able to interpret mathematical results back to the real-world context [10]. It requires learning that not only teaches learners to use mathematical concepts and procedures in working on problems, but can also teach them to visualize mathematical situations in real-world contexts by using mathematical models and interpreting mathematical solutions that have been obtained back to real-world contexts [11].

Mathematics learning has an important role in forming a logical, critical, and creative mindset in students. However, in practice, mathematics learning in elementary schools is still mostly abstract and less associated with the surrounding environment, so it is not able to stimulate students' mathematical literacy and critical thinking skills optimally. One of the approaches that can be used to improve the quality of mathematics learning is through the application of ethnomathematical concepts. The ethnomathematical approach examines how mathematical concepts are manifested in the implementation of a society's culture and traditions [12]. Ethnomathematics is a study that connects mathematics with local culture so that learning becomes more contextual and meaningful for students. In this context, the development of ethnomathematics-based Student Activity Sheets (LKPD) is one of the innovative solutions to improve understanding of mathematics concepts, especially flat building materials in elementary schools.

Among the cultural aspects that are rich in mathematical elements is the architecture of mosques. The Al-Abror Mosque in Sidoarjo is one of the buildings with architectural elements that can be studied through a mathematical perspective, especially in flat building materials. Previous research has examined ethnomathematics in mosque architecture which explores the concept of geometry in Al-Akbar Mosque Surabaya [13]. The results of the study show that various geometric shapes, including squares, rectangles, and circles and other spatial structures, can be found in the structure of the mosque. These findings suggest that mosque architecture can serve as an effective source of mathematics education, especially geometry. In line with this research, the ethnomathematical study of the historical building of the Kanjeng Sepuh Sidayu Gresik Grand Mosque also explored the concept of geometry in elementary schools [14]. The study showed that there were geometric concepts, including flat buildings and space buildings in the historic building of the Kanjeng Sepuh Sidayu Gresik Grand Mosque. It can be used as a

mathematics learning material in elementary school as well as the meaning of philosophy contained in the form of geometry.

One of the learning materials is using LKPD. In previous research, it was concluded that the ethnomathematics-based PMRI approach, which is able to support the achievement of learning goals, can be an alternative to classroom learning which is considered to improve students' mathematical reasoning skills. LKPD activities and practice questions provided are able to improve students' reasoning skills [15]. Therefore, the development of ethnomathematics-based Student Worksheets (LKPD) on the architecture of the Al-Abror Mosque Sidoarjo is a necessity that helps students master the concept of flat building to be more contextual and improve mathematical literacy. With this approach, it is hoped that students will be able to relate mathematical concepts to their local culture, as well as develop the mathematical literacy and critical thinking skills needed to face future challenges.

II. RESEARCH METHODOLOGY

This research model uses Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model approach. The selection of this model is due to its systematic and effective development of quality teaching materials [16]. The ADDIE model chart is as shown in figure 1 below:

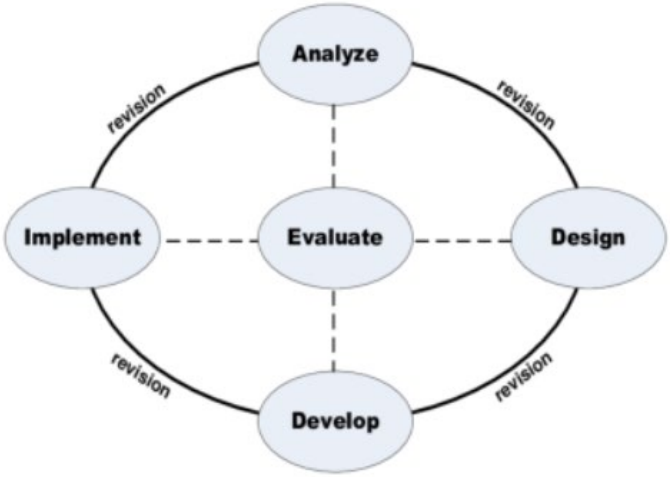

Figure 1 ADDIE Branch Model Stages 2010

The ADDIE model consists of five main stages, namely Analysis, Design, Development, Implementation, and Evaluation [17]. The stages are explained in detail as below:

- ✓ Analysis
  The purpose of this stage is to find needs and problems in mathematics learning in elementary school, especially in mathematical literacy and students' critical thinking skills.
- ✓ Design
  The purpose of this stage is to design an ethnomathematics-based LKPD concept that meets the needs of students.
- ✓ Development
  In this stage of development, LKPD has been designed to be developed into an initial product.
- ✓ Implementation
  After going through the development stage, the revised LKPD will be tested more widely in the classroom environment. The implementation stage aims to determine the effectiveness and acceptance of ethnomathematics-based LKPD in mathematics learning.
- ✓ Evaluation
  The purpose of the evaluation stage is to evaluate the products developed at each stage of ADDIE. After the implementation stage, the activities carried out are to analyze changes caused by the use of products in determining the quality of the product from the aspect of effectiveness. Thus, the scores obtained from the results of the mathematical literacy and critical thinking skills tests were analyzed to determine the expected changes.

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The product developed was in the form of student worksheets using the Canva application with validation of a feasibility test by media experts, subject matter experts and peers, then a one-on-one (individual) trial with 7 students, a small group test with 17 students and a large group test with 35 students. This research was conducted on grade V students of SDN Sidokumpul, Sidoarjo District, Sidoarjo Regency in the odd semester of the 2025/2026 school year. The data collection technique uses questionnaires. All data collected from subject matter experts, media experts, peers, and students is then analyzed. The analysis technique used in analyzing quantitative data is in the form of an assessment questionnaire score given to the test subjects by calculating the percentage of answers. The data analysis technique was carried out using measurements with a 5-point Likert scale with a score of each answer on the questionnaire. After calculating the score percentage, the criteria for the score range can be determined according to table I as follows:

TABLE I.
ELIGIBILITY PERCENTAGE SCALE

Number (%)	Clarification
<21	Very Unworthy
21-40	Not Eligible
41-60	Enough
61-80	Proper
81-100	Highly Worth It

III. RESULT AND DISCUSSION

Results

The product of this research development is in the form of ethnomathematics-based student worksheets that are bolted together using the Canva application. This digital-based student worksheet consists of the front cover of the student worksheet in figure 1, core competencies and basic competencies in figure 2, student worksheets with the written name, class, school as shown in figure 3, there is a video material that can be stopped/played according to the student's wishes by clicking on the material image as shown in figure 4, Conclusion in the form of text such as Figure 5. Some of the product displays of student worksheets are in the image below:

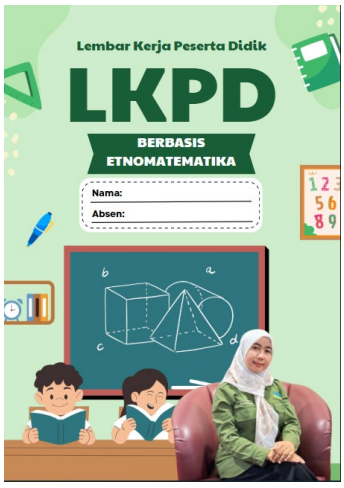

Figure 2. Front Cover

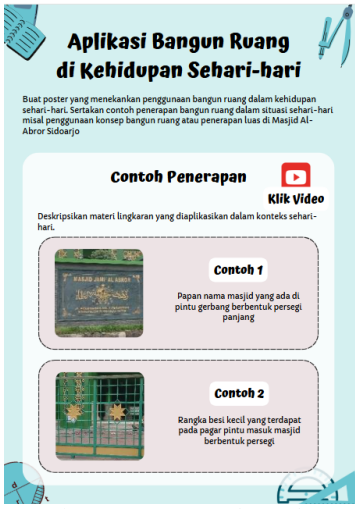

Figure 3. Content And Sample

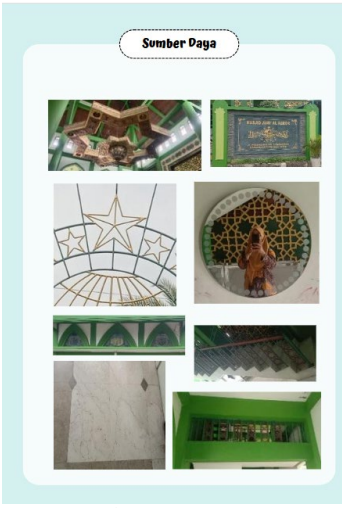

Figure 4. Source

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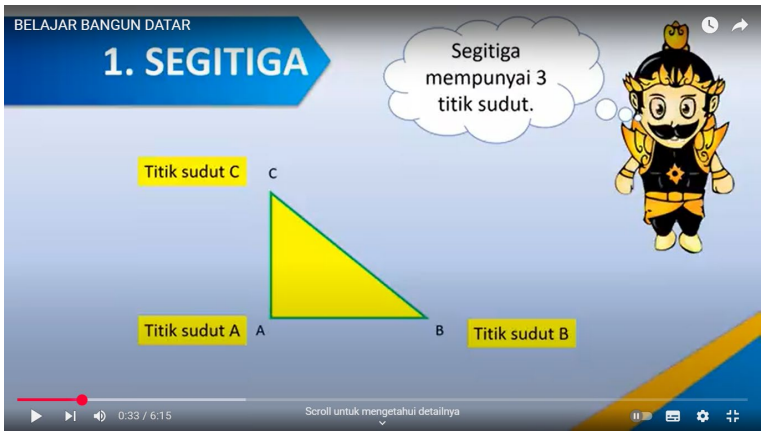

Figure 5. Video Content Learning

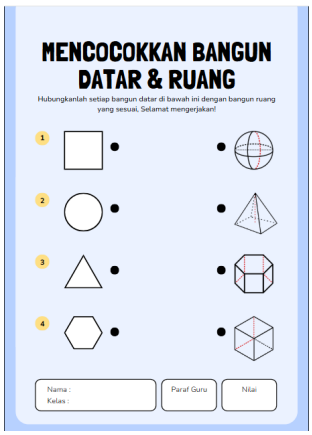

Figure 6.Assigment

Validation testing carried out by media experts in this study, there are 3 aspects with a total of 19 items, including the display aspect with 10 items, the use aspect with 6 items and the utilization aspect with 3 items. The scoring of each aspect uses a 5 likert scale. The results of the validation of media experts are presented in the form of table 2 below:

TABLE II.
MEDIA EXPERT SCORING

Validation Test	Aspect			Percentage
	Display	Use	Utilization	
Media Expert	90%	96%	92%	92,6 %

The score results obtained from the media expert test table 2 on the display aspect with a percentage of 90%, the use aspect of 96% while the utilization aspect was 92% so that a total percentage score of 92.6% was obtained. In the aspect of appearance, media experts gave suggestions that the display be given bright colors so that students' eyes do not get tired quickly. According to table I of the percentage scale of eligibility, the percentage results from media experts can be categorized as very feasible.

After conducting a validation test of media experts, a validation test was carried out by material experts with 5 aspects of assessment with 21 items, namely the preliminary aspect with 3 items, the content aspect with 3 items, the learning aspect with 10 items, the summary aspect with 2 items and the task aspect with 3 items. Aspect scoring uses a 5-likert scale. The results of the validation of the material experts in table 3 are below:

TABLE III.
MATERIAL EXPERT SCORING

Validation Test	Aspect					Percentage
	Introduction	Content	Learning	Summary	Assigment	
Content Expert	90%	94%	88%	94%	94%	92%

The score obtained by the subject matter expert test for the preliminary aspect was 90%, the content aspect was 94%, the learning aspect was 88%, the summary aspect was 94% while the task aspect was 94% so that a percentage of 92% was obtained with the category of very feasible according to the percentage gain in the range score in table I. Subject matter experts provided input on the learning aspect to include objectives and achievement indicators as emphasis and targets in learning that must be mastered oelh every student.

The results of peer testing in this study used 5 aspects of assessment with 16 items, including the introductory aspect with 2 items, the content aspect with 3 items, the learning aspect with 8 items, the summary aspect with 2 items and the task aspect with 1 item. Each aspect uses a 5 likert scale. The results of the peer test score in table 4 are as follows:

TABLE IV.
PEER TEST SCORING

Peers	Aspek					Percentage
	Introduction	Content	Learning	Summary	Assigment	
Peers Test	86%	94%	94%	90%	88%	90,4%

Based on table IV, the peer test score for the preliminary aspect is 86%, for the content aspect 94%, the learning aspect 94%, the summary aspect 90% and the task aspect is 88% so that a score with a percentage of 90.4% is

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obtained so that it can be categorized as very feasible. However, there is a need for a revision to the cover design so that it is given cartoon images so that students are interested in reading.

One-on-one (individual) tests are carried out after being validated by media experts, subject matter experts and peers. This one-on-one (individual) test is given in class V with 5 aspects of 16 items which include the Introduction aspect with 2 items, the Content aspect with 3 items, the learning aspect with 8 items, the evaluation aspect with 2 items and the summary aspect with 1 item. As presented in table 5 below:

TABLE V.
ONE-TO-ONE TEST SCORING

No	Trial	Aspect					Total
		Intro	Content	Learning	Evaluation	Summary	
1	Student 1	90%	89%	86%	90%	90%	89%
2	Student 2	93%	90%	87%	90%	93%	90%
3	Student 3	94%	90%	90%	93%	94%	92%
4	Student 4	89%	93%	90%	94%	89%	92%
5	Student 5	92%	94%	93%	89%	92%	92%
6	Student 6	90%	89%	94%	88%	90%	90%
7	Student 7	92%	85%	89%	89%	92%	89%
	Procentage	**91%**	**90%**	**90%**	**90%**	**91%**	**90%**

The score results obtained in the one-by-one (individual) test of the preliminary aspect obtained 91%, the content aspect with a percentage of 90%, the learning aspect with a percentage of 90%, the evaluation aspect with a percentage of 90% and the summary aspect with a percentage of 91%. So that obtaining a percentage of 90% that can be categorized is very feasible. From this one-on-one (individual) test, although each aspect has received a very good response, it is necessary to revise the url used to be shortened so that it is easier for students to memorize.

After the one-on-one (individual) test was carried out, a small group test was carried out which was given to 17 students of class V with 5 aspects of 16 items which included the Introduction aspect with 2 items, the Content aspect with 3 items, the learning aspect with 8 items, the evaluation aspect with 2 items and the summary aspect with 1 item. It can be seen in table 6 below:

TABLE VI.
SMALL GROUP TRIAL SCORING

No	Trial	Aspect					Total
		Intro	Content	Learning	Evaluation	Summary	
1	Student 1	90%	89%	86%	90%	89%	89%
2	Student 2	88%	85%	81%	88%	86%	86%
3	Student 3	91%	85%	80%	83%	84%	85%
4	Student 4	86%	88%	82%	83%	90%	86%
5	Student 5	88%	85%	83%	83%	88%	85%
6	Student 6	90%	89%	94%	88%	90%	90%
7	Student 7	92%	85%	89%	89%	89%	89%
8	Student 8	82%	88%	85%	85%	82%	84%
9	Student 9	83%	88%	85%	88%	86%	86%
10	Student 10	91%	90%	90%	90%	89%	90%
11	Student 11	93%	90%	87%	90%	90%	90%
12	Student 12	94%	90%	90%	93%	92%	92%
13	Student 13	89%	93%	90%	94%	92%	92%
14	Student 14	92%	94%	93%	89%	92%	92%
15	Student 15	85%	81%	81%	88%	81%	83%
16	Student 16	85%	88%	81%	85%	90%	86%
17	Student 17	88%	83%	81%	85%	91%	86%
	Procentage	**89%**	**87%**	**85%**	**86%**	**88%**	**87%**

Based on a small group trial, the development of print-based Student Worksheets as an online learning innovation was declared very feasible to be used in the learning process because the total percentage was 87%. The preliminary aspect obtained 89%, the content aspect 87%, the learning aspect 85%, the evaluation aspect 86% and the summary aspect with a percentage of 88%. The students' responses to this small group trial were generally very good, the diversity of responses would be an improvement of every aspect of this product. The response of the small group test in several aspects is in the table 7.

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TABLE VII.
RESPONS SMALL GROUP

Subject	Respons		
	Concept	Critical Thinking	Local Culture
Student	"Now I can mention the flat shapes that are in the mihrab."	"How do you calculate the circumference, what if the shape is a combination of several flat buildings?"	"Hopefully other mosques can also be places to learn mathematics like this."
	"It turns out that mathematics is all around us, not just in books."	"In my opinion, this form is most used in the Al-Abror Mosque	"It's just math that's close to our lives."

After conducting a small group test, a large group test was then carried out on 35 students in class V with 5 aspects of 16 items which included the Introduction aspect with 2 items, the Content aspect with 3 items, the learning aspect with 8 items, the evaluation aspect with 2 items and the summary aspect with 1 item. The scoring of large group trials can be seen in table 8 below:

TABLE VIII.
LARGE GROUP TRIAL SCORING

No	Trial	Aspect					Total
		Intro	Content	Learning	Evaluation	Summary	
1	Student 1	90%	89%	86%	90%	89%	89%
2	Student 2	88%	85%	81%	88%	86%	85%
3	Student 3	91%	85%	80%	83%	84%	83%
4	Student 4	86%	88%	82%	83%	90%	86%
5	Student 5	88%	85%	83%	83%	88%	85%
6	Student 6	90%	89%	94%	88%	90%	90%
7	Student 7	92%	85%	89%	89%	89%	88%
8	Student 8	82%	88%	85%	85%	82%	85%
9	Student 9	83%	88%	85%	88%	86%	87%
10	Student 10	91%	90%	90%	90%	89%	90%
11	Student 11	93%	90%	87%	90%	90%	89%
12	Student 12	94%	90%	90%	93%	92%	91%
13	Student 13	89%	93%	90%	94%	92%	92%
14	Student 14	92%	94%	93%	89%	92%	92%
15	Student 15	85%	81%	81%	88%	81%	83%
16	Student 16	85%	88%	81%	85%	90%	86%
17	Student 17	88%	83%	81%	85%	91%	85%
18	Student 18	85%	87%	90%	90%	90%	89%
19	Student 19	89%	90%	88%	92%	88%	89%
20	Student 20	85%	90%	91%	92%	83%	89%
21	Student 21	88%	93%	86%	92%	83%	88%
22	Student 22	88%	81%	88%	81%	83%	83%
23	Student 23	90%	93%	90%	81%	81%	86%
24	Student 24	92%	94%	90%	81%	81%	87%
25	Student 25	92%	89%	92%	90%	81%	88%
26	Student 26	92%	92%	92%	89%	90%	91%
27	Student 27	81%	85%	92%	92%	90%	89%
28	Student 28	90%	85%	81%	85%	90%	85%
29	Student 29	90%	88%	91%	85%	92%	89%
30	Student 30	90%	88%	86%	83%	92%	87%
31	Student 31	90%	90%	88%	83%	92%	88%
32	Student 32	85%	92%	90%	81%	81%	86%
33	Student 33	88%	92%	90%	81%	91%	88%
34	Student 34	92%	92%	85%	81%	86%	86%
35	Student 35	90%	81%	85%	90%	85%	85%
	Prosentase	**89%**	**88%**	**87%**	**87%**	**87%**	**88%**

Based on a large group trial, the development of digital-based Student Worksheets as an online learning innovation was declared very feasible to be used in the learning process because the total percentage was 88% with a 1% increase from the results of small group tests. The preliminary aspect obtained 89%, the content aspect 88%, the learning aspect 87%, the evaluation aspect 87% and the summary aspect with a percentage of 87%. The students' responses to this large group trial received a good response, students were no longer bored with multiple displays and full color and pictures. The response of the large group test in several aspects is in the table 9.

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TABLE IX.
RESPONS LARGE GROUP

Subject	Respons		
	Concept	Critical Thinking	Local Culture
Student	"Wow, it's so fun to learn! Usually building flat is like formulas that make you confused, but when you look at the shapes in the mosque, it becomes more imaginary."	"If it's this size, how much floor area is it? So it's curious."	"We are proud to be a part of our math program."
	"The picture of the mosque is good, ma'am. I'm excited to be working on it."	"Why is it that the shape is not all boxed? There must be a reason."	"So I know more about the Al-Abror mosque besides worship."
	"I just realized that in mosques there are many forms of flat buildings. Yesterday when I went to the mosque, I didn't pay attention."	"For example, if the dome is different in shape, what does it affect us?"	"My friend who lives far away must not know that our mosque has many forms of mathematics."

Discussion

The use of this research development model is ADDIE, with sequential stages that are given responses starting from students and peers to carry out the correct and directed thinking process in accordance with the learning objectives [18]. The use of the ADDIE model is very appropriate for the development of student worksheets because of its systematic nature [19].
The ethnomathematical approach is also in line with the theory of funds of knowledge. This theory states that households and student communities are rich in knowledge and skills that can be utilized as resources in learning. The geometric pattern in the architecture of the Al-Abror Mosque is a form of knowledge owned by the student community. By exploring and validating this knowledge in the classroom, teachers not only make learning more meaningful but also empower students by acknowledging and appreciating the knowledge they bring with them from their environment. This creates a bridge between out-of-school experiences and formal learning, which can ultimately increase students' engagement and understanding of math. Thus, the use of the geometric pattern of the Al-Abror Sidoarjo Mosque in ethnomathematics-based mathematics learning is strongly supported by the conceptual foundation of culturally responsive teaching and funds of knowledge, which emphasizes the importance of connecting learning with the culture and experience of students [20].

The development of this student worksheet has a variety of media including texts, videos that are integrated with interesting presentations to improve students' mathematical literacy to understand and carry out the work steps of the Mathematics subject. The development and validation of the TPACK instrument has been the focus of previous research, with various modifications and adaptations made with the development of ethnomathematics-based LKPD expected to foster students' motivation to learn [21]. Ethnomathematics-based LKPD evaluations, especially the tendency of validators to give high scores simply because of attractive designs without evaluating the real impact on mathematical literacy, require careful and multidimensional evaluation strategies. First, the assessment criteria must be formulated clearly and specificly, with the main emphasis on measurable indicators of mathematical literacy, such as the ability to formulate problems, use mathematical concepts, interpret solutions, and reason. The visual design aspect does need to be considered to attract students' interest, but it must have a proportionate weight of assessment compared to the pedagogical effectiveness in improving mathematical comprehension and skills. Second, the validation process should involve a wide range of experts with relevant backgrounds, including mathematics education experts, instructional design experts, and field practitioners (teachers) [22]. Quantitative data in the form of improved test scores or qualitative data from student observations and interviews can be more objective evidence of the effectiveness of LKPD [23].

Students with a field-dependent cognitive style tend to carry out the stages of Action, Process, Object, and fulfill one Schema, and have a tendency to transform activities in solving number pattern problems [24] so that the development of Ethnomathematics-based LKPD is appropriate to be used in fostering mathematical literacy. This model focuses on developing student worksheets for Class V Flat Building Materials in the form of student worksheets. The researcher wants to develop ethnomathematics-based student worksheets to improve the quality of students' mathematical literacy. The development of ethnomathematics-based student worksheets has specific advantages compared to the use of student worksheets in general, including: (1) ethnomathematics-based student worksheets are easy to understand because they use a cultural approach to the surrounding environment, (2) ethnomathematics-based student worksheets are more varied and contain complete and varied learning content, (3) ethnomathematics-based student worksheets can be provide an increase in mathematical literacy, (4) by using this ethnomathematics-based student worksheet, it will increase students' mathematical literacy because the

environment around the flat building at the Abror Sidoarjo Mosque is the right approach material in learning, (5) this Mathematics student worksheet has the advantages of approach techniques and contemporary models, (6) Mathematics subjects are more interesting and can foster student learning motivation because it contains content that leads to the development of students' mathematical literacy, (7) this ethnomathematics-based student worksheet can be read by all students because it is uploaded on Google Drive with public access, (8) the use of ethnomathematics-based student worksheets can be accessed online and offline (printable) to overcome the limitations that exist in students, (9) All forms of information, be it in the form of Text, Images, Videos, can be included in digital student worksheets, (10) it is easy to access (fast loading), (11) ethnomathematics-based student worksheets are easy to design by all teachers, (12) in designing ethnomathematics-based student worksheets it is very easy and fast because it can be learned by anyone. The specifications in the development of this student worksheet are made with a contemporary image composition, which is very interesting for students, besides that the images and content in them are clearly visible and not blurry like the previous student worksheet prints. Application in learning, student worksheets with bolts from Canva can be published online with Whatsapp social media which is accessed simultaneously by all students at any time. The limitations of the development of this product include only one face-to-face Basic Competencies, the development of this student worksheet has not measured student learning outcomes so it requires further research with AI-based applications.

While Canva is a popular and easy-to-use design platform, there are some limitations to consider, especially in the context of developing interactive and media-rich Learner Worksheets (LKPDs). One significant limitation is the strong reliance on an internet connection. Canva is essentially a web-based platform, so access without an internet connection is very limited, hindering the flexibility of using LKPD, especially in environments with inadequate internet infrastructure. This becomes an obstacle when students or teachers want to access or use the material offline. Compared to dedicated tools like H5P or GeoGebra, Canva's interactivity flexibility is limited. While Canva offers features for inserting videos and simple interactive elements such as links or buttons, its ability to create complex interactive exercises, such as multiple-choice questions with automatic feedback, drag-and-drop, dynamic math simulations, or interactive data visualizations, is far below the capabilities of H5P or GeoGebra [25]. H5P is specifically designed to create interactive learning content, while GeoGebra excels at dynamically visualizing and manipulating mathematical concepts. The limitations of interactivity in Canva can limit the potential of LKPD to actively engage students and provide an immersive learning experience, especially in materials that require visual exploration and manipulation, such as geometry. In addition, the integration of advanced mathematical elements may also be more complicated in Canva. While Canva provides features to insert text and symbols, writing complex mathematical equations or graphical representations of functions may not be as flexible and intuitive compared to GeoGebra, which is specifically designed for mathematical purposes [26]. These limitations can pose a barrier in developing LKPDs that comprehensively explore deeper mathematical concepts. Therefore, although Canva offers ease in visual design, LKPD developers need to consider these limitations, especially regarding internet connectivity and interactivity flexibility, and may need to integrate other tools such as H5P or GeoGebra to create a richer and more effective learning experience in enhancing students' mathematical literacy. To test the effectiveness of the ethnomathematics-based LKPD on the architecture of the Al-Abror Mosque in Sidoarjo in the long term, further research is highly recommended. Longitudinal studies can be conducted to measure students' learning gains over time after continuously using the LKPD in the learning process. In addition, comparative studies with quasi-experimental designs involving control groups will provide stronger evidence of the effectiveness of LKPD compared to conventional teaching methods. In this design, one group of students will learn using the ethnomathematics-based LKPD, while the control group will receive flat geometry lessons using standard methods. Measurements of the mathematical literacy of both groups before and after the intervention, as well as follow-up at a later point in time, will provide valid data on the long-term impact and relative advantages of the LKPD [27]. Although the ADDIE model used in this study offers a systematic framework for the development of LKPD, it is important to acknowledge its weaknesses, especially its linear nature. In practice, the development process often does not go straight from analysis to evaluation, but rather requires iteration and revision based on feedback. This study addresses the weaknesses of ADDIE's linearity by adopting a more flexible and responsive approach to student input. For example, during the limited development and implementation phases, feedback from students regarding the clarity of instruction, visual appeal, and difficulty of the questions in the LKPD was collected and analyzed. The results of this analysis are then used to iterate and revise the design and content of the LKPD, ensuring that the final product is more in line with the needs and learning characteristics of students. Thus, this study implemented an adaptive feedback cycle in monkeys [28].

IV. CONCLUSION

Based on the research objectives and the results of data and analysis of several validation tests by media experts, the conclusion of this study is that the use of student worksheets is very feasible to use, and the use of student worksheets is one way to improve students' mathematical literacy. The use of the ADDIE development model in this study is used according to the stages of developing student worksheets. The results of the test of material experts on digital-based student worksheets as an online learning innovation are very feasible to be applied to students. Meanwhile, testing on peers received a good response with a very decent category. In individual trials, small groups and large groups stated that digital-based student worksheets as an online learning innovation were declared very feasible for learning. The educational innovation in this study is in the form of the use of technology using the Canva application which integrates with various platforms such as YouTube.

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