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Integrating ethnomathematics in E-LKPD: Enhancing learning through rice farming activities

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Abstract

Background: Ethnomathematics offers valuable insights into how cultural practices can enrich mathematical understanding. This study focuses on integrating ethnomathematics related to rice farming activities into electronic Learning Module (E-LKPD) for enhancing mathematical education.
Aim: The research aims to describe the developmental process and assess the effectiveness of the E-LKPD, which incorporates ethnomathematics content from rice farmer activities in paddy fields, in improving students' problem-solving abilities.
Method: Employing the 4-D development model (Define, Design, Develop, and Disseminate), this research was conducted with eighth-grade students of SMP Al-Falah Nusaraya as subjects. Data were collected through observation, interviews, questionnaires, and tests on problem-solving abilities. Both descriptive statistics and t-test analyses were utilized to evaluate the data.
Results: The study reveals that the E-LKPD is validated as effective by experts, with initial field trials placing it in the 'very practical' category. Moreover, results from field tests indicate that students using the E-LKPD with ethnomathematics content demonstrated superior problem-solving skills compared to those who did not use the E-LKPD.
Conclusion: The E-LKPD containing ethnomathematics on rice farming activities significantly enhances students' problem-solving abilities, thereby validating the effectiveness of integrating cultural elements into mathematical education through innovative learning modules.

INTRODUCTION

Indonesia, recognized as the largest archipelagic nation globally, encompasses an extensive array of islands stretching from Sabang to Merauke. This geographical configuration has fostered a distinctive cultural diversity, unparalleled by other nations. Such diversity has cultivated a pluralistic society characterized by varied behaviors, customs, histories, and religious beliefs. According to Mahdayeni (2019), culture is a universal phenomenon that influences attitudes, behaviors, and lifestyles, shaping the unique identity of each regional ethnic group in daily life. Consequently, a variety of mathematical activities have evolved, reflecting the notion that mathematics is a science intertwined with societal existence, often integrated into activities without conscious recognition. Contrary to the common perception of mathematics as merely a school subject, it actually permeates daily life, employed for measuring, counting, and solving problems using diverse mathematical concepts (D'Ambrosio,

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2001; Irfan et al, 2019; Rosa et al, 2016). Hartoyo (2012) states that counting, a frequent daily activity, involves determining the quantity of something, answering the question 'how much?' Counting involves calculating a total (remainder or income) by addition or subtraction (Dekdikbud, 2014). Meanwhile, measuring is an activity aimed at assessing the dimensions or shape of an object.

Agriculture is the primary livelihood for most Indonesians, deeply intertwined with the rich heritage passed down through generations. Often unnoticed, farming tasks incorporate numerous mathematical elements, from the utilization of equipment to the processes involved. Research by Supriana et al. (2021) highlights the mathematical reasoning embedded in agriculture, including the use of ratios to determine seed quantities relative to field size and labor calculations required for land preparation. Furthermore, arithmetic concepts, such as the multiples found in the term "lawe," which signifies increments of twenty-five, are commonplace. This blending of mathematics with everyday activities is central to ethnomathematics, a study which delves into how cultural groups interpret and employ mathematical ideas, as discussed by Rosa et al. (2016).

Ethnomathematics, pioneered by Ubiratan D'Ambrosio in 1985, explores how diverse cultural groups adapt mathematics in their daily lives, treating it as a cultural element (Orey & Rosa, 2016). This field serves as a culturally relevant pedagogical strategy in educational settings, particularly enhancing the comprehension of mathematics through the lens of students' cultural backgrounds (Irfan, 2016). The interplay between education and culture is inevitable, as both are embedded in societal and individual development (Utami, 2018). The revised 2013 curriculum aims to foster an understanding of various fields including science, technology, and arts, through the prism of cultural phenomena, with ethnomathematics acting as a conduit between educational content and cultural insights (Wahyuni et al., 2013).

However, there remains a notable gap in cultural awareness among junior high students in Belitang III Regency, where the curriculum on arts and culture fails to fully convey the richness of local traditions (Astuti et al., 2021). According to Amanan and Juswandi (2020), this lack of engagement with cultural heritage stems from a deficiency in culturally enriched educational materials and activities within schools. Moreover, the cultural components intended to be highlighted in the K13 curriculum revision are not adequately reflected in the teaching materials currently available. The Ministry of National Education (2018) states that educational resources should align with both curricular requirements and the unique environmental and personal needs of students. Yet, the existing materials often do not meet these criteria, lacking the specific content that facilitates targeted learning outcomes as envisioned by Dick and Carey (Utami, 2018). Research by Friansyah and Luthfiana (2018) underscores the need for educators to adopt a holistic approach, integrating cultural contexts into teaching to foster a more engaging and effective learning environment. The implementation of E-LKPD training incorporating ethnomathematics is expected to improve students' problem-solving capabilities and enhance overall educational achievements.

Research on ethnomathematics exploration has been carried out several times, but the development of teaching media containing ethnomathematics is still rare. One such study is Sofaria (2021) on the development of ethnomathematics-based worksheets for laying duck breeders to train adaptive thinking. The results showed that students claimed to be bored with the discussion themes used by the teacher when explaining the material, prompting the creation of ethnomathematics-based worksheets. Another study was conducted by Utami (2018) on the development of ethnomathematics-based E-modules to improve problem-solving abilities. This study focused on traditional dances of Central Java, culturally significant buildings, and regional specialties. The results showed an increase in students' mathematical problem-solving abilities after using the E-module. This research presents a novelty and is different from previous studies, as it focuses more on the presentation of worksheets in the form of Electronic LKPD (E-LKPD). Mathematics lessons inherently require continuous practice; the more you practice, the better you understand the material and solve related problems. Thus, this study aims to develop an E-LKPD containing ethnomathematics that can contribute to problem-solving skills without neglecting cultural values.

METHODS

Research Design:

This study adopts a Research and Development (R&D) approach, utilizing the Four-Dimensional (4-D) model developed by Thiagarajan (1974). The model encompasses four distinct stages: (1) Define, which includes a literature review, needs analysis, field survey, and observation; (2) Design, which involves the preparation of instruments, media design, and product prototyping; (3) Develop, which includes expert validation, limited-scale trials, and field-scale trials; and (4) Disseminate, focusing on the distribution and sharing of the developed educational tools.

Participants:

The research was conducted at Al-Falah Nusaraya Middle School during the 2022/2023 academic year, focusing on the topics of value comparison and value conversion. Participants included two groups: a control class of 24 students and an experimental class of 28 students, totaling 52 students. Initial observations were made at the school to assess students' problems and capabilities, and further observations were conducted on rice farmers in Nusaraya village to explore agricultural cultural practices.

Instruments:

The instruments used in this study included E-LKPD validation sheets for material and media experts, student response questionnaires to the learning tools, teacher response questionnaires, and a problem-solving ability test. These tools were designed to collect comprehensive data from both educational and practical perspectives, ensuring the effectiveness and applicability of the E-LKPD.

Data Analysis:

Data from the questionnaires and tests were analyzed quantitatively. The validity of the E-LKPD was assessed using a scoring system where the results were categorized as Valid (76-100%), Fairly Valid (56-75%), Less Valid (40-55%), and Invalid (0-39%). Practicality was evaluated through teacher and student response questionnaires, with criteria detailed in Table 2. The effectiveness of the E-LKPD was determined through pretest and posttest results in the experimental and control classes, analyzed using the T-test to evaluate improvements in students' problem-solving skills.

Table 1. Product Validity Criteria and Revision Level

Persentage (%)	Validation Criteria
76 – 100	Valid
56 – 75	Fairly Valid
40 – 55	Less Valid
0 – 39	Invalid

The formula used to calculate the results of the questionnaire from the validator is as follows:

$$P = \frac{\sum X}{\sum Xi} x\ 100\%$$

P : The percentage you are looking for

$\sum X$: Total value of respondents' answers

$\sum Xi$: The number of ideal values or highest answers

Test the practicality of the product using a teacher response questionnaire and a student response questionnaire. Criteria for the level of practicality are presented in Table 2 (Akbar, 2013). The percentage is calculated using the formula:

$$P = \frac{\sum_{i=1}^{n} X}{\sum_{i=1}^{n} Xi} x\ 100\%$$

P : The percentage you are looking for

$\sum_{i=1}^{n} X$: Total score of respondents' answers

$\sum_{i=1}^{n} Xi$: The number of ideal values or the highest answer

Table 2. Practical Criteria for Average Value Analysis

Score	Practical Criteria
85 – 100	Very Practical
70 – 84	Practical
55 – 69	FairlyPractical
50 – 54	Less Practical
0 – 49	Not Practical

RESULTS AND DISCUSSION

Result

1. Define

The initial research involves exploring the practices of rice farmers in the field. Observations revealed that ethnomathematics is widely used, particularly by rice farmers in Nusaraya Village. Various mathematical calculations and representations are employed in ethnomathematics, including units of area, symbols for determining area, calculating field area, determining distances between rice seeds, calculating the required amount of seeds, calculating fertilizer ratios, determining the ratio of pesticides during spraying, and calculating the harvest yields obtained by farmers during the harvest season. The concept of Equivalent Value arises when farmers estimate the quantity of seeds to be planted, the amount of fertilizer to be applied, and the quantity of pesticide to be dissolved in water for pest control. Through measuring field areas, farmers can determine the quantity of seeds and fertilizer needed. The larger the field owned by a farmer, the greater the quantity of seeds and fertilizer required. This concept is unconsciously and frequently used by farmers in the field. Conversely, the concept of Inverse Value emerges when farmers estimate the time required by laborers for rice planting and harvesting. For instance, a 1-hectare field worked by 10 laborers will be completed more quickly than the same-sized field worked by 6 laborers. Therefore, it can be concluded that the more laborers are employed, the less time is required, and vice versa.

Observations at SMP Al-Falah involved interviews with teachers and observations of ongoing lessons. The findings from the initial research at the school included the use of traditional lecture-based teaching methods, limited teaching materials and Learning Media (LKPD), and a lack of developed and varied practice questions provided to students. Consequently, the needs analysis conducted is a follow-up to the results of the preliminary research. It addresses the needs identified during the initial research in the school context. The identified needs include the necessity for a clear and syntax-appropriate teaching model aligned with the lesson plans (RPP), and the need for supportive LKPD materials.

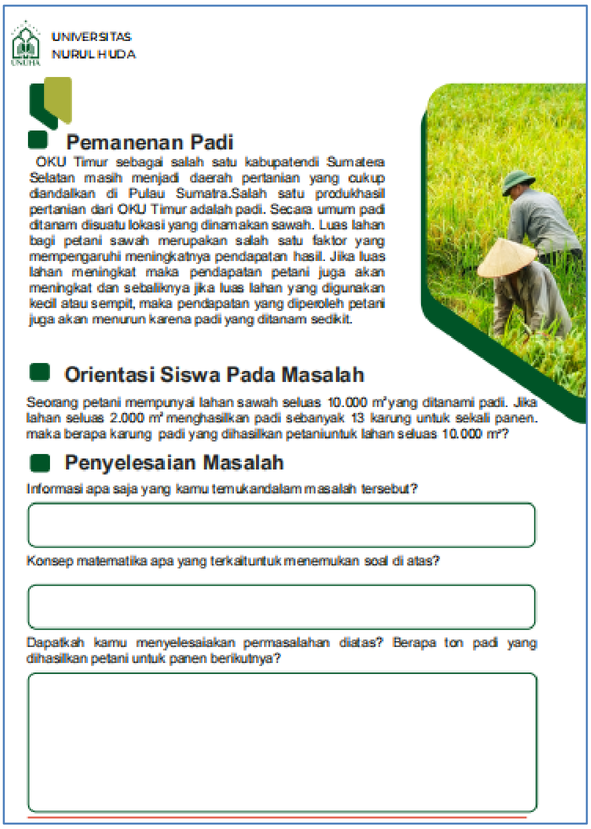
The literature review examines the components to be developed, including ethnomathematics and problem-solving. Ethnomathematics aims to incorporate everyday activities within the cultural context into learning, enabling students to comprehend, articulate, process, and eventually utilize mathematical ideas, concepts, and practices to solve problems (Kusuma et al., 2023). The problem-solving process is guided by the Polya model. According to Polya (Asman & Ariani, 2020), in solving a mathematical problem, there are four steps to be followed: (1) understanding the problem, (2) planning the solution, (3) executing the solution plan, and (4) checking the correctness of the solution. George Polya explains that to simplify the understanding and resolution of a mathematical problem, it is first broken down into simpler sub-problems, then analyzed (exploring all possible steps to be taken), and followed by the synthesis process (verifying the correctness of each step taken) (Finisia et al., 2018).

2. Design

The product development design comprises several components that need to be meticulously organized. Key among these is the creation of an electronic-based Learning Media (e-LKPD) that is accessible to students anytime and anywhere, facilitating flexible learning. Additionally, pre-test and post-test questions are developed to assess students' mathematical problem-solving abilities, providing a measure of their progress and the effectiveness of the learning media.

To ensure the quality and usability of the e-LKPD, the researcher prepares various instruments to evaluate its validity, practicality, and effectiveness. The validity assessment ensures that the content of the e-LKPD is accurate and relevant to the learning objectives. Practicality is evaluated based on feedback from teachers and students regarding the ease of use and the integration of the e-LKPD into the existing curriculum. Effectiveness is measured by comparing students' performance in pre-tests and post-tests, thereby determining the impact of the e-LKPD on their problem-solving skills.

Likewise, as seen in Table 2, students in groups A, B, and C engaged in drill and practice learning have a higher average score compared to their counterparts in the group taught with the modified Moore strategy. These two groups actually had the same opportunity to study together, as there was no restriction preventing them from doing so. The t-test results provide further insights, indicating that groups B and C from the two treatment groups did not show any significant differences in their deductive reasoning scores. This suggests that while both instructional strategies are effective, drill and practice may offer an edge in terms of improving certain mathematical skills. The findings underscore the importance of carefully selecting and designing instructional strategies and materials. By incorporating ethnomathematics into the e-LKPD, the learning experience can be made more relevant and engaging for students, connecting mathematical concepts to their cultural and everyday experiences. This approach not only enhances students' understanding and retention of mathematical concepts but also fosters a deeper appreciation of the cultural context in which these concepts are applied.



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Pemanenan Padi

OKU Timur sebagai salah satu kabupatendi Sumatera Selatan masih menjadi daerah pertanian yang cukup diandalkan di Pulau Sumatra.Salah satu produkhasil pertanian dari OKU Timur adalah padi. Secara umum padi ditanam disuatu lokasi yang dinamakan sawah. Luas lahan bagi petani sawah merupakan salah satu faktor yang mempengaruhi meningkatnya pendapatan hasil. Jika luas lahan meningkat maka pendapatan petani juga akan meningkat dan sebaliknya jika luas lahan yang digunakan kecil atau sempit, maka pendapatan yang diperoleh petani juga akan menurun karena padi yang ditanam sedikit.

Orientasi Siswa Pada Masalah

Seorang petani mempunyai lahan sawah seluas 10.000 m^2 yang ditanami padi. Jika lahan seluas 2.000 m^2 menghasilkan padi sebanyak 13 karung untuk sekali panen. maka berapa karung padi yang dihasilkan petaniuntuk lahan seluas 10.000 m^2?

Penyelesaian Masalah

Informasi apa saja yang kamu temukandalam masalah tersebut?

Konsep matematika apa yang terkaituntuk menemukan soal di atas?

Dapatkah kamu menyelesaiakan permasalahan diatas? Berapa ton padi yang dihasilkan petani untuk panen berikutnya?

Figure 1. The content of the e-LKPD in one of the farmer activities

The creation and arrangement of questions encompass both pre-tests and post-tests, to measure students' mathematical problem-solving abilities. Before formulating the questions, a blueprint (kisi-kisi) and question indicators are developed, taking into consideration factors such as grade level, semester, topic, learning objectives, question format, quantity, and the allocated time for completion. Following this, the questions are structured based on the blueprint. In this particular instance, a total of 5 questions are utilized, focusing on the topic of equivalent and inverse values, aligned with the learning objectives and indicators. Once the questions have been composed, they undergo a thorough examination for suitability, including assessments for validity, reliability, item discrimination, and question difficulty level.

3. Develop

After developing the product in the form of an initial draft, expert validation is essential to determine its validity for subsequent testing. Following this, a limited trial is conducted to assess practicality based on student and teacher response questionnaires. Finally, a field trial is performed to evaluate the product's effectiveness.

Product validation is conducted in two key areas: media validation and content validation. For media validation, the product is reviewed by two experts: Burhanudin Mustofa, M.Pd from STAI Al-Anwar Rembang, and Mega Kusuma Listyotami, M.Pd from STIE Dwi Sakti Baturaja. Content validation, on the other hand, is carried out by two additional experts: M. Anwar Rivai, M.Pd from SMPN 2 Belitang III, and Avissa Purnama Yanti, M.Pd from SMA 13 Bandar Lampung. The results of these validation processes are presented in Table 3 and Table 4.

Table 3. The average score result from media expert validators

Aspects	**Validator**	
	Burhanudin Mustofa, M.Pd	**Mega Kusuma Listyotami, M.Pd**
Graphic Suitability	3,5	3,25
Language Suitability	3,33	3,33
Total Average	**3,35**	
Criteria	**Valid**	

Table 4. T he average score result from content expert validators

Aspects	**Validator**	
	Avissa Purnama Yanti, M.Pd	**M Anwar Rivai, M.Pd**
Content	3,4	3,4
Presentation	3,3	3,5
Problem-Based Learning Using the Polya Method	3,2	3,6
Total Average	**3,4**	
Criteria	**Valid**	

Based on Table 3, the validation results for the E-LKPD contains ethnomathematics on the activities of rice farmers in the fields an average total score of 3.35, which falls within the criteria of being highly valid. The suggestions provided by the validator include making the images of each farming activity more specific, not just showing generic rice fields. For instance, if the activity is about sowing or planting, use images of rice seeds or seedlings. If it's about rice harvesting, include images of busy harvesters.

Furthermore, based on Table 4, the validation results for the content of the E-LKPD contains ethnomathematics on the activities of rice farmers in the fields resulted in an average total score of 3.4, which also falls within the criteria of being highly valid. The validator's suggestion here is to provide more exercises for each rice farming activity in the field. Once the product has been validated with highly valid results, a limited trial is conducted to assess its practicality. Practicality is evaluated through student and teacher response questionnaires. The limited trial is conducted with 6 students in Grade IX as respondents. The student response questionnaire received an average score of 89.4%, which falls within the criteria of being highly practical. The results of the student response questionnaire are presented in Table 5.

Table 5. The results of the student response questionnaire

Aspects Observed	Persentase
E-LKPD Appearance	88,6
Material Presentation	89,1
Benefits of E-LKPD	90
Average	**89,4**

On the other hand, the teacher response questionnaire yielded an average percentage score of 85%, which falls within the practicality criteria. The results of the teacher response questionnaire can be found in Table 6.

Table 6. The results of the teacher response questionnaire

Aspects Observed	Persentase
Didactic Requirements	78,57
Technical Requirements	100
Construction Requirements	83,33
Other Requirements	95
Average	**85**

The test instrument used to measure problem-solving skills was subjected to testing to determine its validity, reliability, item discrimination, and difficulty level. Validity was calculated using the R Table, and valid results were obtained for all items. There were a total of five essay questions, and both the pretest and posttest had the same questions. To measure reliability, a manual calculation was performed using the Alpha technique with a one-time test method, resulting in a reliability score of 0.758. This score meets the reliability criteria as it satisfies the requirement of $r_{11} \geq 0.7$, indicating that the test instrument can be used. Additionally, calculations for item difficulty level and item discrimination were conducted for the test instrument, and the results can be found in Table 7.

Table 7. Level of difficulty and differentiating power of problem-solving ability tests

No	1	2	3	4	5
Level of difficulty	0,6	0,42	0,6	0,36	0,53
differentiating power	0,202	0,230	0,373	0,206	0,476

From Table 7, it can be observed that the difficulty level and item discrimination of the mathematical problem-solving questions are categorized as fairly good. The difficulty level of a question is considered good when its value falls within the range of $0.3 \leq P \leq 0.7$, and item discrimination is considered good if $D \geq 0.30$.

Next, a field trial is conducted. The field trial takes place after a limited trial and yields valid and practical results. The respondents consist of 28 students from class VIII-A, who are assigned as the experimental group and use based on ethnomathematics e-LKPD in rice farming activities. Class VIII-B, comprising 24 students, serves as the control group. In the field trial, the e-LKPD's effectiveness is measured. To assess the effectiveness of the e-LKPD, prerequisite tests such as normality and homogeneity tests are conducted. Normality and homogeneity tests are calculated using SPSS, and the results can be seen in Table 8 and Table 9. Table 8 indicates that $Sig > 0.05$, which means that the data is considered normal. Meanwhile, in Table 9, $Sig > 0.05$, indicates that the data is homogenous.

Table 8. Result of homogeneity test

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Control	.140	24	.200*	.962	24	.482
	Experiment	.148	28	.116	.940	28	.114
Postest	Control	.139	24	.200*	.935	24	.128
	Experiment	.150	28	.107	.951	28	.211

*. This is a lower bound of the true significance.

Table 8. Result of homogeneity test

	Levene Statistic	df1	df2	Sig.
Pretest	.409	1	50	.525
Postest	.571	1	50	.453

A learning model is considered effective and successful if the developed learning media can improve students' mathematical problem-solving abilities. The effectiveness test is calculated using a t-test by comparing the experimental class and the control class for the pretest, as presented in Table 9, and for the posttest, as presented in Table 10.

Table 9. Pretest trial

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Pretest	Equal variances assumed	.409	.525	.153	50	.879
	Equal variances not assumed			.154	49.652	.879

Table 10. Posttest trial

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Postest	Equal variances assumed	.571	.453	-2.819	50	.007
	Equal variances not assumed			-2.758	42.222	.009

The value of $Sig > 0{,}05$ in Table 9 indicates that there is no difference in the pretest results between the experimental class and the control class. On the other hand, in Table 10, the value of $Sig < 0{,}05$ signifies that there is a difference in the posttest results between the experimental class and the control class. To further determine which class, experimental or control, performed better, the N-gain will be calculated as presented in Table 11.

Table 11. N-gain Calculate

No	Class	Grade	N	X_{min}	X_{maks}	$\bar{x}$	*Mean N-gain*
1	ecperimental	*Pretest*	28	28	59	45,68	$g = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}}$ $g = \frac{87{,}46 - 45{,}68}{100 - 45{,}68}$ $g = \frac{41{,}78}{54{,}32}$ $g = 0{,}77$
		Posttest		72	97	87,46	
2	Control	*Pretest*	24	31	56	46,04	$g = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}}$ $g = \frac{81{,}45 - 46{,}04}{100 - 46{,}04}$ $g = \frac{35{,}41}{53{,}96}$ $g = 0{,}65$
		Posttest		62	95	81,45	
Ideal Maksimum Score = 100							

Table 11 shows that the mean N-gain for the experimental class is 0.77, while the mean N-gain for the control class is 0.65. Based on the criteria (Meltzer, 2002), N-gain is considered high when $g > 0{,}7$ and moderate when $0{,}3 \leq g \leq 0{,}7$. From these criteria, it can be concluded that the experimental class exhibited a higher improvement in problem-solving abilities compared to the control class.

Discussion

The increasing recognition of ethnomathematics in educational materials highlights its value in enhancing students' mathematical skills. Studies indicate that contextualizing mathematics within familiar scenarios, such as the daily activities of rice farmers, significantly aids students by rendering abstract concepts more concrete and relevant to their personal experiences (Wiryanto et al., 2022). Kusuma et al., (2023) have noted improvements in student engagement and comprehension when mathematics is embedded within recognizable contexts, thereby boosting their problem-solving capabilities.

Incorporating local knowledge and cultural elements into mathematics education has proven beneficial. Educators are integrating ethnomathematics into their lesson plans, aligning with educational goals and creating adaptable materials that improve students' understanding of mathematical principles (Simamora et al., 2018). This integration of local culture into structured learning enhances not only students' problem-solving skills but also their confidence in handling mathematical challenges (Simamora et al., 2018).

Moreover, the development of teaching modules based on ethnomathematics has effectively improved mathematical literacy at the elementary level. These modules, which merge ethnomathematics with Realistic Mathematics Education (RME), have been shown to boost problem-solving skills and encourage creativity and innovation in students (Yuliana et al., 2022). The application of ethnomathematics in instructional practices is also advocated to support students' academic, social, and physical growth, highlighting the importance of continued research into various teaching methodologies across different cultural contexts (Supriyadi et al., 2022).

In summary, integrating ethnomathematics into educational resources has yielded positive results in enhancing students' mathematical skills by situating mathematical concepts within familiar environments and incorporating local culture into educational frameworks. This strategy not only makes mathematics more approachable and engaging but also deepens students' learning experiences by linking mathematical ideas with their cultural heritage.

CONCLUSIONS

Based on the findings and discussions presented in this study, it is evident that the ethnomathematics-based e-LKPD, focused on the activities of rice farmers, is both valid and practical, proving to be an effective tool in enhancing students' mathematical problem-solving skills. The use of this e-LKPD has demonstrated a marked improvement in problem-solving capabilities compared to traditional methods that do not employ this product. For future research, there is an opportunity to expand the scope of ethnomathematics e-LKPDs to include a broader range of cultural contexts, as the current study was limited to a specific cultural setting. It is also recommended that subsequent studies could look into developing not just e-LKPDs but also a variety of learning modules and teaching models that incorporate ethnomathematics. Additionally, exploring other dependent variables would be beneficial, such as mathematical communication skills, representation, critical thinking, and more.

AUTHOR CONTRIBUTIONS STATEMENT

ANA: Initiated the research idea, designed the methodology, and interpreted the data. MR: Carried out the calculations and statistical analyses.

WT: Conducted field observations and interviews with rice farmers, and contributed to the literature review.

DAS: Assisted in data collection and analysis, and contributed to the writing and revision of the manuscript.

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