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Jamovi-Assisted Ethnomathematics Learning for Data Analysis: A Community Service Initiative with the Mathematics MGMP in South Sumatera

Nila Kesumawati[1], Yunika Lestaria Ningsih[2], Lusiana[3], Jumroh[4], Rohana[5], Eka Fitri Puspa Sari[6], Allen Marga Retta[7]

[1,2,3,4,5,6,7] Universitas PGRI Palembang

Email: nilakesumawati@univpgri-palembang.ac.id; yunikalestari@univpgri-palembang.ac.id; lusiana@univpgri-palembang.ac.id; jumroh@univpgri-palembang.ac.id; rohana@univpgri-palembang.ac.id; ekafitripuspasari@univpgri-palembang.ac.id

ABSTRACT

Background: Mathematics learning is frequently perceived as abstract and disconnected from students' daily experiences. Ethnomathematics offers a culturally responsive approach by embedding mathematical concepts within community traditions. However, teachers often face challenges in analyzing classroom data due to limited familiarity with accessible statistical software. This community service program addressed the need to strengthen ethnomathematics-based instruction supported by digital data analysis tools, particularly Jamovi.

Purpose of the Study: This study aimed to enhance teachers' understanding of ethnomathematics and improve their competence in applying the Jamovi application for statistical data analysis in mathematics learning.

Methods: The program employed a participatory training model consisting of preparation, implementation, and evaluation stages. Activities included socialization sessions, seven online workshops, and one offline session involving 50 mathematics teachers from the MGMP forum. Pre-tests, post-tests, product presentations, and satisfaction questionnaires were used to evaluate outcomes. Data were analyzed using descriptive statistics and Normalized Gain (N-Gain).

Results: The findings indicate high participant satisfaction, with an average of 70.6% selecting "Strongly Agree." Teachers' mean scores improved from 66.56 (pre-test) to 85.76 (post-test), with an average N-Gain of 0.59 (medium-to-high category). The results demonstrate that integrating ethnomathematics with Jamovi effectively enhances teachers' statistical literacy, technological competence, and ability to design contextual mathematics learning.

Keywords
Ethnomathematics; Jamovi; Teacher Professional Development

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Corresponding Author: Yunika Lestaria Ningsih; Email: yunikalestari@univpgri-palembang.ac.id; Universitas PGRI Palembang

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Introduction

Mathematics learning is often seen as abstract and far from daily life. In fact, mathematics is very close to local culture and traditions(Qorimah et al., 2024; Shavira & Suparni, 2021; Suastra et al., 2024). In the 21st century, mathematics learning requires critical thinking skills, data literacy, and the ability to use information technology. In the Indonesian context, ethnomathematics is an innovative approach that integrates cultural values into mathematics learning, making it more contextual, meaningful, and relevant to students' lives (Prahmana & D'Ambrosio, 2020; Rosa & Orey, 2016).

The term ethnomathematics was first introduced by Ubiratan D'Ambrosio, a Brazilian mathematician, as an approach that studies the relationship between mathematics and culture. He stated that ethnomathematics is the study of the specific ways a cultural group understands, expresses, and uses mathematical concepts in their daily lives. Etymologically, the word ethnomathematics comes from two words: *ethno* and *mathematics*. The prefix *ethno* refers to a particular race, ethnic group, or kinship group, reflecting the cultural and social identity of a community (François & Kerkhove, 2010). Meanwhile, *mathematics* refers to the science that studies patterns, structures, numbers, and shapes in a logical and systematic way. Ethnomathematics is therefore an approach in mathematics education that connects mathematical concepts with the cultural context of society.

Ethnomathematics can be understood as mathematics within a culture, meaning the habitual behaviors of people in their environment, such as urban or rural communities, work groups, professional groups, students of certain age groups, indigenous communities, and other specific groups (Tesmeri, 2023). Thus, ethnomathematics is defined as the study of how a cultural group understands, organizes, and applies mathematical concepts that develop from their life experiences. This approach views mathematics not only as universal knowledge but also as contextual knowledge closely connected to the cultural values of society.

The ethnomathematics approach connects local culture with modern mathematical concepts (Arif & Mahmudah, 2022). It not only introduces mathematical concepts through local culture but also strengthens identity and appreciation of local wisdom. This approach is especially important in culturally rich areas such as Indonesia, including South Sumatra. South Sumatra has rich cultural resources that can be used as contexts for mathematics learning through ethnomathematics. For example, the Limas traditional house can be used to teach three-dimensional shapes, songket fabric can introduce patterns and symmetry, and the Gending Sriwijaya dance shows mathematical movement patterns. Survey data about favorite pempek can be analyzed using statistical applications. By integrating local culture into learning, students not only understand mathematical concepts in context but also develop a deeper love for their cultural heritage (Siregar et al., 2024).

However, in implementing ethnomathematics-based learning, there are challenges in collecting, processing, and analyzing data, especially from observations, questionnaires, or learning evaluations. Many teachers and students still struggle to use appropriate data analysis tools due to limited access or the complexity of conventional statistical software such as SPSS. One application that is easy to access today is Jamovi. Jamovi is a data analysis application, especially useful in environments with limited resources, and it can help improve data and statistical literacy (Kangiwa et al., 2024). Jamovi is designed for non-programmers, such as students and teachers, and provides complete features for descriptive analysis, hypothesis testing, analysis of variance, regression, and more. Integrating Jamovi into ethnomathematics-based learning allows data analysis to be more efficient, accurate, and aligned with modern educational technology. Data analysis skills are also essential in 21st-century mathematics education.

Even so, the use of Jamovi in mathematics learning is still low. Many teachers and students are not familiar with it and do not yet have the skills to operate it effectively. This shows an urgent

need for training and guidance in using Jamovi, especially in the context of ethnomathematics and mathematics education research. The combination of ethnomathematics and the use of Jamovi in mathematics learning can provide contextual and meaningful learning experiences and bring mathematics closer to students' culture. Therefore, a community service activity in the form of Jamovi training for ethnomathematics-based mathematics learning is needed.

Currently, mathematics education faces several challenges, especially in connecting learning materials with real-life contexts and mastering supporting technology. At the same time, local cultural potential, such as the culture of South Sumatra, has not been fully used as a contextual learning source. Based on this situation, several problems can be identified: (1) Lack of integration of local culture in mathematics learning at schools. Teachers often use conventional and abstract approaches without connecting mathematics to local culture, even though cultural elements such as the Limas house, songket fabric, and traditional games can provide meaningful learning contexts through ethnomathematics. (2) Limited understanding of ethnomathematics among teachers and its implementation in learning. Many teachers are not familiar with the concept and have little experience designing culture-based lessons. (3) Limited use of statistical software such as Jamovi in mathematics learning and data analysis. Jamovi, which has a user-friendly graphical interface (GUI), is still not widely known or used by teachers, even though it is relevant for teaching statistics in the mathematics curriculum. (4) Lack of technical training or assistance for teachers in using Jamovi in practice. Although Jamovi is open-source and free, most teachers have not received proper training or guidance on how to operate and integrate it into classroom activities. (5) The absence of teaching materials (lesson plans and student worksheets) that integrate local culture and Jamovi. There is a need to develop and assist teachers in preparing ethnomathematics-based learning materials supported by statistical data analysis using Jamovi.

Therefore, the Community Service Team from the Mathematics Education Departement at PGRI University of Palembang conducted activities to introduce and assist teachers in both theory and practice in applying Jamovi for learning and data analysis at schools. This community service activity is titled "The Application of JAMOVI in Ethnomathematics-Based Mathematics Learning and Data Analysis." The focus of this community service activity is to help educators create learning experiences that are more effective, engaging, and satisfying for students. In detail, the objectives of this activity are: (1) to improve teachers' understanding of the importance of ethnomathematics in mathematics learning, and (2) to improve teachers' skills in using the JAMOVI application for statistical data analysis.

Method

The method used in this activity consists of socialization sessions and practical training conducted both online and offline. In the socialization sessions, participants receive materials about the Jamovi application, the culture of South Sumatra, and its ethnomathematical potential integrated into developed learning problems. These activities were conducted for 73 mathematics teachers who are members of the MGMP (Musyawarah Guru Mata Pelajaran) in Ogan Ilir Regency. The steps of this community service activity include the following stages: preparation, implementation, and evaluation.

The preparation stage is the initial phase before the implementation of the program. Several activities were carried out at this stage, including internal coordination by the team, selection and recruitment of training participants, preparation of program instruments such as attendance sheets, questionnaires, ethnomathematics-based mathematics materials, and the application of Jamovi in learning and data analysis. Preparations for publication, location, documentation, and other technical matters were also completed. The internal coordination meeting was held on June 15, 2025. From this meeting and discussion, the team decided on the theme, location, materials, and schedule of the program.

The implementation stage includes socialization, introduction to the Jamovi application, practice in data analysis using Jamovi, and the development of ethnomathematics-based learning instruments. The materials presented focused on the use of the Jamovi application in mathematics learning and data analysis to develop teachers' creative competence and mindset. The materials were organized into 7 (seven) online sessions. The presenters were members of the community service team, according to their respective areas of expertise. The eighth and final meeting was conducted offline, where several mathematics teachers demonstrated their ability to use the Jamovi application.

At the end of the activity, the participants and the team conducted a reflection on the training results. The participants also provided evaluations of the training. After all planned activities were completed, the head of the community service team officially closed the program and encouraged all participants to apply what they had learned in their respective classrooms. Evaluation was conducted both during the activity and at the end of the program. The program lasted for one month. At the end of the activity, participants were given a questionnaire after completing the practice sessions and material presentations. The questionnaire was designed as a participant satisfaction survey for the community service activity and was distributed to participants through Google Forms. The method flowchart can be seen in Figure 1.

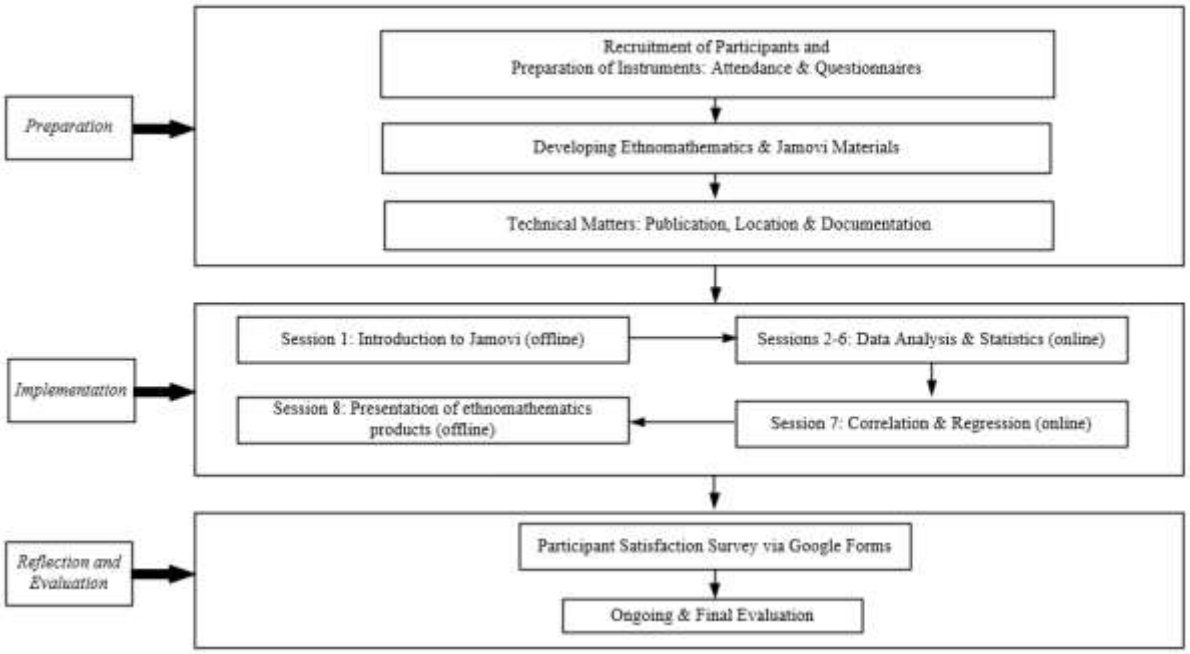

Figure 1. The Flowchart of Activity Method

Result

This community service activity was conducted for approximately one month, from Wednesday, September 10, 2025 to October 8, 2025, at the hall of SMP Negeri 1 Indralaya, Ogan Ilir Regency of South Sumatera, Indonesia. The distance between Universitas PGRI Palembang and Ogan Ilir Regency is 35.3 kilometers. The travel time by a four-wheeled vehicle on regular roads is 56 minutes. This travel route can be seen on the map in Figure 1.

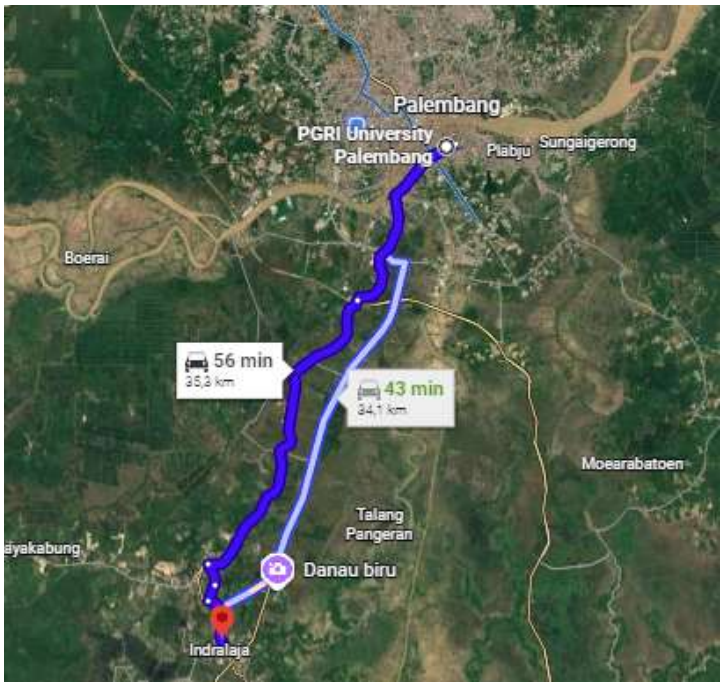

Figure 1. The Map of SMP Negeri 1 Indralaya

This community service activity began with an opening speech by the Rector of Universitas PGRI Palembang, represented by the Head of the Institute for Research and Community Service. It was then followed by the implementation stage and the presentation of the materials. At the implementation stage, the community service team began the activity by conducting a pre-test to measure teachers' knowledge of the JAMOVI application, data analysis, and ethnomathematics-based learning. After that, the activity continued with material presentations and training on how to use the JAMOVI application. This activity can be seen in Figure 2.

Figure 2. The Activity in First Meeting

In this implementation stage, the materials covered included an introduction to the JAMOVI application, analysis of data validity and reliability, descriptive statistics, binomial and normal distributions, tests of normality and homogeneity, t-distribution, correlation, and simple linear regression. The second to the seventh meetings were conducted online. An example of the online activities can be seen in Figure 3.

Figure 3. The Activity in Online Training

Furthermore, at the final meeting, which was the eighth session, the activity consisted of presenting ethnomathematics-based learning products using JAMOVI. This activity can be seen in Figure 4, and the attendance rate of participants for all of the meetings in this activity program can be seen in Table 1.

Figure 4. The Activity in the Final Meeting

Table 1: The Attendance Rate of Participants for all the Meetings

No	Topic	Speaker	Total of Participant
1	Introduction to Jamovi Application	Yunika Lestaria Ningsih, S.Si., M.Pd	100%
2	Data Validity and Reliability Analysis	Prof. Dr. Nila Kesumawati, M.Si	90.4%
3	Descriptive Statistics	Allen Marga Retta, M.Pd	93.2%
4	Binomial Distribution and Normal Distribution	Dr. Rohana, M.Pd	100%
5	Normality and Homogeneity Test	Dr. Eka Fitri Puspa Sari, M.Pd	89.2%
6	t-Distribution	Dra. Lusiana, M.Pd	94.5%
7	Simple Linear Correlation and Regression	Dra. Jumroh, M.Pd	95.9%
8	Presentation of Ethnomathematics Learning Product Using Jamovi	Participants	100%

At the final meeting, an evaluation was also conducted, which included completing a questionnaire about participants' satisfaction with the activity and taking the final test. The results of the satisfaction questionnaire can be seen in Table 2.

Table 2: Participant Satisfaction Survey Results for the Community Service Activities

No	Statement	Strongly Agree	Agree	Disagree	Strongly disagree
1	The material is aligned with participants' needs.	69.4	30.6	0	0
2	The activities implemented met participants' expectations.	72.2	27.8	0	0
3	The presenter delivered the material in an engaging manner.	80.6	19.4	0	0
4	The material presented was clear.	77.8	22.2	0	0
5	The material presented was easy to understand.	69.4	30.6	0	0
6	The time allocated for delivering the material was appropriate.	63.9	36.1	0	0
7	Participants were interested in taking part in activities according to the school's needs.	52.8	47.2	0	0
8	The team members involved in the activity provided services according to needs.	75	25	0	0
9	The implemented activities were sustainable.	61.1	38.9	0	0
10	Every question raised was followed up properly by the presenters/team members involved.	72.2	27.8	0	0
11	Participants gained direct benefits from the implemented activities.	72.2	27.8	0	0
12	Overall, participants were satisfied with the activities.	80.6	19.4	0	0
	Average	70.6	29.4		

Based on Table 3, the statements with the highest "Strongly Agree" responses are items number 3 and 12 (each 80.6%). This shows that participants found the presenter's delivery interesting and felt that the community service activity was satisfying overall. The lowest "Strongly Agree" response was found in item number 7 (52.8%). This indicates that although participants were interested, some of them still needed to consider their time and school responsibilities before joining future activities. With an overall average of 70.6% in the "Strongly Agree" category, it can be concluded that the participants' level of satisfaction with this program was very high. These results indicate that the activity was well implemented, met the needs of the Mathematics MGMP teachers in Ogan Ilir Regency, and provided direct benefits in improving their ability to use the JAMOVI application and integrate ethnomathematics into their teaching.

In addition, the team conducted pre-tests and post-tests to measure the teachers' knowledge of data analysis using JAMOVI and ethnomathematics-based learning. The calculation shows that the average pre-test score was 66.56, while the average post-test score increased to 85.76. This means there was an average score improvement of 19.20 points after completing the entire program. Furthermore, the improvement in participants' ability was measured using the Normalized Gain (N-Gain), which shows how much their ability improved compared to the maximum possible score. The analysis resulted in an average N-Gain of 0.59. According to Hake

(1998) criteria, this value falls into the medium to high category:

- High: $g \geq 0.7$
- Medium: $0.3 \leq g < 0.7$
- Low: $g < 0.3$

Overall, the distribution of participants' N-Gain scores can be described as follows:

High category (≥ 0.7) : 16 participants (32%)
Medium category (0.3–0.69) : 25 participants (50%)
Low category (< 0.3) : 9 participants (18%)

These results show that most participants experienced a significant improvement in their understanding, especially in using the JAMOVI application for ethnomathematics-based data analysis. This community service activity has proven to be effective in improving teachers' competence, particularly in mastering data analysis technology and applying it in contextual mathematics learning.

Discussion

The transformation of data analysis learning through an ethnomathematics-based approach supported by Jamovi within the Mathematics MGMP of SMP Ogan Ilir reflects a pedagogical shift toward culturally responsive and technology-enhanced mathematics instruction. Ethnomathematics positions mathematical knowledge as embedded within cultural practices, emphasizing that mathematical concepts become more meaningful when connected to learners' sociocultural environments. Recent bibliometric analyses indicate a significant increase in global ethnomathematics research over the past decade, highlighting its growing relevance in mathematics education reform (Deda et al., 2024). This trend underscores the importance of contextualizing mathematics instruction through local cultural elements to enhance conceptual understanding and student engagement.

Empirical studies further demonstrate that integrating ethnomathematical design into statistics instruction strengthens numeracy literacy by linking abstract statistical concepts to real-life cultural contexts (Irvandi & Darma, 2024). In the MGMP program, this approach enabled teachers to frame statistical investigations around culturally meaningful data sources, such as surveys or practices rooted in South Sumatran traditions. Such contextualization aligns with contemporary views that effective mathematics learning requires bridging informal cultural knowledge with formal mathematical structures.

The technological component of this transformation was facilitated using Jamovi, an open-source statistical software with a graphical user interface designed for accessibility. Recent research examining Jamovi in statistics education reports positive outcomes in student engagement, conceptual understanding, and attitudes toward statistical learning (Jumroh et al., 2025). Because Jamovi simplifies computational procedures and provides immediate visualization outputs (e.g., histograms, boxplots, inferential test summaries), teachers can focus more on data interpretation and reasoning rather than manual calculation. This supports the broader goal of developing statistical literacy, defined as the ability to interpret, critically evaluate, and communicate statistical information effectively.

The integration of ethnomathematics and Jamovi also aligns with 21st-century educational competencies that emphasize critical thinking, digital literacy, and evidence-based reasoning. By analyzing culturally contextualized datasets using Jamovi, teachers in the MGMP program engaged in authentic data analysis processes that mirror real-world problem-solving situations. The observed improvement in pre-test and post-test scores, as well as the medium-to-high N-Gain

results, suggests that combining cultural contextualization with accessible digital statistical tools significantly enhances teachers' analytical competencies and pedagogical readiness. These findings indicate that the transformation of data analysis instruction through ethnomathematics and Jamovi is not merely a methodological innovation but represents a broader pedagogical advancement toward contextual, culturally grounded, and technology-supported mathematics education.

Despite these positive outcomes, this study has several limitations that should be acknowledged. First, the intervention was conducted over a short duration of only one month, which may not be sufficient to gauge the permanent mastery of the tools. Second, the scope was limited to a single district, meaning the results may not be generalizable to other regions with different cultural or technological backgrounds. Finally, there are potential challenges in long-term adoption, such as the consistency of teachers in applying Jamovi in their respective classrooms after the program ends. Future research should consider longitudinal assessments to evaluate the sustainability of these pedagogical shifts.

Conclusion

The results of the community service activity conducted by lecturers and students of the Faculty of Teacher Training and Education (FKIP), Universitas PGRI Palembang, show several positive outcomes. Mathematics teachers from the MGMP of SMP/MTs in Ogan Ilir improved their understanding of ethnomathematics and its application in teaching, and they were able to identify elements of South Sumatra's local culture, such as the Limas traditional house, songket fabric, and deliberation traditions, as meaningful contexts for learning geometry, statistics, and probability. In addition, teachers improved their skills in using the Jamovi application for descriptive analysis, reliability and validity testing, and probability distributions; they were able to input data, create frequency tables, calculate measures of central tendency and dispersion, and present results in graphs, boxplots, and histograms, which also supports classroom action research and data-based evaluation of student learning outcomes. The integration of local culture and technology made mathematics learning more contextual and engaging for students. Participants showed high enthusiasm throughout the training, actively joining discussions and practice sessions, and most reported that the program was useful, easy to follow, and relevant to the needs of 21st-century teachers. Overall, the activity strengthened teachers' statistical literacy, promoted evidence-based teaching, and enhanced their professionalism through the use of free and open-source statistical technology in education.

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Conflicts of Interest

The authors declare no conflict of interest

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