MACCA: JOURNAL OF LINGUISTIC APPLIED RESEARCH
Vol.2, No.1, 2025: Page 291-299

Development of a Mathematics Module Integrating Traditional Games from South Sulawesi

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A R T I C L E I N F O

Keyword : Mathematics, Traditional Games, South Sulawesi, Learning Module

A B S T R A C T

Mathematics teaching activities at SDN 21 Turatea and SDN 8 Turatea show that students have difficulty in understanding basic mathematical concepts. One solution to improve student understanding is to develop a learning module based on traditional games from South Sulawesi. This module integrates local cultural elements into mathematics learning to make it more interesting and easier for elementary school students to understand. The use of traditional games such as Madende (Engklek), Magalle (coconut shell game), Lambasena (rubber jump), Enggo'-Enggo' (hide and seek), and Maggasing (spinning top) in learning has been proven to improve student understanding and make the learning process more enjoyable

INTRODUCTION

Mathematics learning is often considered difficult by elementary school students. This is due to the lack of interactive learning approaches and minimal student involvement in understanding concepts in a concrete manner. Many teaching methods remain conventional and fail to incorporate visual elements and physical activities that could help students grasp abstract concepts more effectively.Based on observations and teaching activities conducted at SDN 21 Turatea and SDN 8 Turatea, it was found that many students struggle to understand basic operations such as addition, subtraction, multiplication, and division. These difficulties are largely caused by the lack of direct student engagement in the learning process, as well as the limited variety of teaching methods employed by teachers.

To address these issues, a mathematics module based on traditional games from South Sulawesi was developed. Games such as *Madende*, *Magalle*, *Lambasena*, *Enggo'-Enggo'*, and *Maggasing* were used to help students understand basic mathematical concepts in a more enjoyable and experiential way. Through this approach, students not only learn mathematical concepts theoretically, but also through playful experiences that make the material easier to understand and remember in the long term.

This module is designed to enable students to actively participate in learning by leveraging the social interactions that occur during gameplay. Additionally, the use of traditional games aims to preserve local culture and foster a sense of pride among students in their cultural heritage. As such, mathematics learning not only serves to enhance students' academic abilities but also plays a role in character development and instilling an appreciation for cultural values within the community.

LITERATURE REVIEW

The teaching and learning of mathematics at the elementary level remains a major focus of educational research due to its foundational role in students' cognitive development. However, mathematics is often perceived as an abstract and difficult subject, especially among early-grade students. Several studies have emphasized the importance of developing innovative teaching approaches that can transform mathematical concepts into more concrete and meaningful learning experiences (Bruner, 1966; Piaget, 1973). One such approach is the integration of culturally relevant and play-based learning strategies.

According to Vygotsky's socio-cultural theory (1978), learning occurs most effectively when it is mediated through meaningful social interaction and cultural tools. In the context of mathematics education, this implies that integrating cultural elements such as traditional games can provide a powerful scaffold for student understanding. Traditional games, being rooted in the social and cultural context of learners, can serve as both educational tools and vehicles for cultural preservation.

Research conducted by Irwanto et al. (2021) explored the use of traditional games as a medium for character education and found that these games promote cooperation, discipline, and strategic thinking. Their study demonstrated how game-based learning not only improves engagement but also supports the development of multiple intelligences. Similarly, Sulistyaningsih and Yuniati (2019) noted that incorporating traditional games into mathematics instruction can enhance students' understanding of number patterns, spatial awareness, and measurement concepts.

The use of traditional games in learning is also supported by constructivist theory, which posits that learners construct knowledge based on their experiences and interactions. When children are engaged in active learning through play, they are more likely to internalize abstract concepts. Traditional games such as *Madende* (similar to

hopscotch), *Magalle* (coconut shell race), *Lambasena* (rubber jumping), *Enggo'-Enggo'* (hide and seek), and *Maggasing* (spinning top) are inherently rich with mathematical elements such as counting, patterns, estimation, measurement, and geometry. These elements, when purposefully integrated into classroom instruction, can turn a routine activity into an educational opportunity.

Moreover, local studies have shown that embedding cultural values in learning materials contributes positively to student motivation and identity development. A study by Hasibuan and Nasution (2020) reported that when students feel a connection to the cultural content in their lessons, they are more likely to participate actively and retain the concepts learned. In the context of South Sulawesi, where traditional games are part of daily life, using these games in the classroom helps bridge the gap between school learning and real-life experiences.

In recent years, curriculum reforms in Indonesia have increasingly emphasized the importance of contextual and character-based education. The 2013 Curriculum (Kurikulum 2013) promotes thematic and student-centered learning, encouraging the use of local wisdom and culture as instructional resources. This educational shift aligns well with the development of learning modules that incorporate traditional games, especially in remote and rural schools where students may be more familiar with traditional play than with digital technologies.

Despite the growing recognition of traditional games as educational tools, implementation remains limited. Many teachers lack access to structured modules that integrate these games into academic content. In addition, there is a need for professional development programs to help educators understand how to align these games with curriculum objectives and learning outcomes.

In conclusion, the literature supports the integration of traditional games into mathematics learning as a means to increase engagement, deepen understanding, and promote cultural identity. The development of a mathematics module based on South Sulawesi traditional games represents an innovative strategy that aligns with both pedagogical theory and national educational goals. Further research and implementation efforts are needed to evaluate the long-term impact of such modules and to optimize their design for broader application.

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METHOD

This study employed a development research design aimed at producing a mathematics learning module based on traditional games from South Sulawesi. The goal was to enhance elementary students' conceptual understanding through culturally responsive and experience-based learning. The development process included several stages: observation, data collection, module design, implementation planning, and evaluation.The research and development activities were conducted following the teaching phase at SDN 21 Turatea and SDN 8 Turatea, two elementary schools located in Jeneponto Regency, South Sulawesi. Observations and preliminary teaching took place in January 2025. The mathematics module was designed and completed shortly after, and distributed on February 4, 2025, for use by both teachers and students at the selected schools.

The target audience of the developed module includes first-, second-, and third-grade students. The module was also intended for teachers who would implement it in their classroom teaching. Participants in this study included approximately 60 students across the three grade levels and 4 mathematics teachers from the two schools. These teachers

were directly involved in the preliminary evaluation of the module and provided feedback based on classroom observations and student responses.

This research utilized a qualitative descriptive approach combined with elements of research and development (R&D) methodology. The development process adopted was loosely based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), adapted to suit the context and scope of this community-based project.In the initial phase, the researchers conducted field observations and informal interviews with teachers and students to identify problems and gaps in the current mathematics learning process. During this phase, it became evident that many students struggled with basic mathematical operations such as addition, subtraction, multiplication, and division. Teachers also reported that traditional methods of teaching were not engaging enough and did not accommodate students with diverse learning needs.

Based on the results of the analysis, the researchers began designing a module that would integrate mathematics content with traditional games familiar to local students. The design process involved selecting relevant mathematical concepts and aligning them with the nature and structure of the games. Each selected game was mapped to one or more mathematical skills:

- Madende (hopscotch): Addition and subtraction, spatial reasoning
- Magalle (coconut shell race): Distance measurement and estimation
- Lambasena (rubber jump): Pattern recognition and symmetry
- Enggo'-Enggo' (hide and seek): Logical reasoning and problem-solving
- Maggasing (spinning top): Rotation, momentum, time and speed estimation

Lesson plans and activity sheets were designed for each game, ensuring that students would not only play but also engage in reflection and discussion about the mathematical concepts involved.After completing the module design, the next step involved developing the physical learning materials. This included writing instructional texts, creating worksheets, drawing illustrations, and formatting the content to be accessible and attractive for young learners. Care was taken to use language that was clear and age-appropriate, and to include visual aids that would help explain abstract concepts in a more tangible way.In this phase, expert validation was sought from two educators—one with a background in mathematics education and another in local cultural studies—to ensure both pedagogical and cultural appropriateness. Feedback from these experts was used to revise and refine the module.Although the full implementation of the module had not occurred at the time of this writing, preliminary activities were carried out to introduce the module to the target schools. The modules were distributed to teachers, and orientation sessions were conducted to familiarize them with the module structure, objectives, and usage guidelines.

Teachers were encouraged to integrate one or two games per week into their lessons and to document students' responses, challenges, and learning outcomes. However, as reported, the actual classroom implementation was still in the introductory phase, and full-scale testing had not yet been conducted.While summative evaluation is planned for future stages, a formative evaluation approach was taken at this stage. Teachers provided initial feedback on the module's clarity, relevance, and engagement level. Observational data and anecdotal records from teaching activities before the module's full implementation served as baseline references.

The key success indicators for this module included:

- Increased student engagement and participation during mathematics lessons
- Improved conceptual understanding as reflected in classroom discussions and assessment results
- Teacher satisfaction with the integration of games into lessons
- Enhanced awareness and appreciation of local culture among students

Several qualitative techniques were used to collect data during the development

process:

- Observation: Used to assess student behavior and engagement during traditional math lessons.
- Interviews: Conducted informally with students and teachers to gain insights into their perceptions and learning difficulties.
- Documentation: Analysis of teaching materials, student work, and photos of classroom activities.
- Expert Validation: Assessment of the draft module by content and cultural experts for relevance, accuracy, and feasibility.

5. Ethical Considerations

All research and development activities were conducted with ethical consideration. Verbal consent was obtained from school principals and participating teachers. The identities of students were anonymized, and the activities were designed to be non-intrusive, fun, and aligned with students' existing cultural practices.

RESULTS AND DISCUSSION

After the development of the module, it was distributed to students and teachers at SDN 21 Turatea and SDN 8 Turatea. However, to date, the module is still in the introductory stage and has not yet been fully implemented or practiced directly by students in classroom learning activities. This indicates that further steps are needed to ensure the effective implementation of the module.

Nevertheless, both students and teachers have shown great enthusiasm for this traditional game-based learning approach. The module is designed to help students understand basic mathematical concepts such as addition, subtraction, distance measurement, number patterns, symmetry, and probability. The game *Madende* helps students grasp the concepts of addition and subtraction interactively through hopping on numbered squares. *Magalle* provides practical understanding of distance measurement, while *Lambasena* introduces patterns and symmetry through repetitive and structured rubber jump movements. *Enggo'-Enggo'* teaches the importance of teamwork and strategy in identifying hiding patterns, and *Maggasing* helps students understand the concepts of rotation, momentum, and the calculation of time and speed.

Teachers who accompanied the learning process using the module reported that students were more active and motivated to learn. The interaction that occurred during the games also helped to improve collaboration among students. Some students who previously struggled with mathematics showed significant improvement in understanding after participating in this traditional game-based learning approach.

Teachers who received the module responded positively to its potential to enhance students' interest and motivation in learning. The next step is to provide support and conduct evaluations of the module's implementation in classroom activities.

With the presence of this module, it is hoped that mathematics learning can become more enjoyable and no longer be seen as a difficult subject. The traditional game-based approach provides a unique and contextually relevant learning experience for students, while also contributing to the preservation of the local culture of South Sulawesi.

Figure 1. Program Activities: (a) Teaching at SDN 21 Turatea, (b) Teaching at SDN 8 Turatea, (c) Module Distribution at SDN 21 Turatea, (d) Module Distribution at SDN 8 Turatea

CONCLUSION

The development of a mathematics module based on traditional games from South Sulawesi represents an innovative step in improving students' understanding of basic mathematical concepts. This module has been successfully developed and distributed to students and teachers at SDN 21 Turatea and SDN 8 Turatea, although it has not yet been fully implemented in classroom learning. The enthusiasm shown by both students and teachers indicates that this method holds great potential for increasing student interest and comprehension in mathematics.

Moreover, this culturally responsive approach contributes to preserving local traditions by integrating traditional games into the learning process. In addition to supporting academic achievement, the module also fosters character building and strengthens students' appreciation of their cultural heritage. To maximize the effectiveness of the module, further efforts such as teacher training, ongoing assistance, and thorough evaluation are needed to ensure sustainable and impactful implementation in elementary school mathematics education.

ACKNOWLEDGEMENTS

Praise be to Allah SWT for His mercy and guidance, which has given the author strength to complete this Community Service Program (KKN) article entitled *"Development of a Mathematics Module Based on Traditional Games from South Sulawesi."* The author realizes that the implementation of this program could not have been accomplished without the guidance, encouragement, and support—both material and non-material—from various parties. The author would like to express sincere gratitude to all those who contributed to the success of this program,

including:

1. Allah SWT, who is always present in every step of life, providing protection and good health.
2. The author's parents, for their unwavering prayers and support throughout this journey.
3. Dr. Sumarlin Rengko Hr, S.S., M.Hum., as the Supervising Lecturer, for his encouragement and motivation throughout the Community Service Program.
4. The Village Head, the Village Secretary of Pa'rasangan Beru, and all village officials who assisted us during the execution of our program.
5. The principals and teachers of SDN 21 Turatea and SDN 8 Turatea for their support and for giving us the opportunity to carry out our program in their schools.
6. The people of Pa'rasangan Beru Village, who contributed and brought life to the implementation of our program.

To all fellow KKN team members, thank you for your help and companionship throughout the process and during our time at the KKN post.

The author acknowledges that this article is far from perfect and welcomes constructive criticism and suggestions from readers. It is hoped that this Community Service Program article will provide useful knowledge for all parties involved.

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