Infinity Journal of Mathematics Education
Volume 15, No. 1, 2026
https://doi.org/10.22460/infinity.v15i1.p133-158

p-ISSN 2089-6867
e–ISSN 2460-9285

Aru ethnomathematics: Exploration of mathematical concepts in *Daret Damar Jan* game and its integration in mathematics learning in elementary school

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Received: Mar 22, 2025 | **Revised**: Dec 9, 2025 | **Accepted**: Dec 11, 2025 | **Published Online**: Jan 21, 2026

Abstract

Various research on traditional games has been reviewed in previous studies, including *layang-layang*, *congklak*, *galah panjang*, and *guli*. However, there has been no research on the *Daret Damar Jan* game. Previous research has only focused on exploring mathematical concepts in traditional games without integrating these concepts into mathematics learning at school. Therefore, this research aims to explore the mathematical concepts in the traditional game *Daret Damar Jan* and integrate them into mathematics learning in elementary schools. A descriptive exploratory method was used in this study. The participants in this study were 2 local cultural figures, 6 children of Dokabarat village, 1 teacher, and 22 second-grade students at a public elementary school. Data was collected through participatory observation, in-depth interviews, documentation studies, and concept understanding tests. The data were then analyzed using thematic and descriptive analysis. The results of the research indicate that the concepts of symbols, units, and arithmetic operations of natural numbers were found in the *Daret Damar Jan* game. The utilization of the *Daret Damar Jan* game as a learning resource can improve students' concept understanding of natural number counting operations material from 40.91% to 77.27% and is in the high category.

Keywords:
Aru culture, Conceptual understanding, *Daret Damar Jan*, Mathematics learning, Traditional games

How to Cite:
Labuem, S., Sa'dijah, C., Parta, I. N., & Sulandra, I. M. (2026). Aru ethnomathematics: Exploration of mathematical concepts in *Daret Damar Jan* game and its integration in mathematics learning in elementary school. *Infinity Journal*, *15*(1), 133-158. https://doi.org/10.22460/infinity.v15i1.p133-158

1. INTRODUCTION

Ethnomathematics as an interdisciplinary branch that combines mathematics and culture, has developed into an important field of study in recent decades. It seeks to bridge the gap between the mathematical concepts taught in schools and the mathematical practices that naturally grow in local cultures (Wiryanto et al., 2022). In an increasingly interconnected

global context, the relevance of ethnomathematics is more apparent, particularly in efforts to promote inclusive education that is grounded in socio-cultural realities (Sunzuma & Umbara, 2025). Indonesia, with its rich cultural diversity, offers great opportunities to explore mathematical concepts hidden in local traditions. However, this potential has not been fully utilized in formal education (Sa'dijah et al., 2021).

Grounded in the ethnomathematics framework that positions culture as a potential source of learning, the integration of local contexts into mathematics education becomes particularly important when applied in regions with limited access to formal education (Anwar, Sa'dijah, Fauzan, et al., 2024). This approach functions not only as an alternative pedagogical strategy but also as an adaptive response to disparities in learning resources across regions. In areas characterized by challenging geographical conditions and uneven educational infrastructure, such as the Aru Islands, the use of local cultural knowledge as a learning resource can provide a realistic and sustainable contextual solution. Therefore, ethnomathematics should not be viewed merely as a theoretical field of study, but as a practical approach capable of bridging limitations in learning resources while strengthening the meaningfulness of mathematics learning within local socio-cultural contexts (Wiryanto et al., 2022).

Aru Islands is one of the regencies in Maluku province, Eastern Indonesia. Based on Presidential Regulation Number 63 of 2020 concerning the determination of disadvantaged areas, the Aru Islands are categorized as a 3T area in Indonesia. 3T regions refer to areas classified as *Frontier*, *Outer*, and *Underdeveloped* regions in Indonesia, characterized by limited accessibility, lower levels of development, and restricted access to basic public services compared to other regions. Aru is an archipelago consisting of 187 islands. Based on observations conducted by researchers, it is known that as a 3T and island-based area, numerous challenges arise in the field of education in the Aru Islands, especially schools in remote villages located far from the district capital. Inadequate internet access, with some villages situated far from the district center being blank spot areas, remains a significant issue. The limited availability of textbooks for students is another ongoing obstacle (Labuem et al., 2025). These constraints on learning resources have an impact on student learning achievement directly (Fiantika et al., 2020).

In the Aru Islands, there is a lot of local culture but it has not been integrated into school learning to be utilized as a learning resource (Labuem et al., 2025). This challenge is not only relevant to the Aru Islands but also reflects a wider issue in many remote areas of Indonesia, where the national curriculum often does not fully reflect the realities of students' daily lives (Zana et al., 2024). This mismatch has the potential to hinder students' conceptual understanding and reduce the relevance of education for them (Suherman & Vidákovich, 2022). Therefore, there is an urgent need to bridge this gap by integrating elements of local culture into mathematics learning, especially in culturally unique areas such as the Aru Islands.

The Aru Islands were selected as one of the primary focuses of this study because the region represents an archipelagic context with rich cultural practices that remain actively embedded in the daily lives of the community, yet have received limited attention in mathematics education research. At the same time, the remote geographical conditions of the Aru Islands and the limited availability of educational facilities and learning resources in

schools render locally grounded, culture-based learning approaches not merely pedagogical alternatives, but practical necessities (Suryaningrum, 2023). By focusing on the Aru Islands, this study aims to contribute not only to the advancement of ethnomathematics research, but also to offer contextually relevant solutions to challenges in mathematics learning in archipelagic regions, particularly in enhancing the meaningfulness of learning and elementary students' conceptual understanding.

Although mathematics is regarded as a universal discipline, the way students understand and internalize mathematical concepts is strongly influenced by their cultural context and social environment. Based on the study conducted by Labuem et al. (2025), it was found that in the Aru Islands there exists a significant gap between the mathematics learning content taught in schools and the local cultural realities experienced by students in their everyday lives. This gap becomes even more apparent when students are exposed to mathematical concepts derived from contexts far removed from their experiences, which can result in superficial understanding and a lack of motivation to learn mathematics (O'Hara et al., 2022). One of the main problems faced is the lack of culturally relevant learning resources, which can connect mathematical concepts with local practices that students are familiar with (Hendriyanto et al., 2023). As a result, students often do not see the connection between the math they learn in school and their lives, potentially hindering their conceptual understanding (Umbara et al., 2023). Furthermore, this absence of cultural context in learning can also negatively affect the motivation of students, who feel that math lessons are not relevant to the real world (Turmuzi et al., 2024).

The problem faced by students in the Aru Islands is not only about difficulties in understanding mathematical concepts but also thes lack of bridging the connection of formal knowledge with knowledge that naturally develops in their culture (Kaliky & Labuem, 2025). Thus, this research aims to explore the mathematical concepts contained in the local culture of the Aru Islands community, namely the *Daret Damar Jan* traditional game, and then integrate these mathematical concepts into mathematics learning in schools. The traditional game *Daret Damar Jan* was selected as the object of this study because its structure inherently involves counting activities that align with fundamental arithmetic operations on natural numbers, such as addition, subtraction, grouping, and division. This game represents an authentic cultural practice of the Aru Island community that remains actively sustained and frequently played by children in their everyday lives. Beyond its mathematical relevance, the game is readily accessible, low-cost, flexible for adaptation as a learning medium, and rich in character-building values. Moreover, the limited academic documentation of this traditional game positions the present study as a contribution to both the preservation of local cultural heritage and the development of ethnomathematics-based approaches in mathematics education. Pellas and Mystakidis (2020) explains that many studies on ethnomathematics have remained at the exploratory stage and have not yet been integrated into instructional practices. Translating explorations of local cultural knowledge into mathematics learning materials and classroom implementation therefore becomes an important direction (Mosimege & Egara, 2023). By focusing on a culturally rich yet underrepresented context, this study aims to provide empirically grounded insights into the use of local culture as a relevant and effective learning resource for enhancing students' conceptual understanding of mathematics.

Although research on ethnomathematics has grown significantly in recent decades, in-depth studies on the integration of local culture into mathematics learning in remote areas are limited (Supahmi et al., 2022). Previous studies have shown the importance of contextualizing mathematics learning by incorporating elements of local culture to increase relevance and student understanding (Cervantes-Barraza & Araujo, 2023; Leton et al., 2025). However, most of these studies have focused on areas with better access to educational resources, while remote areas such as the Aru Islands have received less attention. Studies on ethnomathematics in Indonesia often center on major cultures such as Java, Bali, or Minangkabau, which have richer and more widely known cultural documentation (Deda et al., 2024; Kusuma et al., 2024; Nurcahyo et al., 2024; Nursyahidah et al., 2025; Utami et al., 2019). On the other hand, small and remote communities such as those in the Aru Islands tend to be overlooked, both in academic research and in practical applications in education. In fact, the Aru culture possesses a wealth of mathematical concepts that have yet to be fully explored. If integrated into the learning process, these cultural elements have the potential to enhance student engagement and deepen their understanding of mathematical concepts.

These shortcomings in the literature indicate a significant research gap, particularly in terms of how mathematical concepts in Aru Islands culture can be identified and applied in school mathematics learning. Without deliberate efforts to bridge this gap, students in remote areas such as the Aru Islands will continue to experience difficulties in linking mathematics learning to their life context (Mairing & Nini, 2023). This research aims to fill the gap by exploring and integrating local mathematical concepts from Aru Islands culture into school mathematics learning.

Conceptual understanding constitutes an essential foundation in elementary mathematics education, as it shapes how children construct meaning around numbers, arithmetic operations, and patterns encountered in their everyday lives. At the elementary school level, students are at a developmental stage that is particularly sensitive to concept formation; therefore, instruction that emphasizes procedural memorization without meaningful understanding risks leading to persistent misconceptions and limited transfer of knowledge to new situations (Supahmi et al., 2022). Within the context of Aru ethnomathematics, conceptual understanding becomes increasingly important when mathematical ideas are introduced through the traditional game *Daret Damar Jan*, as students are not merely solving problems but engaging with mathematical concepts through meaningful cultural activities. Such integration enables students to connect mathematical symbols and operations with concrete experiences in their environment, making learning more contextualized, culturally relevant, and supportive of deeper, more durable mathematical understanding aligned with students' cultural identities in elementary education.

This research offers a unique and significant contribution to the field of ethnomathematics and mathematics education in Indonesia, particularly in remote areas such as the Aru Islands. One novel aspect of this research is its focus on exploring ethnomathematics in the Aru culture, a community that has been largely untouched by previous research. This research seeks to fill this issue by investigating and incorporating indigenous mathematical concepts from the Aru Islands' culture into school mathematics instruction.The justification for this study is based on the importance of integrating local culture into mathematics

education, particularly in schools located in remote areas. By connecting mathematics to students' everyday life contexts, this approach is expected to enhance their learning motivation and conceptual understanding while also equipping them with the perspective to see mathematics as a dynamic and relevant aspect of their lives (Sa'diyah et al., 2024). In addition, this research also has the potential to provide guidance for educators and policymakers in designing a more inclusive and contextualized curriculum, which in turn can improve the overall education quality in Indonesia.

2. METHOD

2.1. Research Design

This research uses a qualitative approach with a descriptive exploratory method to explore and document the mathematical concepts contained in the *Daret Damar Jan* traditional game and then integrate these traditional games into mathematics learning at school. This research was conducted in Dokabarat village, in the Aru Islands which still preserves the local game *Daret Damar Jan*. The selection of this location was based on the authenticity and continuity of the cultural practice in the daily life of the local community. Participants were purposively selected in line with the aims of the study, namely to gain an in-depth understanding of the traditional game *Daret Damar Jan* and its implementation in elementary mathematics instruction to support students' conceptual understanding. The participants in this study consisted of:

a. Two local cultural figures who are indigenous and long-term residents of Dokabarat Village, possessing in-depth knowledge of the traditional game *Daret Damar Jan*, including its meanings, rules, philosophical values, and historical significance.
b. Six children, coded as A1, A2, A3, A4, A5, and A6, were involved in the game exploration phase. These children were intentionally selected from the same grade level based on considerations of comparable cognitive development and mathematics learning experiences, the suitability of small-group social interaction in accordance with the characteristics of the *Daret Damar Jan* game, and the feasibility of conducting in-depth observations of students' mathematical thinking processes and character values emerging during gameplay.
c. One Grade 2 mathematics teacher was involved to provide insights into students' initial characteristics and the continuity of prerequisite content, to assist in validating the alignment of the instructional content with students' developmental stages, and to support the smooth implementation of the study through classroom facilitation and observation of the teaching learning process.
d. Twenty two Grade 2 students participated in this study. All students in the class were involved because the study focused on the implementation of ethnomathematics-based instruction within an authentic classroom setting; thus, engaging an intact class allowed for a holistic, natural, and contextual examination of students' conceptual understanding without introducing selection bias. Furthermore, these students were at the concrete operational stage of development, in which mathematical concepts are most effectively constructed through concrete and contextual activities aligned with the characteristics of

the *Daret Damar Jan* game. In addition, Grade 2 students had already been introduced to basic number concepts and arithmetic operations and were members of the local cultural community, thereby enabling an authentic and developmentally appropriate integration of ethnomathematics to support conceptual understanding.

The research site, namely IP Elementary School, was selected because it is situated within a community that continues to actively preserve the traditional game *Daret Damar Jan*, thereby providing an authentic and rich context for exploring the integration of local culture into mathematics learning. Accordingly, the school was positioned as an information rich case to obtain in-depth understanding rather than for the purpose of broad generalization. With regard to ethical considerations, prior to data collection the researcher obtained permission from the school and the participating teacher, consent from students' parents or guardians, and verbal assent from the students (child assent). The school also granted permission for the institution's identity to be disclosed in the publication, while the identities of all individual participants were anonymized using codes to ensure confidentiality and protect participants' privacy in accordance with educational research ethics principles.

2.2. Instrument

This study employed four main research instruments: participatory observation, in-depth interviews, document analysis, and a conceptual understanding test, which were used selectively in accordance with the research objectives and the characteristics of the participants. Participatory observation was conducted to identify mathematical concepts emerging from the *Daret Damar Jan* game and to examine its implementation in instructional settings, involving child players, Grade 2 students, and the classroom teacher. In-depth interviews were used to explore cultural meanings, game rules, and pedagogical perspectives, and were conducted with local cultural leaders, the classroom teacher, and a selected number of students representatively. Document analysis was employed to complement and verify observational and interview data through the examination of cultural artifacts and instructional materials. Meanwhile, the conceptual understanding test was administered exclusively to Grade 2 students to assess their mathematical concept understanding after the *Daret Damar Jan* game was integrated into classroom instruction. Through this targeted use of instruments, the collected data comprehensively represent cultural, pedagogical, and student learning dimensions.

2.3. Data Collection

To address the research objectives, three types of data were required, consistent with the exploratory and integrative nature of this study. First, ethnographic data were collected to identify mathematical concepts embedded in the traditional game *Daret Damar Jan*, including observational data of gameplay processes and interview data with cultural leaders concerning the game's history, meanings, rules, philosophical foundations, and historical values. Second, pedagogical data were gathered to examine the process of integrating the *Daret Damar Jan* game into elementary mathematics instruction, obtained through teacher interviews and classroom observations. Third, student learning outcome data, consisting of conceptual

understanding test results and students' interview responses, were used to assess the impact of the game's integration on students' conceptual understanding. Together, these three data types enabled a comprehensive analysis of the cultural, pedagogical, and learning dimensions within the ethnomathematics study conducted in the Aru Islands. To obtain these data, participatory observation, in-depth interviews, and conceptual understanding tests of mathematics content were employed as the primary data collection techniques.

2.4. Data Analysis

Data analysis was conducted in an integrated manner in accordance with the objectives of ethnomathematical exploration and its integration into instruction. Data from participatory observations and interviews were analyzed using thematic analysis, involving transcription, coding, and theme categorization to identify mathematical concepts emerging from the *Daret Damar Jan* game. Documentary data were analyzed through content analysis to strengthen understanding of the game's cultural context and to support the mapping of relevant mathematical concepts. Classroom observation data and interviews with teachers and students were analyzed to examine the process of integrating the game into mathematics instruction. Furthermore, data from students' conceptual understanding tests were analyzed descriptively by comparing pre- and post-instruction scores, supported by source and method triangulation to ensure the trustworthiness of the research findings.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Exploration of *Daret Damar Jan* Traditional Game

Based on in-depth interviews with two local cultural figures from Dokabarat Village, a comprehensive understanding was obtained that the *Daret Damar Jan* game is a traditional practice that has been passed down across generations and constitutes an integral part of children's social life in the Aru Islands. The informants explained that the game is played using damar seeds arranged on *gaba-gaba* according to specific rules, without the use of manufactured tools, thereby reflecting the close relationship between the Aru community and their natural environment.

Both cultural leaders explained that damar is the name for candlenuts in Aru language. The word *daret* in Indonesian means throwing (in English), which is the activity of throwing *damar* fruits placed on *gaba-gaba* (fronds of *sagu* tree branches) using *gilgelur* (a piece of wood used for throwing). The word jan refers to a collection of *damar* fruits. Thus, *Daret damar jan* means throwing damar fruits. According to local cultural figures in Dokabarat Village, the traditional game *Daret Damar Jan* has been played by children in the village for generations and continues to this day. They also explained that for the people of Dokabarat, *damar* and *gaba-gaba* (palm midrib) serve as symbols of lighting and survival. Historically, *damar* oil was used as a source of light at night, while *damar* itself has also been utilized as a cooking ingredient and traditional medicine. Due to its various practical applications, *damar* holds economic value and can be traded. This economic and cultural significance has

contributed to the continued preservation of the *Daret Damar Jan* game. In addition, *damar* fruit can be used as a cooking spice and traditional medicine.

Therefore, damar has economic value because it can be traded. This is one of the reasons why the *Daret Damar Jan* game is still preserved today. *Sagu*, which is the staple food of the Dokabarat village community, is useful for survival, which must be maintained and preserved by the Dokabarat village generation. The sacred meaning contained in damar and *sagu* then encourages the people of Dokabarat village to continue to introduce *damar* and *sagu* to every generation of Dokabarat village through the *Daret Damar Jan* game and the preservation of *sagu* as a staple food.

The two cultural leaders also highlighted the philosophical meanings embedded in the *Daret Damar Jan* game. The game reflects values of order, balance, and responsibility, as each player is required to adhere to shared rules and accept the consequences of the decisions made. Within the context of traditional Aru society, *Daret Damar Jan* functions as a medium for intergenerational knowledge transmission, through which children learn by observing and imitating older members of the community. Values of togetherness, sportsmanship, and honesty are strongly emphasized, as the game is typically played in groups and relies on mutual trust among players in counting and acknowledging the final outcomes. Figure 1 shows the elements of the *Daret Damar Jan* game, namely the *damar* fruit, *gaba-gaba*, and *gilgelur*.

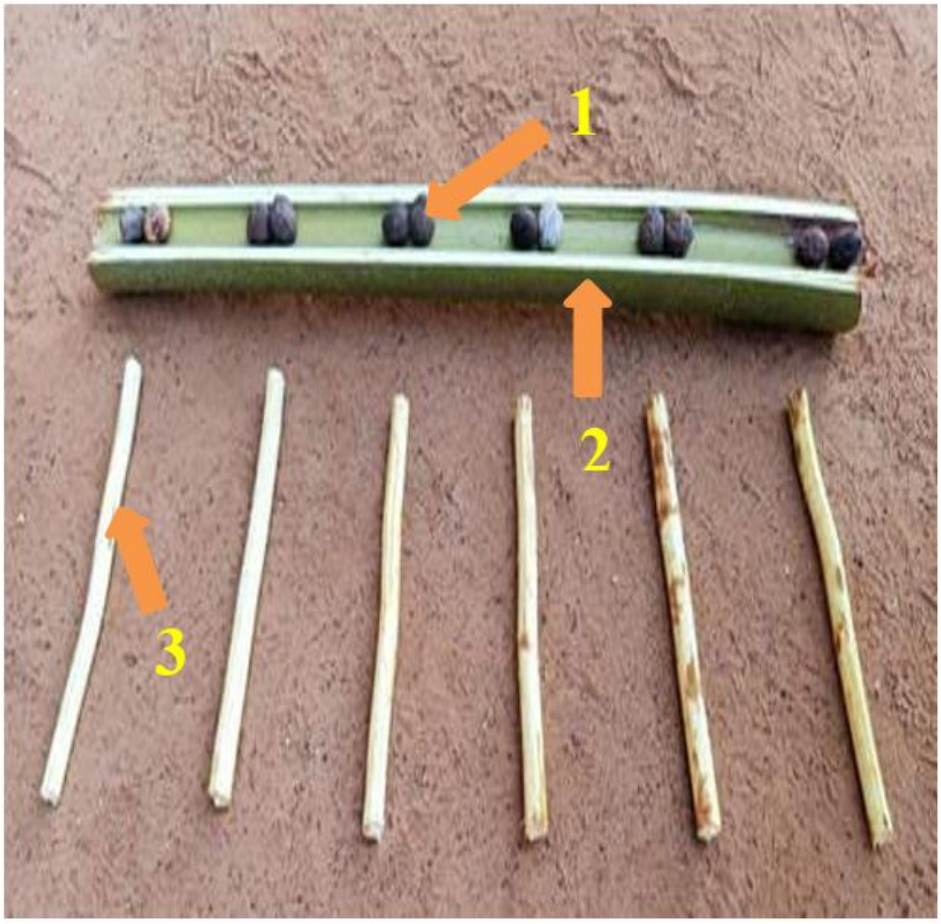

Figure 1. (1) *Damar*, (2) *Gaba-gaba*, and (3) *Gilgelur*

To play the game *Daret Damar Jan*, each player first prepares their *damar* and agrees on the number of *damars* to be placed on the *gaba-gaba*, a step known as "*pasang pot*." The player whose *gilgelur* lands farthest from the *gaba-gaba* will go first, while the one whose *gilgelur* lands closest will go last. The researcher instructed A1, A2, A3, A4, A5, and A6 to play *Daret Damar Jan* following the established rules and procedures. First, they agreed on a *pasang pot* of 2. Each player then took 2 *damars* from what they had and placed them on the *gaba-gaba*, forming six groups, with each group consisting of 2 *damars*. Based on interviews with A1, A2, A3, A4, A5, and A6, it was found that they were accustomed to arranging the *damars* this way, as it signified ownership of the pieces. Figure 2 illustrates A1, A2, A3, A4, A5, and A6 placing their *damars* as part of the *pasang pot* on the *gaba-gaba*.

Figure 2. The child is placing the *damar* on top of the *gaba-gaba*

Based on the observation, it is known that during the installation of *pot* 2, there were two ways that A1, A2, A3, A4, A5, and A6 placed the *damar* on the *gaba-gaba*, namely (1) placing the *damar* one by one according to the agreement to install *pot* 2, and (2) placing two *damar* at once on the *gaba-gaba*.

After A1, A2, A3, A4, A5, and A6 set up the *pot* by placing the *damar* on top of the *gaba-gaba*, they then stood behind the *gaba-gaba* and threw their *gilgelur* into the large field area in front of the *gaba-gaba* to determine the order of throwing. The player whose *gilgelur* is furthest from the *gaba-gaba* is the child who gets the first chance to throw the *gaba-gaba*. The child who succeeds in throwing the *gaba-gaba* so that all the *damar* falls is declared the

winner. The winning child will be the owner of all the *damar* that has fallen from the *gaba-gaba*. Based on the results of interviews with A1, A2, A3, A4, A5, and A6, it is known that throughout their experience playing *Daret Damar Jan*, when the *gaba-gaba* is successfully thrown, all the *damar* on top of the *gaba-gaba* will fall. This is because the bottom of the *gaba-gaba* is semi-circular and the surface of the *gaba-gaba* is slippery, so when it is thrown and impacted, the position of the *gaba-gaba* will tilt and cause all the *damar* on top of the *gaba-gaba* to fall. The top of the *gaba-gaba* is concave and flanked by a pair of parallel sides, so that the *damar* does not fall when placed on the *gaba-gaba*.

A5 was the winner in the toss. The researcher asked A5 about the amount of *damar* he got. A5 then counted by adding up one by one the *damar* that fell from the *gaba-gaba*. After all the *damar* was added up, A5 said that the *damar* that fell was 12. The activity of calculating the number of *damar* by A5 can be written in mathematical symbols, namely 1+1+1+1+1+1+1+1+1+1+1+1=12. Besides A5, A3 also counted the number of *damar* that fell from the *gaba-gaba* by grouping. Each group consisted of 2 *damar*. A3 added two *damar* then added two more *damar*, and so on until all the *damars* that had fallen from the *gaba-gaba* were added up. After all the damar was added up, A3 mentioned that the *damar* that A5 got as the winner was 12. The activity performed by A3 can be written in mathematical symbols, namely 2+2+2+2+2+2=12.

Next, the researcher asked A1, A2, A3, A4, A5, and A6 to continue the game in a new round with the agreement to install *pot* 3 and still apply the same methods and rules of the game. The purpose of the researcher asking to set up *pot* 3 was to observe how A1, A2, A3, A4, A5, and A6 set up *pots* with an odd number of *damar*. Figure 3 shows the damar that A1, A2, A3, A4, A5, and A6 had placed on the *gaba-gaba* based on the researcher's request for *pot* 3.

Figure 3. *Damar* placed on a *gaba-gaba* with 6 players and pairs of *pot* 3

Based on the observation results, it is known that during the installation of *pot* 3, there were three ways of installing the *pots* carried out by A1, A2, A3, A4, A5, and A6, namely (1) placing one *damar* after another on the *gaba-gaba*, (2) placing two *damar* on the *gaba-gaba* then placing another one *damar*, and (3) placing three *damar* at once on the *gaba-gaba*. There are symbolic concepts in the activity of installing *pots*, namely (1) 1+1+1 represented in the form of the action of combining one *damar* with one *damar*, (2) 2+1 represented in the form of the action of combining two *damar* with one *damar*, and (3) the number 3 represented in

the form of the action of placing three *damar* at once on the *gaba-gaba*. In addition to the concept of symbols in the potting stage, there is also the concept of counting operations, namely simple addition, which is expressed in symbols, namely 1+1+1=3 and 2+1=3.

The researcher then asked A1, A2, A3, A4, A5, and A6, about the total number of *damar* that had been installed as *pots*. A5 counted by adding the *damar* one by one until it was finished. The activity carried out by A5 can be written in mathematical symbols, namely 1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1=18. A3 calculates by adding 3 *damar* repeatedly 6 times. The way A3 calculates can be written in mathematical symbols, namely 3+3+3+3+3+3=18. The way A3 calculates shows that A3 utilizes the arrangement of *damar* fruits on the *gaba-gaba* based on the number of *pots* installed by each player.

In addition to A5 and A3, A2 also calculated the total number of *damar* installed as a *pot* by applying the multiplication operation, namely 6×3. A2 utilized the information he received visually, namely, there were 6 groups of *damar* with each group consisting of 3 *damar*, so to find out the total number of *damar* can be done by calculating the result of 6×3. The multiplication operation performed by A2 originated from his understanding that if there are 6 players with 3 *pots*, then the total number of *damar* can be known by adding 3 *damar* 6 times. A2's argument can be expressed in the symbol 3+3+3+3+3+3=6 x 3=18. A2 argued that 3 *damar* that were added 6 times could be expressed in the form of multiplication 6×3 and also 3×6. A2's argument was based on the multiplication result obtained was the same, namely 18. Based on this finding, it was known that A2 understood that repeated addition of the same number could be expressed in multiplication. However, the concept of multiplication built-in A2's mind is still incorrect.

The researcher then asked A1, A2, A3, A4, A5, and A6 to continue the game. At the time of throwing, A4 was the winner. The researcher then asked the subjects to gather and then conducted an interview about how they divided 18 *damar* into 3 people. Based on the results of interviews between researchers with A1, A2, A3, A4, A5, and A6, it is known that A4 distributed the 18 *damar* he got to 3 people by giving one *damar* to each person repeatedly until the *damar* ran out. A4's activity in performing division operations through repeated subtraction of the same number can be written in mathematical symbols, namely 18-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1=0. When performing the division operation, A4 applies a simple way of counting, namely by using the smallest units.

3.1.2. Integration of *Daret Damar Jan* Game in Primary School Mathematics Learning

Based on the exploration results, it is known that in the *Daret Damar Jan* game there are concepts of symbols, units, and arithmetic operations of addition, subtraction, multiplication, and division of natural numbers. Thus, the *Daret Damar Jan* game can be utilized as a learning resource for grade 2 elementary school students.

The traditional game *Daret Damar Jan* contains several elements that are relevant to elementary mathematics education, including the use of concrete symbols, counting units, and basic operations on natural numbers. These elements emerge through activities such as counting, grouping, and comparing *damar* fruits during gameplay, thereby providing opportunities to connect the game with mathematics content outlined in the elementary school

curriculum. Such integration not only enriches instructional approaches but also contributes to the preservation of local cultural heritage.

After exploring the *Daret Damar Jan* game, the researcher then conducted an interview with the second grade teacher of ID elementary school to gather information about the learning resources used by the teacher in teaching the arithmetic operation of natural numbers and also the learning outcomes of second grade students after learning the material. Based on the results of the interview, it is known that so far, the teacher has not used concrete examples or concrete objects around students as learning resources, including the *Daret Damar Jan* game. The teacher explained that students still have difficulties understanding the arithmetic operation of natural numbers. This information was supported by the students' initial test results, which were only 9 out of 22 students or around 40.91% of students who had high concept understanding abilities. The researcher then developed an ethnomathematics-based contextual learning strategy to integrate the concepts of symbols, units, and counting operations of natural numbers into mathematics learning in the classroom by utilizing the *Daret Damar Jan* game as a learning resource. The following is a description of the integration of the *Daret Damar Jan* game into mathematics learning in class 2 of ID elementary school which was carried out in 4 meetings.

Meeting I: Addition Operation of Original Numbers

The integration of the *Daret Damar Jan* game to teach the material of natural number addition operations which includes the concepts of symbols, units, and calculations to students is carried out in 3 stages, namely preparation, implementation, and closing.

a) Preparation Stage

In the preparation stage, researchers formulated learning objectives, namely (1) students were able to use concrete symbols (*damar*) to represent numbers, (2) students were able to perform addition operations by combining units in the game, and (3) students were able to explain the concept of addition based on the results of the game. After that, researchers provided game media in the form of *damar* fruits and also researchers prepared question cards and student worksheets for students to use in recording the results of addition in the game. The researcher then designed game-based activities integrated with local culture-based learning steps.

b) Implementation Stage

First of all, the researcher provided motivation by explaining the importance of addition operations in everyday life, for example in calculating the number of items or game scores. The researcher also provided an apperception by asking the question "If you have 5 *damar* and your friend gives you 3 more *rosin*, how many *rosin* do you have in total?". The researcher connected students' daily activities with the concept of addition. The researcher explained that students would learn the addition operation through the *Daret Damar Jan* game by using concrete objects, namely *damar* as a learning medium.

The researcher introduced to the students that each *rosin* has a symbolic value as a natural number, for example, 1 *damar* = 1 point, 2 *rosins* = 2 points, and so on. The researcher

pointed out that combining damar can be used to calculate the total number of *damar*. For example "if I have 2 *rosins*, then I add 3 more *rosins*, how many *damar* will I have in total?" The researcher pointed out that the act of combining the *damar* can be represented using the symbol 2+3=5. The symbol "+ " is used to indicate that two groups of *damar* are combined and the symbol = indicates the final result. The researcher also introduced the concept of units used in the game, e.g. each bundle of 10 *damar* is considered as one bundle. The researcher then gave an example, namely "If you have 15 *damar*, how many bundles and remaining *damar* do you have?"

The researcher then divided the students into small groups and gave *damar* to each group. Each group played the *Daret Damar Jan* game with a scenario prepared by the researcher, namely: (1) on the first turn, each group obtained 4 *damar*, (2) on the second turn, each group obtained 6 more *damar*, and (3) students added up all the *damar* obtained. Furthermore, the researcher asked students to record the sum results of each turn of the game. The researcher also challenged students to predict the amount of *damar* before counting using the *damar*. After the game was over, students were led to discuss. The questions given by the researcher during the discussion were (1) how did you calculate the total amount of *damar*? and (2) what did you learn from the addition process in this game?

c) Closing Stage

The researcher together with the students summarized the learning outcomes. The researcher connects the concept of addition to everyday life. The researcher then evaluates by giving game-based story problems and also non-play-based story problems, namely (1) if your group gets 7 *damar* in the first turn and 5 *damar* in the second turn, how many *damar* do you have? and (2) In the garden there are 10 chickens. Then 7 ducks came to the garden. How many animals are there in the garden? Students were asked to write their answers on a sheet of paper prepared by the researcher.

Meeting II: Subtraction Operation of Original Numbers

The following is a description of the structured steps applied by researchers to integrate the *Daret Damar Jan* game to teach the material of natural number subtraction operations to the second grade elementary school students.

a) Preparation Stage

At this stage, the researcher formulated the learning objectives, namely (1) students are able to understand the concept of subtraction of natural numbers, (2) students are able to use the symbol "- " in the context of the game, and (3) students are able to apply subtraction in a concrete context. The researcher then prepared *damar* fruits to be used as learning media. The researcher also designed student worksheets to be used in recording subtraction results. Researchers designed problem cards containing subtraction operation problems. The researcher modified the game by changing the game scenario, for example, if there were 18 *damar* on top of the *gaba-gaba*, at the time of throwing, only 12 *damar* fell, how much *damar* was left on the *gaba-gaba*?

b) Implementation Stage

The researcher explained that the symbol "-" is used to represent subtraction or the removal of some *damar*. To illustrate this concept, the researcher provided a concrete example using *damar* as a representation of numbers. For instance, if a student has 15 *damar* and removes 4, the remaining number of *damar* is 11. When expressed using symbols, this is written as 15-4=11. Next, students were asked to practice a subtraction activity: "Start with 8 *damar*, then take away 2 more, and count how many are left." The researcher emphasized that each time a *damar* is removed (subtracted), the action is recorded using the subtraction symbol "-", for example, 8-2=6. The students' calculation process and results were recorded on worksheets prepared by the researcher.

The researcher also introduced the concept of units to students, namely 1 *damar* = 1 unit, and 10 *damar* = 1 bundle (tens). The concept of units helps students understand the concept of grouping *damar* into certain units to facilitate calculation (Sa'dijah et al., 2021). The researcher then gave an exercise of dividing into units, for example, there were 15 *damar* and the researcher asked students to divide it into 1 bundle (10 *damar*), and then asked students to calculate the number of *damar* remaining.

The researcher directed students to collect *damar* in 3 rounds of the game using a game simulation. The number of *damar* obtained in each round was 6, 12, and 18 *damar*. Students were then asked to answer the questions on the question card. If the answer is wrong once then the student must subtract 3 *damar*. The researcher started with simple subtraction (unit numbers). The researcher then continued with subtraction involving tens and grouping. Students were directed to calculate the number of *damar* bundles formed if 6 *damar* were taken from the collection of *damar* that had been obtained in rounds I, II, and III. After the game was over, the researcher guided the students in a group discussion to discuss how the students performed the calculations. The researcher asked the students to explain their strategy for performing the subtraction operation.

c) Closing Stage

The researcher conducted a learning evaluation by giving game-based questions, and questions that were not game-based, namely (1) in the *Daret Damar Jan* game, team A initially had 18 points. After losing one round, they lost 7 points. How many points are left for team A? and (2) Roy has 40 pages of books to read. Today, Roy has already read 12 pages. How many more pages does Roy have to read? Students were asked to write their answers on the sheet of paper prepared by the researcher.

Meeting III: Multiplication Operations of Numbers

The following is a description of the structured steps designed and implemented by researchers to integrate the *Daret Damar Jan* game to teach natural number multiplication operation material to second grade elementary school students.

a) Preparation Stage

The researcher formulated the learning objectives, namely (1) students are able to understand the basic concept of multiplication as repeated addition, and (2) students can solve

multiplication problems using a concrete approach. Furthermore, researchers prepared game media, namely *damar* fruits. Researchers also designed student worksheets to record the results of multiplication, and researchers prepared question cards containing questions about multiplication material according to the ability level of students. Researchers determine the rules of the game that support the concept of multiplication, for example, counting the number of *damar* by group (multiplication representation).

b) Implementation Stage

The researcher introduced the symbols and concepts of the multiplication operation to the students by guiding the students to use the group of *rosin* as a visualization. For example, "each group has 2 *damar*, if there are 5 groups, add up all the *damar* to get the result. Students are directed to draw the group according to the example given earlier. The researcher then showed how to calculate the number of *damar* by expressing it symbolically, namely, 2+2+2+2+2=5 x 2. Symbols are used to help students understand mathematical notation in performing certain mathematical operations (Brezovszky et al., 2019). The researcher explained that the symbol "×" is a symbol that points to the multiplication operation. The researcher guided students to complete the multiplication operation by applying the concept of repeated addition operations of the same number. This aims to make students understand that multiplication is the opposite of addition. In addition to the concept of symbols, researchers also introduced the concept of units to students by leading students to represent numbers using *damar*. For example, 1 *damar* = 1 unit, 10 *damar* = 1 group (tens). The unit system helps students understand the concept of multiplication in certain groupings (Bortot et al., 2021).

The researcher designed a game scenario where each group had to collect 3 *damars* per turn and determine how many *damars* would be collected after 4 turns. The students played the game according to this scenario while recording the number of *damars* they gathered. To help them understand the concept of multiplication 4×3=12 they were asked to group the *damars* accordingly. The researcher guided them in calculating the total using multiplication and relating it to addition: 4 x 3=3+3+3+3=12. Afterward, the researcher encouraged deeper thinking by asking a reflective question: "What is a faster way to count the total number of *damars* without adding them one by one?

c) Closing Stage

The researcher explained the importance of applying multiplication in everyday life, such as calculating the number of items or scores in various games. To assess students' understanding, the researcher provided word problems related to division, incorporating both game-related and real-life contexts. The problems included: (1) In the game *Daret Damar Jan*, each player uses 3 *damar* to play. If there are 8 players, how many *damar* are used in total? and (2) A mother has 6 boxes of cookies, with each box containing 10 cookies. How many cookies does she have in total?. Students were asked to write their answers on worksheets prepared by the researcher.

The researcher explained the importance of applying multiplication operations in everyday life, such as calculating the number of items or scores in other games. The researcher

then evaluates the learning by giving story problems related to the division operation but using the context of the game and the context outside the game, namely (1) In the *Daret Damar Jan* game, each player uses 3 *damar* to play. If there are 8 players, how much total *damar* is used in the game? and (2) Mom has 6 boxes of cookies, and each box contains 10 cookies, how many cookies does mom have in total?" Students were asked to write their answers on a sheet of paper prepared by the researcher.

Meeting IV: Division Operations of Natural Numbers

The following is a description of the structured steps designed and implemented by the researcher to integrate the *Daret Damar Jan* game to teach division operations of natural numbers to second grade elementary school students.

a) Preparation Stage

In the preparation stage, the researcher formulated the learning objectives, namely (1) students are able to represent numbers with symbols through games, (2) students are able to divide unit objects into equal groups, and (3) students are able to solve division problems using game strategies. Furthermore, the researcher prepared the object of the game, namely *damar* fruits. The researcher also made question cards and prepared student worksheets.

b) Implementation Stage

The researcher motivated the students by explaining how the *Daret Damar Jan* game is relevant to the concept of division. The researcher gave an apperception, namely "how to divide 12 *damar* evenly into 4 groups? What happens if the numbers are not the same?" The researcher explained that the learning would focus on understanding the concept of division using games. The researcher then guided students to understand the concept of symbols by using *damar* as a concrete object. For example, there are 12 *damar*, then the researcher explains that each *damar* represents one unit. Students are asked to divide the *damar* into 4 groups evenly, how many *damar* received by each group?. Students are directed to write the process and the final result in mathematical symbols, namely 12:4=3

The researcher created a game scenario in which each group had to collect 3 *damar* per turn and determine the total number of *damar* collected after 4 turns. The students played the game according to this scenario while recording the number of *damar* they obtained. To help them grasp the concept of multiplication (4×3) they were asked to group the *damars* accordingly. The researcher guided them in calculating the total using multiplication and relating it to addition: 4×3=3+3+3+3=12. Finally, the researcher posed a reflective question: “What is a faster way to count the total number of *damars* without adding them one by one?”

The researcher then conveyed the next game scenario, which is that in one turn, a player must divide 17 *damar* to 5 other players equally. Students were asked to calculate the amount of *damar* each player received. The researcher guides students to perform the division operation and relates it to the subtraction operation to show division as repeated subtraction of the same number until it reaches zero. Students perform division directly using *damar* as a concrete object. Next, the researcher introduces the concept of the remainder in the division, for example, 17 ÷ 5 the result is 3 with a remainder of 2. After that, the researcher guides

students to discuss by asking questions, namely (1) how do you divide the *damar* evenly? and (2) what happens if the *damar* cannot be divided evenly?

c) Closing Stage

The researcher together with the students summarized the concept of division of natural numbers learned through the game, including (1) division is the process of dividing something into groups evenly, and (2) in the *Daret Damar Jan* game, the division operation is carried out when we divide the *damar* to several players. The researcher then conducted evaluation and feedback by giving story problems that were not related to the *Daret Damar Jan* game, namely (1) Mr. Anton has 20 mangoes. He wants to put the mangoes into 5 baskets with the same number. How many mangoes are in each basket? and (2) Delila has 27 books. She wants to arrange the books into 6 shelves with the same number of books. How many books will be on each shelf? Students were asked to write their answers on the sheet of paper prepared by the researcher.

3.2. Discussion

In the stage of pasang *pot*, there is the concept of mathematical symbols, namely one *damar* represents the number 1, two *damar* represents the number 2, and so on. The symbol "+" is represented in the form of the action of combining several *damar* which points to the addition operation. To get two pieces of *damar* as agreed by the pasang *pot*, A1, A2, A3, A4, A5, and A6 use a simple calculation strategy of adding one piece of *damar* to another, which can be expressed in the symbol 1+1=2. The symbol "=" indicates the final result. Thus, the act of combining one *damar* with one other *damar* to get two *damar* can be expressed in the mathematical symbol 1+1=2. Based on the findings in this observation, it is known that in the stage of pasang *pot*, in addition to the concept of mathematical symbols, there is also the concept of counting operations for the addition of natural numbers. This finding is related to the theory of cognitive development according to Jean Piaget, namely elementary school children, aged 7-11 years, are at the stage of concrete operations, where they begin to understand logical concepts but still need real objects or concrete examples (Alharbi, 2022). The real object used by A1, A2, A3, A4, A5, and A6 in this game is *damar* fruit. Activities A1, A2, A3, A4, A5, and A6 in the pairs of *pots* stage are closely related to mental process theory, i.e. primary school children are still developing their working memory capacity. Repeated addition helps them process information gradually to reduce cognitive load by breaking down big problems into smaller steps that are easier to manage (Sa'diyah et al., 2024).

After the *pots* are set up, the *damar* fruits placed on the *gaba-gaba* are thrown at. The fruits that fall from the *gaba-gaba* are considered the winner's possessions. This activity embodies mathematical concepts, particularly related to counting and quantifying the number of *damar* fruits that fall from the *gaba-gaba*. In addition to the concept of symbols at the stage of calculating the results of throwing, there is also the concept of units, namely one *damar* represents 1 unit or 1 value. Each *damar* has a numerical value of 1, so a grouping of unit values can be made, for example 10 *damar* represents 1 bundle. This finding relates to Bruner's theory that games can provide opportunities for children to interact with abstract concepts

through visual representations (iconic) and direct experience (inactive). Games can involve roles, symbolic representations, or even real-world-like systems (Purnomo et al., 2023).

The way A1, A2, A3, A4, A5 and A6 calculated the amount of *damar* they threw was by using the smallest units. A1, A2, A3, A4, A5, and A6 use a very simple strategy, which is to add the number 1 repeatedly and also add the number 2 repeatedly. This way of calculating is related to the theory of constructivism according to Lev Vygotsky, namely repeated addition is always done by elementary school children because they try to solve problems with the most easily understood strategy, namely repeating the addition process one after another (Sa'dijah et al., 2021).

Based on the findings at the stage of calculating the results of throwing, it is known that in the *Daret Damar Jan* game, there is not only the concept of repeated addition but also the concept of successor. A successor is a number that is one unit larger than the given number (Untu et al., 2020). The successor of the numbern is n+1. In other words, a successor is the addition of one unit of a given number (Sa'dijah et al., 2020). In the context of the addition operation of natural numbers in the *Daret Damar Jan* game, a successor can indicate the next number by adding 1 to the known number, for example, the successor of 4 is 5 because 4+1=5.

The children's activity of counting the *damar* fruits by repeatedly adding equal quantities indicates that they make use of the arrangement of the *damar* fruits on the *gaba-gaba*, which is organized according to the players' *pots*. This finding relates to Bruner's theory that games can provide opportunities for children to interact with abstract concepts through visual representations (iconic) and direct experience (inactive). Games can involve roles, symbolic representations, or even real-world-like systems (Purnomo et al., 2023). In addition to applying repeated addition with an equal number of *damar* fruits, the children also applied multiplication by drawing on their understanding of repeated addition. This was evident when a child stated that the expression 3+3+3+3+3+3=6×3=18. This finding shows that in the stage of calculating the number of *damar* installed as a *pot*, there is the concept of multiplication operation which is the inverse of the addition operation (Titikusumawati et al., 2020).

Subsequently, the researcher guided the children to distribute 18 *damar* fruits equally among three children. The children carried out the division process through repeated subtraction of equal units, which can be represented symbolically as 18-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1=0. The children stated that the quotient represents the number of *damar* fruits received by each child. This finding shows that A4 understands that the word "divide" is the same as subtracting the same number repeatedly until it reaches (Sa'dijah et al., 2021). The division operation is performed by applying the principle of subtraction operation showing that division is the inverse of subtraction (Anwar, Sa'dijah, Murtafiah, et al., 2024).

The subtraction operation performed by A4 is not only related to counting operations but also relates to the concept of predictors. A predecessor is a number that is one unit smaller than the given number (Vogel & De Smedt, 2021). In natural numbers, the predecessor of *n* is *n-1* (Zayyadi et al., 2020). In the context of subtraction operation of nsatural numbers in *Daret Damar Jan* game, predecessor can indicate the previous number by subtracting 1 from the known number, for example, the predecessor of 4 is 3 because 4-1=3. Based on the results of the exploration, it was found that in the *Daret Damar Jan* game, there are concepts of symbols, units, successors, predecessors, and arithmetic operations which include addition, subtraction,

multiplication, and division of natural numbers. Based on the distribution of mathematics materials in the curriculum implemented in Indonesia, the concepts of symbols, units, and arithmetic operations of addition, subtraction, multiplication, and division of nastural numbers are materials taught to grade 2 elementary school students (Sa'dijah et al., 2021). Thus, it is important to integrate the mathematical concepts contained in the *Daret Damar Jan* game into mathematics learning in elementary schools.

Following exploration and analysis of the *Daret Damar Jan* traditional game, it was identified that the game inherently involves mathematical concepts related to symbols, units, and operations on natural numbers. This finding is in line with Sa'dijah et al's opinion, namely around students there are many objects, objects, and daily activities which, if studied more deeply, have a relationship with mathematics (Syawahid et al., 2020). In accordance with the curriculum implemented in Indonesia, the material for counting operations of natural numbers is material for grade 2 elementary school students (Sa'dijah et al., 2021). Therefore, the researchers subsequently conducted interviews with second-grade elementary school teachers in the village to explore whether this traditional game had previously been integrated into classroom learning and to examine the profile of students' conceptual understanding of natural number operations. The interview results revealed that the game had never been utilized as a learning resource. Moreover, operations on natural numbers were identified as one of the topics perceived as difficult by students, as indicated by their relatively low level of conceptual understanding. Consequently, the researchers designed an integration strategy to connect concepts of symbols, units, and natural number operations through the use of the *Daret Damar Jan* game. This integration plan was based on the findings Bistari et al. (2024) namely that activities around students that are closely related to mathematics can be used as learning resources. The use of traditional games as local wisdom–based learning resources is also consistent with the findings of Suherman and Vidákovich (2022), who reported that mathematics learning is often perceived as abstract by students and therefore requires contextual and interactive approaches. One innovative way to address this issue is by utilizing traditional games as learning resources (Turmudi et al., 2021).

The integration of the *Daret Damar Jan* game into mathematics learning in elementary schools is consistent with Zoltan Dienes' theory of learning mathematics. Students can understand math concepts better through 4 stages, namely concrete experience, visual representation, symbolism, and abstraction (Ramos et al., 2024). In the concrete experience stage, students learn through the manipulation of real objects first before understanding abstract concepts (Abuhassna et al., 2024). Students calculate the amount of *damar* won by manipulating real objects. This activity introduces students to natural numbers and basic operations, namely addition, subtraction, multiplication, and division. The next stage is visual representation, which is the stage where students are introduced to images to visualize concepts (Matiti, 2024). Students are asked to draw a group of *damar* in a box. This activity aims to help students understand the concept of grouping as the basis of multiplication. The third stage is the symbolic stage. At this stage, students can use mathematical symbols to represent concepts, for example, "If 12 *damar* is divided into 4 groups, each group gets 3 *damar*", thus, it can be expressed with the symbol 12 ÷ 4=3. This activity introduces students to the use of natural number-counting operations in a formal way. The fourth stage is the

abstraction stage. At this stage, students begin to generalize patterns in concrete experiences and symbols into abstract understanding, for example, students understand that division is the opposite of multiplication, for example, 12 ÷ 4=3 because 4 x 3=12. Students can conclude number patterns and arithmetic operations, namely (1) for the concept of multiplication "if each group has the same number of *damar*, then the total *damar* is the product of the number of groups and the number of *damar* in each group" and (2) for the concept of division "if the total *rosin* is known, then division can be used to determine the number of groups or the number of *damar* in each group."

After the implementation of four instructional meeting, a conceptual understanding test was administered to the 22 Grade 2 students who had participated in the entire instructional sequence. From the results of the concept understanding test, it is known that the average percentage of the initial test is 40.91% and the average percentage of the final test is 77.27%. Based on the success criteria of concept understanding according to the National Council of Teachers of Mathematics (NCTM), the value of 76-90% is in the high category because students have understood most of the concepts and are able to use them with few errors (Awaji et al., 2025). The final test results show that the utilization of the *Daret Damar Jan* game as a learning resource potential contributions the concept understanding of grade 2 students of ID elementary school on the material of counting operations of natural numbers.

This study showed an increase in students' concept understanding from 40.91% to 77.27% after using the *Daret Damar Jan* game in learning. These results are comparable to research by Almo et al. (2022), which found that number-based games can improve elementary school children's understanding of numerical concepts. However, that study focused on digital math games, namely seven spells, while this study shows that traditional games also have the same ential or even more effective in the local cultural context. This study supports Dienes' learning theory, which emphasizes the importance of the transition from concrete manipulation to symbolic representation. This finding is in line with the research of Kyeremeh et al. (2023), which is related to the enactive-iconic-symbolic theory of learning. However, this study is more specific in adapting the theory to traditional games as a tool for the transition of mathematical understanding. Different from previous studies that mostly use conventional or technology-based learning media, this study highlights the value of local culture as a source of learning mathematics. This contributes to the study of ethnomathematics, as also researched by Kurniawan et al. (2024) and Wiryanto et al. (2022) who emphasize that mathematics is part of culture and can be found in people's daily practices and can be integrated into mathematics learning in schools.

This study has several limitations. First, although the findings indicate potential contributions to the conceptual understanding of arithmetic operations on natural numbers among Grade 2 students at ID Elementary School, the study did not include a control group or comparisons with other instructional methods; therefore, the effectiveness of the *Daret Damar Jan* game-based approach cannot be comprehensively determined. Second, the data set in this study was relatively limited, both in terms of the number of participants and the research context, which involved only one school and one cultural community; consequently, the findings are not intended for broad generalization. Third, this study focused on the *Daret Damar Jan* game, which is culturally specific to the Aru context, and its application in other

cultural settings would require contextual adaptation and further investigation. Accordingly, future research is recommended to employ experimental designs with control groups and larger sample sizes, as well as to examine the application of this game in different cultural contexts. Future studies may also investigate the more systematic integration of *Daret Damar Jan* into the mathematics curriculum, including the development of instructional modules and teacher training based on traditional games.

4. CONCLUSION

In the *Daret Damar Jan* game, manipulative objects such as tiles can be used to represent numbers or the results of operations. The process of counting and grouping in the game can be explored to introduce mathematical symbols such as numbers and operators (e.g. + , - , x , ÷). *Daret Damar Jan* game involves explicit unit counting, either through grouping or breaking down the number of objects. The process of adding, taking away, or subtracting *damar* in the game reflects the concept of addition and subtraction operations. The concepts of multiplication and division can be explored through the grouping and even distribution of *damar*. The game involves counting strategies that require procedural understanding, such as calculating the initial amount, processing the operation, and uncovering the final result.

Daret Damar Jan game gives students direct experience in manipulating real objects. Students learn to recognize numbers, understand the concept of units, and perform practical arithmetic operations through play. *Daret Damar Jan* game supports the gradual transition from concrete manipulation to symbolic abstraction, in accordance with the principles of Dienes learning theory. The utilization of *Daret Damar Jan* game as a learning resource can help students learn through four stages, namely concrete manipulation, visual representation, symbolism, and abstraction. By utilizing the *Daret Damar Jan* game as a learning resource, the test results show an increase in students' understanding of concepts in the material of counting operations of natural numbers from 40.91% to 77.27% and are in the high category.

Compared to previous studies, this research provides a new perspective by emphasizing the integration of traditional games into mathematics learning in primary schools. The results show that the *Daret Damar Jan* game not only improves understanding of mathematical concepts, but also supports more contextualized culture-based learning. Thus, this research enriches the study of ethnomathematics and provides an innovative alternative in mathematics learning in primary schools. This research provides valuable insights into how the *Daret Damar Jan* game can be used as a tool for culture-based math learning. However, there are some limitations in methodology, generalizability and measuring long-term impact. Future research could deepen the exploration by using an experimental design, broaden the scope of mathematical concepts, as well as develop a more systematic implementation model in the educational curriculum.

Acknowledgments

The authors sincerely thanks the government of Dokabarat Village, local culture figures, the children of Dokabarat Village, the school principal, teachers, and students of SD Inpres Dokabarat for their invaluable contributions and support throughout this research.

Declarations

Author Contribution : SL: Data curation, Formal analysis, Investigation, Methodology, and Writing - original draft; CS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, Writing - original draft, and Writing - review & editing; INP: Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, and Writing - original draft; IMS: Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, and Writing - original draft.

Funding Statement : The author discloses no receipt of the following financial support for this article's research, authorship, and publication.

Conflict of Interest : The authors declare no conflict of interest.

Additional Information : Additional information is available for this paper.

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