ETHNOMATHEMATICS STUDY: THE TRADITIONAL GAME OF TIKAM BANA AS A MEDIUM FOR LEARNING MATHEMATICS

Siti Rahmawati¹, Hidayu Sulisti²

^{1, 2}Pontianak State Islamic Institute, Jl. Letjen Soeprapto No. 19, Pontianak, West Kalimantan, Indonesia Email: rhmasitiawa@gmail.com

Article History	Abstract. This study aims to identify the elements and concepts of mathematics contained in the game of tikam bana. In addition, the traditional game of tikam
Received: 07-02-2025	bana must also be introduced so as not to be left behind by the progress of the
Revision: 21-02-2025	times, where children have begun to be eroded by some modern technology. The method used was ethnography with the subject of five class VIII students at SMP
Accepted: 23-02-2025	Pondok Pesantren Assalam Kota Pontianak. The data collection techniques used were observation and documentation. This technique is to obtain information and
Published: 01-03-2025	data about the elements of mathematics contained in the tikam bana game performed by students. Data obtained or collected by researchers from various existing sources. Then the data obtained will be drawn conclusions through the data triangulation process. The results of the research were obtained in the form of questionnaires and assessments carried out while playing by giving test questions on each of the deepest numbers in the plot of tikam bana. The mathematical elements contained in the game of tikam bana are flat, namely square and trapezoid. The concept of mathematics in this game is the concept of integers known at the time of assessment and giving test questions, while the concept of chance is known when doing hompimpa to determine the order of players.
	Keywords: Ethnomathematics, Learning Media, Tikam Bana
	<i>Abstrak.</i> Penelitian ini bertujuan untuk mengidentifikasi unsur dan konsep matematika yang terkandung dalam permainan tikam bana. Selain itu, permainan tradisional tikam bana juga harus diperkenalkan agar tidak ditinggal oleh kemajuan zaman, dimana anak-anak sudah mulai tergerus oleh beberapa teknologi modern. Metode yang digunakan adalah etnografi dengan subjek lima siswa kelas VIII di SMP Pondok Pesantren Assalam Kota Pontianak. Teknik pengumpukan data yang digunakan adalah observasi dan dokumentasi. Teknik ini untuk mendapatkan informasi dan data-data tentang unsur unsur matematika yang terkandung dalam permainan tikam bana yang dilakukan oleh peserta didik.

ini untuk mendapatkan informasi dan data-data tentang unsur unsur matematika yang terkandung dalam permainan tikam bana yang dilakukan oleh peserta didik. Data yang diperoleh atau dikumpulkan peneliti dari berbagai sumber yang telah ada. Kemudian data yang diperoleh akan ditarik kesimpulannya melalui proses triangulasi data. Hasil penelitian diperoleh berupa angket dan penilaian yang dilakukan sambil bermain dengan memberikan soal tes pada setiap bilangan terdalam pada alur tikam bana. Unsur matematika yang terdapat dalam permainan tikam bana berbentuk datar yaitu persegi dan trapesium. Konsep matematika dalam permainan ini adalah konsep bilangan bulat yang diketahui pada saat penilaian dan pemberian soal tes, sedangkan konsep peluang diketahui pada saat melakukan hompimpa untuk menentukan urutan pemain.

Kata Kunci: Etnomatematika, Media Pembelajaran, Tikam Bana

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INTRODUCTION

Mathematics is a universal language that is the basis for various aspects of human life and knowledge (Zulmaulida & Saputra, 2024). Mathematics is a systematic thought process by linking the relationship of concepts or media which of course there are mathematical elements, or in mathematical terms called relations. In line with what is expressed by Sadewo et al., (2022) mathematics is a science that has a wealth of ideas by not only proving a theorem, but focusing on finding new concepts. In connection with the explanation of the definition, it can be concluded that mathematics cannot be defined with certainty, because mathematics itself works according to the results obtained in the form of assumptions and observations made by previous researchers. The concepts developed to date are also comprehensive, therefore the characteristics of mathematics give birth to many theorems as a form of mathematical explanation itself.

Mathematics develops for itself as a science, so that anyone who studies mathematics also has the ability to understand the theory presented. In line with the Regulation of the Minister of Education of the Republic of Indonesia No. 22 of 2006 (Depdiknas, 2006) which states that mathematics education aims to enable students to master mathematical concepts, explain the relationship between theorems and apply algorithms flexibly, accurately, efficiently, and precisely, in solving problems. In mathematics learning, there are various ways to improve mathematical knowledge, one of which combines cultural wisdom and mathematics learning through ethnomathematics studies. According to Qadry et al., (2021) ethnomathematics is a strategy that includes curricular relationships by forming knowledge about students' interests, needs and culture. According to Bartton in Putra & Prasetyo (2022), the purpose of ethnomathematics is to study how students are able to understand, process, describe mathematical ideas, concepts and practices to find solutions to problems related to everyday life. To apply algorithms accurately and efficiently to solve mathematical problems, mathematical ideas in the form of ethnomathematics learning are needed, one of which is an idea that combines mathematics learning with surrounding culture. The variety of cultures owned by the Indonesian state can help educators teach math more enjoyably. In line with Andriono (2021) who concluded that ethnomathematics-based mathematics learning becomes fun and contextual learning. However, in this industrial era 4.0, modern technology is starting to appear.

According to the survey results of the Indonesian Internet Service Users Association (APJII), there are more than 221 million internet users or 79.5% of the total population in Indonesia. And as much as 65.34% of internet usage per individual in Indonesia is at the age

of 9-19 years, usually children use the internet to access social media, YouTube and online games (Kominfo, 2024). The negative impact on Indonesian children is the misuse of the internet and lax parental supervision. As we can see around our daily lives, the popularity of online games and other social media applications has made children addicted to school, study and do simple things in daily life. Ginting (2020) mentioned that Indonesian children prefer to play online games rather than traditional toys such as playing marbles, gangsingan, and so on. The community, especially in the world of education, which is the heir of the future, is expected to bear concern for regional culture which is starting to fade by the emergence of foreign cultures (Fitri, 2024). This is a challenge for teachers to orient local wisdom in the learning process so that the wisdom values of the local culture of the community are not eroded.

Learning is described as the implementation of the curriculum of an educational institution that affects students to achieve educational goals. In his book, Nurfadhillah (2021) reveals that media in learning is defined as graphic, photographic or electronic tools for recording and reorganizing visual or verbal information. The media functions to make learning more fun, such as linking traditional games with elements contained in mathematics material. According to Syakira & Sulisti (2023) games are traditional culture, and in traditional games there are links to mathematical elements. One of the traditional games known in Melawi district, West Kalimantan is the Tikam Bana game. The Tikam Bana game has been around since the time of our ancestors, which aims to train cohesiveness, accuracy, and thoroughness. Tikam Bana means throwing darts, except that technically, the darts are replaced with rubber bands. This game provides rubber bands and square lines containing numbers called tikam bana plots. The game is played by at least 2 children aged 7-11 years. This game is similar to the bracelet throwing game, except that the target of the throw is the tikam bana plot. In this traditional game of tikam bana, there are many mathematical values. The object used in this game is a rubber band. The rubber band is thrown to the ground that has been formed a square picture, and in the square picture there are other flat shapes.

Based on the above explanation, ethnomathematics in the realm of traditional games can be used as a meaningful learning reference for students. Therefore, researchers are interested in identifying what mathematical elements and concepts are contained in the game tikam bana. It is hoped that this can be an idea in the development of relevant and contextualized mathematics learning materials, preservation and promotion of local cultural heritage, and open the insight that mathematics exists in every aspect of life.

METHOD

The research method used is a qualitative method with an ethnographic approach. This is in line with the research objectives in describing the relationship between the traditional game of tikam bana as a medium for learning mathematics. The data needed in applying the tikam bana game was obtained by making observations. Observation is in the form of direct observation of the object, namely children aged 10-15 years, where at that grade level integers and flat shapes have been taught. Then documentation is done by taking pictures as a result of the practice of students in conducting learning using learning media from playing tikam bana. This technique is to obtain information and data about the elements of mathematics contained in the game of tikam bana conducted by students. Data obtained or collected by researchers from various existing sources. Then the data obtained will be drawn conclusions through the data triangulation process.

RESULTS

Forms of Tikam Bana Plots

The shapes of Tikam Bana plots include:

Square Shape

The square shape is the main plot shape in the tikam bana game which consists of 5 plots.

Trapezoidal Shape

The trapezoidal shape is a part that is formed as many as 4 plots and is contained in a square plot. Each trapezoidal plot is given a number 1-4, where the bottom plot is given the number 1, the right trapezoidal plot is given the number 2, the left trapezoidal plot is given the number 3, and the top plot is given the number 4.

- Small Square Shape
- The small square shape is a small patch that lies in the center and connects four trapezoidal patches. It is the most difficult range due to its small shape. The small square is assigned the number 5, so it is crowned the highest number by the players.

Rules for Playing the Bana Stabbing Game

The rules for playing the game of tikam bana are as follows:

• The subjects required to play tikam bana are 5-7 people.

- Before the game starts, players draw the stab bana game field first. Then make a starting line 2 meters away from the bana stab field. Each player is required to prepare 5 rubber bands.
- Players hompimpa to determine the order of players.
- Players only have the opportunity to throw the rubber band 5 times.
- If the first player throws the rubber band into the plot and does not hit the line, it is declared successful and given a question according to the number in the plot.
- If you can answer the question given, then the player gets a score according to the number in the plot that was thrown, and if you cannot answer the question, then the player gets a score of 0.
- If the player throws the rubber band over the line or out of the stab bana game field, the player is scored -1.
- The player who has the most throwing scores is the winner.

Mathematical Elements Found in Tikam Bana Game

According to the results of the research, it can be seen that the traditional game of tikam bana has elements of mathematics. This research focused on several objects including integers, square shapes, and trapezoidal shapes.

Geometric elements

Based on the results of the study, the tikam bana game has mathematical elements that include flat shapes and congruence. Flat shapes consist of square and trapezoidal arrangements. The illustration of flat shapes can be seen in figure 1.1



Figure 1. Bana stabbing plots

The tikam bana plot has elements of flat shapes, namely a square and an isosceles trapezoid. The square can be seen in plot number 5 and the isosceles trapezoid can be seen in plots number 1, 2, 3 and 4. In addition, tikam bana plots also have an element of congruence which can be seen from trapezoid plots number 1, 2, 3 and 4, because the trapezoid plots have the same shape and size.

Elements of Integers

In the rules of the game tikam bana, each plot has numbers 1 to 5. In the game a scoring system applies which aims to determine the winner of the game. If the player successfully

throws the rubber band on target and successfully answers the questions given, then the player gets a score according to the target number. If the player throws the rubber band on target, but cannot answer the question correctly, the player gets a score of 0. Meanwhile, if the player throws out of the plot or on the plot line, a score of -1 will be given. The score calculation involves zero, positive and negative numbers, which are included in the integer element.

The element of chance

There is a concept of chance in this tikam bana player. It can be seen in the hompimpa activity. If there are five players with the order of the first, second, third, fourth and fifth players, then there is an element of chance in determining the order of the players.



Figure 2. Hompimpa

For example, players 1,2,3,4 and 5 are playing tikam bana, then they hompimpa to determine the playing order pattern. By using the permutation formula, the number of ways to determine the order of play can be known, namely

$$P_5^5 = \frac{5!}{(5-5)!} = \frac{5!}{0} = 5! = 120$$

So, there are 120 ways to determine the playing order of the five children.

Application of Tikam Bana Game Generation 4.0

Referring to the results of the ethnomathematics study, the tikam bana game can be applied to generation 4.0 as a learning medium in schools, namely modification of the tikam bana game in the form of patterns and game techniques, where all plots use flat shapes, but each plot is filled with questions that have been adjusted to the points obtained. For example, if a player throws a rubber band falling on a trapezoidal plot with the number 1, then the problem solved is related to the calculation of whole numbers. If the player throws the rubber band until it hits the boundary line or goes out of the plot, then the player gets a score of -1 and only has the opportunity to play according to the terms of the game.

The rules in the learning media using the game tikam bana are as follows:

• The researcher explained the form and rules of the tikam bana game, and prepared test questions related to whole numbers and flat shapes on the tikam bana plots.





Figure 4. Giving test questions

Figure 3. Explaining the rules of the game

In the game of tikam bana, each player is required to prepare a rubber band.



Figure 5. Students prepare rubber bands

Players hompimpa to determine the order of play.



Figure 6. Students performing hompimpa

• The player who gets the first turn starts throwing the rubber band, and is given five chances for each player.



Figure 7. The first student throws

• Then the student gets a test question according to the number obtained when throwing to the bana stab plot.



Figure 8. Students earning number 2

- If the student can do the test question, it will be given a score according to the number obtained, if it fails, it will be given a score of 0.
- Students throwing on the line and out of the stab bana plot, then given a score of -1.



Figure 9. Students throwing on the line

• Assessment is done using a scoreboard.



Figure 10. Scoreboard

 The researcher invited students to count together and explained that the assessment was included in the integer material. Furthermore, the student who gets the most points is the winner.



Figure 11. calculating the score earned

Figure 12. Score

Based on this research, scores were obtained from the five students who played. The highest score is 4 while the lowest score is 0. In addition, the responses after playing obtained from students include:

- 100% of students stated that after trying the tikam bana game, there is a sense of excitement and enthusiasm in learning math.
- 100% of the students stated that they can recognize the trapezoidal flat shapes contained in the tikam bana game.
- 100% of students stated that they can answer when given math problems in the tikam bana game.
- 100% of students stated that the area and perimeter formulas are not something to be dreaded in math.
- 80% of students stated that the area and perimeter formula of a trapezoid is not something to be feared in math lessons while 20% stated that it is not.
- 100% of the students stated that this game gives them an insight into traditional games in West Kalimantan.
- 100% of students stated that this game supports knowledge of mathematical elements found in traditional culture.
- 100% of students stated that traditional culture plays a very important role if applied in learning math.
- 100% of students stated that the whole number material contained in the tikam bana game can be understood.
- 100% of the students stated that the flat building and whole number materials in this game are made simply and easy to understand.

DISCUSSION

The traditional game "tikam bana", with the provision of tests or challenges when it is the child's turn to throw the rubber band, is not only entertainment, but also has an important role in developing communication skills and understanding of mathematical concepts in students.

Heryan (2018) in his research empirically found that students who participated in ethnomathematics-based learning, where traditional games such as "tikam bana" were integrated in the learning process, showed significantly better mathematical communication skills compared to students who participated in conventional learning. This finding underscores that the ethnomathematics approach can improve students' ability to effectively communicate mathematical ideas.

In addition, ethnomathematics innovation, as revealed by Nurazizah (2023), is proven to increase students' understanding and interest in mathematics. The integration of Indonesian culture in mathematics learning, through the traditional game "tikam bana", creates a relevant and fun learning experience, thus motivating students to be more involved in the learning process. This is also part of the effort to preserve Indonesian culture in the midst of rapid technological development.

Furthermore, the preservation of the traditional game "tikam bana" as a unique and fun learning medium has added value because this game is very close to the real life of students. In line with research conducted by Patih et al., (2022), traditional games that are known and have been played by students create conditions for learning mathematics that are fun and easier to understand. Thus, "tikam bana" is not only a means of recreation, but also a bridge that connects abstract math concepts with students' concrete experiences, so that learning becomes more meaningful and relevant.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that there are elements of mathematics in the traditional game of tikam bana. Mathematics in tikam bana plots appears in the shape, size, and number of plots that contain elements of flat shapes, integers and opportunities. The element of flat shapes is found in the tikam bana plots which consist of square and trapezoidal shapes. Then the element of integers is known at the time of scoring and giving test questions, while the element of chance is found when doing hompimpa to determine the order of players playing the game.

Some of these elements encourage students' knowledge of mathematical skills, so by integrating mathematical elements into the game, students can learn in a more interactive and fun way. In addition, reintroducing these traditional games to the younger generation is an important step to preserve local culture amidst the onslaught of modern technology. Therefore,

it is recommended that teachers and educators can utilize traditional games such as tikam bana as a tool in the learning process.

RECOMMENDATIONS

Tikam Bana game can be integrated in the mathematics curriculum as one of the interesting and relevant learning media. Teachers can design learning activities that utilize this game to achieve specific learning objectives. Also, teachers can develop different variations of the Tikam Bana game to suit the math concepts being taught and the students' ability levels.

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REFERENCES

- Andriono, R. (2021). Analisis Peran Etnomatematika dalam Pembelajaran Matematika. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, 4(2). https://doi.org/10.24176/anargya.v4i2.6370
- Depdiknas. (2006). Permendiknas Nomor 22 Tentang Standar Isi untuk Satuan Pendidikan Dasar dan Menengah. 1–43.
- Fitri, I., & Sulisti, H. (2024). Eksplorasi Etnomatematika dalam Kebudayaan Tujuh Likoran di Kabupaten Sambas. *Math Educa: Jurnal Matematika dan Pendidikan Matematika*, 8(1), 1–12.
- Ginting, B., & Mahara, S. (2020). Peran Guru dalam Menerapkan Nilai-Nilai Kearifan Lokal di Era Revolusi Industri 4 . 0 pada Peserta Didik. *Universitas Negri Medan*, 6.
- Heryan, U. (2018). Meningkatkan Kemampuan Komunikasi Matematis Siswa SMA Melalui Pendekatan Pembelajaran Matematika Realistik Berbasis Etnomatematika. *Jurnal Pendidikan Matematika Raflesia*, 3(2), 94–106.
- Kominfo. (2024). Pengguna Internet Meningkat, Kominfo Galang Kolaborasi Tingkatkan Kualitas Layanan. Diakses pada tanggal 2 Juni 2024 dari Https://Www.Kominfo.Go.Id/
- Nurazizah, K. (2023). Etnomatematika: Meningkatkan Minat dan Pemahaman Matematika Melalui Media Permainan Congklak. *Jurnal Ilmiah Pendidikan Matematika Al Qalasadi*, 7(2), 138–147. https://doi.org/10.32505/qalasadi.v7i2.6793
- Nurfadhillah. (2021). In Mu'in, Langkah Tepat Meningkatkan Hasil Belajar Siswa Menggunakan Video Pembelajaran (P. 6). NTB: Pusat Pengembangan Pendidikan dan Penelitian Indonesia.
- Patih, T., Halistin, H., Saputri, R. O., & Azia, A. (2022). Implikasi Pengalaman Etnomatematika dan Gender terhadap Pemahaman Konsep Bilangan Siswa. *Jurnal Tadris Matematika*, 5(2), 223–240. https://doi.org/10.21274/jtm.2022.5.2.223-240
- Putra, A. P., & Prasetyo, D. (2022). Peran Etnomatematika dalam Konsep Dasar Pembelajaran Matematika. *Intersections*, 7(2), 1–9.

- Qadry, I. K., Asyari, S., Ismiyati, N., & Patimbangi, A. (2021). Karakteristik Kultural dan Filosofi Matematika. *Jurnal Matematika dan Aplikasinya (IJMA)*, 2(1), 62–71.
- Sadewo, et al., (2022). Filsafat Matematika: Kedudukan, Peran, dan Persepektif Permasalahan dalam Pembelajaran Matematika. *Jurnal.Balitbangda.Lampungprov.Go.Id*/, 16.
- Syakira, V., & Sulisti, H. (2023). Etnomatematika: Pengenalan Teori Peluang. Al-'Adad: Jurnal Tadris Matematika, 2(2), 71–79.
- Zulmaulida, R., & Saputra, E. (2024). Ontologi Matematika. *JUMPER: Journal of Educational Multidisciplinary Research*, 3(1), 62–73. https://doi.org/10.56921/jumper.v3i1.179